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DESERTIFICATION AND THE INTERNATIONAL POLICY IMPERATIVE

Edited by Caroline King, Harriet Bigas and Zafar Adeel

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Desertification and the International Policy Imperative

La Lutte Contre La Désertification et L'Impératif International de Politiques de Soutien

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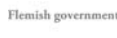
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Min. of Land Planning &
Environment, Algeria



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Opening Remarks

Son Excellence Monsieur Abdelaziz Bouteflika

Président de la République de l'Algérie

Messieurs les Sous-Secrétaires Généraux des Nations Unies,

Monsieur l'Administrateur du Programme des Nations Unies pour le Développement/PNUD,

Monsieur le Directeur Exécutif du Programme des Nations Unies pour l'Environnement/PNUÉ,

Monsieur le Secrétaire Exécutif de la Convention des Nations Unies sur la Lutte contre la Désertification dans les pays les plus gravement touchés par la sécheresse et/ou la désertification, en particulier en Afrique/UNCCD,

Monsieur le Secrétaire Exécutif de la Convention des Nations Unies sur la Diversité Biologique/UNCBD,

Madame la Présidente et Directrice Générale du Fonds pour l'Environnement Mondial/FEM,

Messieurs les Ministres,

Honorable Assemblée, chers Invités,

Je désire, en premier lieu, exprimer nos remerciements à toutes celles et tous ceux qui nous ont fait l'amitié de répondre favorablement à l'invitation, que nous leur avons conjointement adressée avec l'Université des Nations Unies.

Je voudrais également adresser nos remerciements à Monsieur le Secrétaire Général des Nations Unies et à travers lui, particulièrement Monsieur le Recteur de l'Université des Nations Unies, d'avoir choisi mon pays, pour abriter cette Conférence Internationale, sous le thème pertinent de : « La Lutte contre la Désertification et l'Impératif International de Politiques de Soutien », qui viendra ainsi couronner, en Algérie, en terre africaine, le programme général de célébration de l'Année Internationale des Déserts et de la Désertification 2006.

Je suis tout particulièrement honoré d'être présent, aujourd'hui, parmi vous, à l'ouverture de cet important événement dans l'agenda environnemental onusien.

Une conférence très opportune et revêtant une importance évidente, en raison de la qualité et de la diversité des participants, (acteurs et partenaires politiques et décideurs internationaux et gouvernementaux, communautés scientifiques et société civile), impliqués dans cette problématique, d'une part, et de ses objectifs stratégiques, qui contribueront à l'évaluation objective des efforts consentis pour la lutte contre la désertification, dans ses dimensions politiques, économiques, scientifiques, sociales et culturelles et à l'identification d'orientations stratégiques indispensables, en capitalisant les résultats des initiatives majeures de l'Année Internationale 2006, d'autre part.

Une Année très singulière pour mon pays, qui a vu la concrétisation de ses engagements permanents et de ses efforts soutenus, en faveur de la mobilisation indispensable du système onusien, des partenaires internationaux pour le développement et de la communauté internationale, dans toutes ses composantes et avec tous ces moyens, en faveur de la lutte contre la désertification, devenir une

réalité avec l'adoption par l'Assemblée Générale des Nations Unies, de la Résolution 58/211, pour laquelle l'Année 2006 a été proclamée Année Internationale des Déserts et de la Désertification.

Une Année emblématique, durant laquelle l'Algérie a été doublement honorée par l'Organisation des Nations Unies, à travers sa nomination en qualité de Porte Parole Honoraire pour l'Année Internationale 2006 et le choix d'Alger et de Ghardaia pour la célébration de la Journée Mondiale de l'Environnement, en Juin 2006, sous le slogan pertinent : « Ne désertez pas les zones arides ».

L'Algérie perçoit, à travers cette double distinction, à laquelle vient s'ajouter ce choix comme pays hôte pour l'important événement international qui nous réunit aujourd'hui, une reconnaissance internationale de ses efforts résolus en faveur de la protection de l'environnement et le développement durable.

La mise en œuvre d'un partenariat international, novateur et responsable, fondé sur les principes de solidarité, d'équité et de responsabilité commune mais différenciée, constitue de ce point de vue une préoccupation permanente de l'Algérie.

Notre pays a été confronté dès son indépendance, dont nous venons de fêter le 44^e anniversaire, à une situation inquiétante de dégradation des sols, induits par la déforestation à grande échelle par les forces militaires coloniales, l'érosion et la désertification de surfaces importantes à haut potentiel agricole, résultant d'une politique économique coloniale orientée vers l'exploitation inconsidérée et irrationnelle des richesses nationales pour la satisfaction exclusive des marchés d'outre-mer.

Aspirant à un développement réel, global et durable, au profit de toutes les couches sociales, l'Algérie, nouvellement indépendante, s'est attelée, dès les années 60 et 70, à mettre en œuvre une politique volontariste pour juguler les effets dévastateurs de la dégradation des terres et les menaces de l'avancée rampante du désert, avec notamment les premiers chantiers populaires et surtout le projet de grande nevergure qui est « le Barrage Vert », concernant une superficie de 3 millions d'hectares.

Cependant, la désertification constitue encore et toujours, une préoccupation nationale majeure et prioritaire.

L'état algérien, après avoir joué un rôle déterminant dans son élaboration et son endossement au niveau international, a adopté en 1994 et ratifié en 1995 la Convention des Nations Unies sur la Lutte contre la Désertification/UNCCD, et consenti de lourds investissements, selon une approche privilégiant le développement intégré et durable, et le respect des équilibres écosystémiques.

Je voudrais citer à cet égard, le Programme National de Développement Agricole/PNDA, lancé en 2000, étendu à sa dimension agricole et socio-économique en milieu rural, en 2002, Développement Rural/PPDR, mis en œuvre dans le cadre des programmes de soutien à la croissance économique et des programmes spécifiques au développement des régions du sud et des hauts plateaux.

L'Algérie dispose également, depuis 2003, de son Plan d'Action National pour la Lutte contre la Désertification, qui a bénéficié du précieux concours du Fonds pour l'Environnement Mondial/FEM, et autres agences d'exécution des Nations Unies, au titre de la mise en œuvre de la Convention des Nations Unies/UNCCD, et dont la mise en œuvre se fera en parfaite cohérence avec la politique nationale d'aménagement du territoire et des politiques nationales de développement économique et social.

L'Algérie se réjouit d'accueillir durant cette Année, cet autre événement marquant de l'agenda environnemental mondial, sur le continent africain réputé formé en grande partie de terres arides et désertiques, continent le plus gravement affecté par les impacts destructeurs de la dégradation alarmante des terres nourricières.

Il est utile de se rappeler que ces terres arides sont le berceau d'une grande partie de la richesse biologique et du patrimoine culturel et civilisationnel de l'humanité.

Notons surtout, dans la continuité du bilan du millénaire, entrepris par 1 300 scientifiques, que les dégâts et modifications spectaculaires, irréversibles parfois et dramatiques le plus souvent, que l'environnement terrestre a subi inlassablement durant ces dernières 50 années, sont aujourd'hui clairement établis, et interpellent la communauté internationale.

Ainsi, les zones arides représentent 41% de la surface du globe, dont 20% sont dégradés, et concernent une population de 2 milliards, dont 50% vivent dans un dénuement aggravé et insupportable.

La désertification affecte 1/3 de la surface de notre planète, soit plus que la surface de la Chine, du Canada et du Brésil réunis, et plus d'un milliard de personnes.

Elle génère des tensions sociales, économiques et politiques très lourdes, en raison de la pauvreté, de la famine, de l'insécurité alimentaire et des flux migratoires de « réfugiés environnementaux », à la recherche de terres plus clémentes, et de nouveaux moyens de vie ou de subsistance.

Selon certaines estimations très crédibles, le coût économique de la perte de production agricole est de l'ordre de 40 à 50 milliards de dollars américains/an, et la pression démographique à l'origine de 60 à 80% de la déforestation dans le monde !

Le Sommet du Millénaire de 2005, a avec sagesse et pertinence, proclamé « les terres arides comme facteur essentiel pour la concrétisation de développement durable et Objectifs de Développement du Millénaire/ODM ».

Aussi, les incidences multiples produites par ces fléaux dramatiques du sous-développement ne pourraient être appréhendées dans le seul cadre étroit des contextes et espaces nationaux et régionaux, car ils dépassent les frontières politiques et naturelles des états et des groupements régionaux. Ceci a été à just titre souvent souligné par le Secrétaire Général des Nations Unies, Monsieur Kofi Annan.

C'est aussi le cadre de rappeler, à cet instant précis et à cette occasion précise, que les résultats les plus dramatiques sont enregistrés, malheureusement, dans notre continent africain, qui demeure, en dépit de ses richesses formidables et ses potentialités naturelles et humaines, peu ou mal exploitées, le continent le moins développé.

Ceci ne doit pas être considéré comme une fatalité ou une malédiction, mais le résultat de faits historiques douloureux et d'expériences de développement et de gouvernance post-indépendance inabouties.

Et de ce point de vue, le NEPAD, initiative africaine, unique et novatrice, dont l'Algérie s'enorgueillit d'être l'un des premiers initiateurs et fervents défenseurs, constitue, sans nul doute, une réponse résolue, rationnelle et responsable aux défis majeurs qui se posent, aujourd'hui, à l'Afrique et plus particulièrement dans sa quête déterminée pour la lutte contre la désertification, la préservation et le développement

intégré et durable des régions arides, semi-arides, sub-humides, montagneuses et forestières.

Cependant, cette initiative ambitieuse et responsable ne pourrait se développer et atteindre ses objectifs fondamentaux pour mettre fin aux effets tragiques du sous-développement, de la mauvaise gouvernance et du déracinement humain, qui représentent également des Objectifs essentiels du Millénium/ODM, qu'avec la mobilisation réelle et la solidarité sincère de la communauté internationale et des pays les plus riches, qui sont le plus souvent, historiquement, à l'origine de l'état préoccupant de l'Afrique et autres pays en développement, d'une part, et les plus grands pollueurs de la planète.

Il est, aujourd'hui, admis et reconnu que la réalisation des Objectifs de Développement du Millénium dépendra, sans nul doute, de la nature, de l'importance et de la fiabilité des mesures que prendra la communauté internationale, en matière de protection des sols contre l'érosion et la salinisation, la protection des ressources hydriques contre la pollution et la mauvaise gestion, la déforestation, le surpâturage et la surexploitation des terres en milieu steppique et montagneux.

Nous reconnaissons tous que la lutte contre la désertification constitue, aujourd'hui, à l'échelle mondiale, un défi environnemental et politique majeur, affectant le bien-être social et le développement humain, partout dans le monde, directement ou indirectement, par l'insécurité sociale et politique, le développement de la pauvreté et la pression croissante des réfugiés environnementaux.

Il nous faudra veiller et encourager les politiques de mise en œuvre de modes de vie et de développement alternatifs, mieux adaptés aux spécificités des régions éprouvées, faisant appel à leurs potentialités intrinsèques (énergie solaire, agriculture saharienne, tourisme et artisanat...) et offrant des emplois durables et valorisants. Toutefois, la lutte contre la désertification ne peut, en aucune manière, être appréhendée, en faisant abstraction des conséquences effrayantes des changements climatiques qui menacent, plus que jamais, la vie des terres arides, voire l'existence même de certaines parties du monde.

Plus d'un milliard de personnes sont de nos jours recensées comme victimes de la sécheresse et de la désertification, ainsi que 30% des terres irriguées, 47% des terres agricoles non-irriguées, et 73% des zones des parcs, et pour lesquels l'adaptation aux changements climatiques se pose en terme de question de survie !

Est-ce inutile de rappeler, enfin, que la diversité biologique des terres arides assure l'alimentation, l'abri et la subsistance d'un nombre important de personnes et contribue de ce fait à préserver près de 45% des terres cultivées dans le monde ? Et qu'un quart des médicaments à base de plantes, aux E-U, proviendrait des plantes des terres arides ?!

En vertu de toutes ces raisons, il devient impérieux de pouvoir asseoir une mise en œuvre diligente, résolue et synergétique des programmes de travail complémentaires des trois Conventions des Nations Unies issues du Sommet de la Terre de Rio, en l'occurrence :

- la Convention des Nations Unies sur la Lutte contre la Désertification dans les pays les plus gravement touchés par la sécheresse et/ou la Désertification, en particulier en Afrique ;
- la Convention des Nations Unies sur la Diversité Biologique ; et
- la Convention Cadre des Nations Unies sur les Changements Climatiques, ainsi que le Protocole de Kyoto.

Ceci devrait permettre de répondre effectivement et efficacement à l'appel récurrent, mais peu entendu, des pays et personnes cruellement affectés dans leur vie quotidienne et le peu d'espoir dans leur avenir immédiat et lointain, afin de faire bénéficier la Convention sur la Lutte contre la Désertification du même intérêt et des mêmes moyens de mise en œuvre, au niveau des pays, que les autres conventions environnementales internationales !

Nous sommes profondément convaincus que c'est là la voie la plus indiquée pour relever les défis et atténuer les risques alarmants de famine, de maladie, et de détresse humaine induits par la désertification dans les zones et régions sévèrement frappées par ce fléau mondial.

A la faveur de cette emblématique Année 2006, Année Internationale des Déserts et de la Désertification, et de cette Conférence Internationale sur la Désertification et l'Impératif International de Politiques de Soutien, la communauté internationale, les bailleurs de fonds et la communauté des scientifiques et de la société civile, sont interpellés pour réfléchir sur un partenariat durable, novateur, et responsable pour assumer le devoir d'agir avec diligence, courage, conviction et sens élevé de la solidarité internationale collective, et de la responsabilité commune mais différenciée.

Telle est la réponse attendue et espérée au cri de désespoir et aux aspirations et espérances légitimes des nations et des peuples qui endurent tragiquement les affaires d'une détresse quotidienne et d'un avenir des plus incertains.

Nous saisissons l'heureuse opportunité de cette Conférence Internationale et de l'Année Internationale des Déserts et de la Désertification 2006, pour réitérer notre appel pour l'adoption d'une Charte Mondiale des Déserts et de la Lutte contre la Désertification.

Nous contribuerons ainsi, concrètement, à la réalisation des nobles objectifs de l'Année Internationale 2006, d'une part, et des Objectifs fondamentaux du Millénium, renouvelés et renforcés par les chefs d'états et de gouvernements à l'occasion du Sommet du Millénaire, en septembre 2005, à New York.

Nous avons la forte conviction qu'il est de notre devoir d'unifier et consolider toutes nos volontés, tous nos efforts et tous nos moyens au service d'un avenir nécessairement commun et d'une conviction commune pour redonner un espoir réel aux générations actuelles et futures dans la satisfaction effective et proche de leur droit légitime à vivre dans un monde et dans une planète protégés et sûrs, débarrassés des facteurs et conditions de crises à l'échelon national, et à l'échelle internationale.

Nos efforts devraient se conjuguer et s'orienter en direction du renforcement et de la pérennité d'une lutte commune pour le développement des droits humains, pour un environnement sain, une vie digne et décente, un développement harmonieux, réel, durable et global pour l'épanouissement de tous les enfants et tous les peuples du monde.

Que cette rencontre soit pour tous une nouvelle opportunité pour être des messagers de la paix, de la sécurité et de la concorde mondiales ! Des messagers porteurs d'espérance et d'espoirs pour l'avenir de nos enfants et de notre planète.

Prof. J.A. van Ginkel

Rector UNU, and UN Under Secretary General

Your Excellency, President Bouteflika

Your Excellency, Cherif Rahmani, Minister of Land Planning & Environment

Excellencies, Distinguished Conference Participants, Ladies and Gentlemen,

Good morning. Please allow me to add my warmest welcome to all of you to this Joint International Conference. It is a pleasure to be back here in Algiers, and I am greatly obliged for the wonderful support and hospitality shown by our Algerian hosts.

As we celebrate the closing of 2006 as the International Year of Deserts and Desertification, quite appropriately, the main focus of this conference is on desertification. It is an issue that is of particular interest to UNU as an organization, and to me personally.

Over the past few years, it has been increasingly obvious that desertification is one of the most threatening global environmental challenges. More importantly, our inability to address it adequately threatens to reverse the gains in sustainable development we have seen emerge in many parts of the world. It is a process that can inherently destabilize societies by deepening poverty and creating environmental refugees who can often add stress to areas that may not yet be degraded. Impacts of desertification are exacerbated by political marginalization of the dryland poor, and the slow growth of health and education infrastructure.

We also have mounting evidence that desertification leads to strong adverse impacts on non-drylands. The most common and visible are dust storms, typically originating in Sahara and Gobi deserts and affecting the entire Northern hemisphere. In addition to dust storms, desertification is directly linked to downstream flooding, impairment of global carbon sequestration capacity, and regional and global climate change. These impacts on the natural environment are also linked to societal impacts. For example, some experts estimate that the number of people at risk of displacement due to severe desertification will exceed 50 million over the next ten years. Indeed, such migration of people is top-level political issue in many countries like the United States, France, Spain and Italy.

It is also becoming increasingly obvious that our failure as a global community to address this problem in part relates to our inability to formulate effective and successful policies. While the magnitude of desertification has grown by the day, we see a dwindling interest in addressing it as a full-blown global challenge. Policies, whether implemented at the national or the international level, are failing to account for this slow, creeping problem when addressing poverty and economic development at large. Some forces of globalization, while striving to reduce economic inequality and eliminate poverty are contributing to worsening desertification. Perverse agricultural subsidies are one such example.

UNU has a mission to bridge the divide between the research and policy-making communities, in order to address pressing global challenges like desertification. And this is indeed the challenge of today: How can we pull all the strands of this human, social and economic development together in a way that we arrive at success for the people most threatened by desertification.

Ladies and Gentlemen, while we know about and will hear about the doom-and-gloom scenarios during the next three days, this conference is about finding a way forward. We have at our disposal today immense human, technological, institutional and even financial resources to overcome this challenge. What we need is a coherent, cohesive and integrated policy approach.

To date, there have been very few examples of effective national efforts to combat desertification. This is because national governments are typically faced with the problem of insufficient resources to address the problem, and ineffective policy integration. This is often further exacerbated by poor implementation at the local level due to lack of capacity and societal motivation. During the conference we will hear of and learn from many efforts to integrate policies at both national and regional scales. We congratulate our presenters from different regions of the world on their contributions to this global debate. We must learn from these experiences in carving out a new policy direction.

One may argue that effective policies and sustainable agricultural practices can reverse the decline of drylands, and allow us to meet the Millennium Development Goals (MDG's) by 2015. Foremost among these are measures that protect soils from erosion, salinization and other forms of degradation. Proper land use management policies are needed to protect existing vegetative cover from overgrazing, over-exploitation, trampling and unsustainable irrigation practices.

These policies can be further strengthened by creating viable livelihood alternatives for dryland populations and directly linking them to national strategies to combat desertification and poverty reduction. In other words, the situation may also be improved by reducing the stresses on dryland ecosystems. This can be achieved either through the introduction of alternative livelihoods – like desert ecotourism – that have less of an impact on dryland resources, or by the creation of economic opportunities in urban centers and areas outside drylands. Such an approach to creating livelihoods would benefit from the unique advantages of drylands: year-round availability of solar energy, attractive landscapes, and large wilderness areas.

On the whole, combating desertification yields multiple benefits at local and global levels. Addressing desertification is a critical and essential part of adaptation to climate change and mitigation of global biodiversity losses. UNU has led the argument over the last decade that such interlinkages in policy formulations must be taken advantage of.

It is also important to note that formulation of international and global policies for combating desertification has been hindered by the lack of concrete data about rates and extent of desertification. We must, as the global international community interested in desertification, put monitoring and assessment at the top of our policy agenda. I invite you to join hands with us in developing a global desertification assessment.

On the whole, looking at the wealth of experience and resources gathered at this conference, I am sure that we can develop policy recommendations that will lead to mobilization of resources and building of capacity in developing countries.

In closing, I would like to express my gratitude to the many partners in this conference, who have strengthened this event and without whose support we would not be able to organize this conference. I am particularly grateful for the financial support provided by CIDA, GEF, FAO, ICARDA, UNESCO and the Flemish Government of Belgium.

I look forward to productive discussions over the next three days, and hope that we can converge on innovative and far-reaching recommendations during the panel discussion on the final day of the conference.

Thank you very much for your attention.

Monsieur Chérif Rahmani

Ministre de l'Aménagement du Territoire et de l'Environnement, Ambassadeur des Nations Unies, Porte Parole Honoraire de l'Année Internationale des Déserts et de la Désertification 2006, Président de la Fondation Déserts du Monde

Excellences, Honorable Assistance, Chers Invités,

Je voudrais, en premier lieu, exprimer mes plus sincères remerciements à toutes celles et à tous ceux qui nous ont fait l'honneur et l'amitié de répondre favorablement à notre invitation, adressée conjointement avec l'Université des Nations Unies.

Permettez-moi également d'exprimer mes plus vifs remerciements à l'Organisation des Nations Unies, et plus particulièrement à son Recteur, notre ami, le Docteur Hans van Ginkel, pour avoir eu l'obligeance de choisir mon pays, l'Algérie, et sa capitale, Alger, pour abriter cet événement marquant de l'agenda environnemental onusien pour la célébration de l'Année Internationale des Déserts et de la Désertification 2006, que représente notre Conférence Internationale conjointe, placée sous l'exergue pertinent, de la « Lutte contre la Désertification et l'Impératif International de Politiques de Soutien », sous-tendant un appel pressant envers la communauté internationale et les acteurs et partenaires pour le développement international et le développement durable.

Excellences, Honorable Assistance, Chers Amis,

Il se peut que vous vous souveniez qu'un certain temps s'est écoulé depuis que l'idée a germé et que l'initiative portée par l'Algérie, appuyée par beaucoup d'institutions internationales et régionales, soutenue par beaucoup de pays et de responsables amis, convaincus de l'impérieuse nécessité de mobiliser la communauté internationale et tous les partenaires du développement et de la coopération internationale, envers une réelle et vitale prise de conscience de l'avancée inexorable et préoccupante de ce fléau mondial que constituent aujourd'hui, la désertification, la déforestation, la sécheresse, d'une part, et d'autre part, du besoin d'assumer ce principe de responsabilité collective, de responsabilité commune, mais différenciée, pour faire face résolument, aux défis majeurs et déterminants et reconnaître ce besoin vital d'un intérêt accru et de moyens adaptés et conséquents pour la mise en œuvre réussie et différente de la Convention des Nations Unies pour la Lutte contre la Désertification dans les pays les plus gravement touchés par la sécheresse et/ou la désertification, en particulier en Afrique, qui se doit d'être considérée en rapport avec les défis et les enjeux qu'elle véhicule et qui ont présidé à sa naissance, et donc être hissée au même niveau d'intérêt et de préoccupation politique et stratégique qui entourent les Conventions issues du Sommet de la Terre de Rio, à savoir la Convention des Nations Unies sur les Changements Climatiques/UNFCCC et le Protocole de Kyoto, et la Convention des Nations Unies sur la Diversité Biologique/UNCBD.

Excellences, Auguste Assemblée,

Il me plaît de vous rappeler que durant cette Année 2006, année singulière et emblématique pour tous les pays affectés par les tragiques impacts de la désertification et de la sécheresse, en particulier du continent africain, et après l'année 2005, qui a été célébrée sous le slogan de « Villes Vertes », à San Francisco aux E-U, le Programme des Nations Unies pour l'Environnement/PNUE, a fait l'honneur à l'Algérie d'être le pays hôte de la Journée Mondiale de l'Environnement, sous le thème très actuel des déserts et de la désertification, et sous le slogan significatif « Don't Desert Drylands » « Ne désertez pas les zones arides ».

Je voudrais saisir l'occasion qui m'est offerte aujourd'hui, pour réitérer l'expression de nos vifs remerciements au PNUE d'avoir choisi mon pays pour cette lourde et noble responsabilité.

Le message adressé par le PNUE à l'occasion du 5 juin 2006, de l'ONU et l'UNU aujourd'hui, à travers le choix de l'Algérie, ne saurait être fortuit, car il concerne, certes, un pays confronté sérieusement aux problématiques qui feront l'objet de vos communications et de vos débats, mais aussi, et surtout, un pays représentant d'un continent, ce continent africain, dont plus de 75% de son territoire global est constitué de déserts et de zones arides et dont les richesses naturelles et nourricières, les écosystèmes et les richesses en biodiversité d'importance mondiale, subissent des pertes souvent irréremédiables et des blessure outrageuses et outrageantes.

Un continent dont le niveau de sous-développement et de pauvreté atteint des seuils alarmants, insoutenables et intolérables.

Excellences, Honorable Assistance, Chers Amis,

Les aspirations et les attentes légitimes suscitées par la résolution 58/211 de l'Assemblée Générale des Nations Unies, proclamant l'année 2006 Année Internationale des Déserts et de la Désertification, nous interpellent tous et nous placent face à de nouvelles et lourdes responsabilités.

L'Année 2006, dédiée aux Déserts et à la Lutte contre la Désertification, devrait offrir l'opportunité de fédérer les efforts et les moyens indispensables pour soutenir la mise en œuvre des Conventions Internationales pour l'Environnement et le Développement Durable, notamment la Convention des Nations Unies sur la Lutte contre la Désertification dans les pays les plus gravement touchés par la Sécheresse et/ou la Désertification, en particulier en Afrique/UNCCD, dans son double combat contre la désertification et la pauvreté, et la mise en place de cadre approprié à l'impulsion des programmes nationaux, sous-régionaux et internationaux.

A l'aube de cette Année 2006 et à l'orée de l'année 2007, il est indispensable de procéder à l'évaluation des efforts multiples et diversifiés entrepris pour concrétiser les objectifs de l'Année Internationale, dans leurs dimensions politique, scientifique, économique, sociale et culturelle.

Cette Conférence Internationale décidée et organisée conjointement avec nos partenaires de l'Université des Nations Unies, avec le soutien et l'assistance d'autres partenaires engagés (GEF, PNUD, ACDI OSS, PNUE, BIRD...) devrait capitaliser les résultats des initiatives marquantes de l'Année et proposer les orientations stratégiques appropriées en faveur des populations et communautés des régions et pays arides, grâce aux communications et aux débats stratégiques qu'elles génèrent au sein de cette auguste assemblée constitué d'un riche panel de personnalités et de compétences académique et scientifique, de représentants de la société civile et des populations autochtones, de décideurs politiques et d'acteurs gouvernementaux, de représentants des médias...

Elle est destinée à contribuer à impulser davantage l'échange de savoirs, de connaissances, d'expertises et d'expériences.

Elle est destinée à impulser davantage la mobilisation et l'engagement de la communauté internationale, dans toutes ses composantes, pour apporter les réponses adéquates, diligentes, et durables, aux appels et espoirs exprimés quotidiennement par des millions de citoyens du monde, en difficulté de vie permanente, en raison du sous-développement, de la pauvreté, et de la

désertification, pour une vie plus digne et un avenir décent, plus sûr, pour eux et pour les générations futures.

A ce titre, le NEPAD, Initiative de Partenariat unique et novateur pour la Bonne Gouvernance et le Développement Durable, pour et par l'Afrique et plus précisément son Initiative pour l'Environnement, qui a bénéficié de l'intérêt et du soutien du GEF, du PNUE et du PNUD, en particulier, devrait pouvoir bénéficier d'une meilleure visibilité et susciter un plus grand intérêt et davantage de soutien pour sa concrétisation de la part de tous les partenaires et acteurs de la coopération internationale et du développement durable.

À travers cette initiative continentale et à travers cette Année Internationale emblématique, la communauté internationale se devrait de s'orienter résolument et de manière responsable vers la concrétisation des engagements et des programmes internationaux issus des Sommets de Rio et de Johannesburg, et Sommet des Nations Unies sur les Objectifs de Développement du Millénaire/ODM, d'une part, et l'instauration de partenariats et de cadres stratégiques de coopération et de concertation, régionaux et internationaux, en faveur de la promotion d'objectifs partagés pour répondre avec efficacité aux aspirations et attentes communes.

C'est ainsi que nous avons saisi le message onusien et c'est ainsi que nous concevons notre mission et notre devoir communs pour la protection de l'environnement et le développement durable, envers les civilisations et les peuples des déserts, de leur patrimoine civilisationnel, culturel et environnemental, et envers toutes les générations futures dont le destin est présentement entre nos mains.

La communauté internationale a un devoir d'équité envers les populations qui souffrent aujourd'hui. Elle a le devoir de conférer plus d'intérêt et d'agir avec plus de responsabilité pour donner à ceux qui sont les plus affectés, à ceux qui sont défavorisés. Donner plus à ceux qui sont souvent oubliés et marginalisés.

Le combat d'aujourd'hui et le combat à venir pour relever les enjeux et les défis actuels et futurs pour lutter contre la désertification et ses effets pervers et tragiques, est sans conteste une œuvre nécessitant forte conviction et volonté inébranlable.

La lutte contre la désertification, la réduction de la pauvreté, l'immigration et l'accroissement des « réfugiés environnementaux », qui constituent des objectifs majeurs des ODM sont une entreprise de grande haleine et de grande envergure qui ne pourrait se confiner dans un contexte ou un cadre local ou sous-régional, ou une approche scientifique et technique « élitiste », mais concernant la majeure partie de notre planète.

C'est une entreprise qui exige, pour sa réalisation réussie, une prise de conscience internationale politique, scientifique et sociale, réelle et non conjoncturelle, une mobilisation, politique, scientifique et sociale, durable à l'échelle mondiale.

Elle nécessite une mobilisation soutenue des capacités et ressources techniques et financières en adéquation avec l'ampleur des défis et des enjeux que les pays pauvres ou en développement ne pourraient fournir ou supporter à eux seuls.

L'Algérie manifestera toujours sa disponibilité et son engagement en faveur de ces challenges et de ces enjeux déterminants pour l'humanité.

Avant de terminer mon intervention, je voudrais réitérer tous mes chaleureux remerciements à nos partenaires, et à leur tête de l'Université des Nations Unies, pour leur assistance, leur soutien, leur contribution technique et financière, et leurs encouragements pour la tenue de cette Conférence Internationale qui viendra

couronner en Algérie, la célébration de l'Année Internationale des Déserts et de la Désertification.

Je vous souhaite plein succès dans vos travaux et formule à toutes et tous ici réunis, selon ses croyances et ses convictions, mes meilleurs vœux pour Noël pour les uns, Aid Adha Moubarak pour les autres, et Bonne Année 2007 pour toutes et tous.

SESSION 1:

**POLICY CHALLENGES IN
COMBATING
DESERTIFICATION**

Interdépendances entre désertification, pauvreté, et les menaces sur la sécurité humaine

Gogo Banel Ndiaye Macina
Ministère de l'Environnement et de la Protection de la Nature (MEPN), Sénégal

Introduction

La CCD reconnaît que le processus de désertification est complexe et sous tendue par plusieurs facteurs en interaction permanente (environnemental, social et économique). Pauvreté et désertification sont donc intimement liées en une spirale où tout se confond entraînant une fragilisation de la stabilité économique et sociale.

Au Sénégal, malgré les politiques de relances des productions agricoles, la contribution de l'agriculture dans l'économie nationale est en deçà des espérances. Ceci serait dû en grande partie par la désertification dont les impacts négatifs se traduisent par la:

- Saturation et dégradation des terroirs ; près de 50% des terres de cultures sont dégradées ;
- Baisse du revenu réel des paysans qui a provoqué réduction très sensible de l'utilisation des intrants agricoles ;
- Baisse des rendements cultureux pour une agriculture largement dominé par la monoculture et des pratiques culturales inadaptés qui ont tendance à rompre l'équilibre des écosystèmes ;
- Régression des forêts naturelles de près de 8% pendant les dix dernières années ;
- Dégradation sensible des ressources en eau à cause des intrusions salines et la pollution des eaux superficielles dans les zones rurales.

Principaux symptômes et leur ampleur

Symptômes	Ampleur
Déforestation	80 000 hectares/an
Salinisation	9% des superficies dégradés
Acidification	1035 hectares de terre
Erosion hydrique	77% des terres dégradés
Erosion éolienne	3% des superficies dégradés
Baisse de la pluviométrie	Progression de l'isohyète 400mm vers le Sud
Perte de biodiversité	L'habitat de la faune et de la flore sauvage est passé de 19600 ha à 3500 ha entre 1970 et 1986
Baisse des rendements	Baisse de 25% du niveau des rendements des principaux produits agricoles par rapport à 1980

Cette communication présente les efforts fait au Sénégal pour faire face aux menaces de la désertification sur la sécurité humaine. Les défis comprennent :

- Un cadre juridique ;
- Un cadre institutionnel ;
- Un financement acquis.

Réponses apportées à la lutte contre la dégradation des terres

Pour briser ce cercle, en plus de mesures correctives techniques et d'accompagnement, il faut avoir un cadre juridique et institutionnel adéquat. Devant la dégradation continue des ressources naturelles entraînant des performances négatives dans le secteur de l'agriculture, conduisant à la paupérisation des masses rurales et à l'insécurité alimentaire, il est apparu urgent pour le Gouvernement du Sénégal de s'inscrire dans la nouvelle approche internationale pour la promotion du développement local et de la sécurité alimentaire.

A la demande du gouvernement du Sénégal, le Mécanisme Mondial lui a accordé en 2001, un don de 130.000 US dollars pour la mise en œuvre d'une phase pilote d'un an. Les objectifs de la phase pilote sont entre autres de tester (i) les possibilités de partenariat entre les acteurs en vue d'aboutir à une synergie et (ii) l'efficacité du dispositif institutionnel ainsi que la capacité d'intervention des acteurs. La phase pilote qui couvre un total de 12 sites à raison de 2 dans chacune des 6 zones éco-géographiques du pays, a identifié 6 grands types d'activités :

- (i) le reboisement,
- (ii) la régénération des capacités productives des sols,
- (iii) l'amélioration de l'accès à l'eau,
- (iv) la récupération des terres salées,
- (v) la lutte contre les feux de brousse et
- (vi) l'amélioration à la sécurité alimentaire.

Ces activités sont considérées comme des pôles autour desquels devront se développer des accords de partenariat entre les différents intervenants.

Par ailleurs, face aux difficultés de financement direct du PAN, le Sénégal compte de manière indirecte tirer profit des opportunités financières qu'offrent les Conventions dites de RIO, des stratégies de réduction de la pauvreté, de l'Initiative du NEPAD etc.... Ceci, dans l'objectif ultime d'atténuer la dégradation des ressources naturelles, de lutter contre la pauvreté et d'aboutir à la sécurité alimentaire des populations vulnérables.

Du Point de vue du cadre juridique et institutionnel

Cadre juridique

Les principaux instruments juridiques sont de deux ordres : (i) les textes relatifs à la tenure foncière et (ii) les textes sectoriels.

Les textes relatifs à la tenure foncière

Il s'agit entre autres de :

- la loi de 1964 sur le domaine national (LDN) et ses décrets d'application (subdivision du territoire en 4 zones : urbaines, de terroir, classées et pionnières);
- la loi de 1972 relative aux communautés rurales (conférant à ces dernières une certaine compétence en matière de gestion des ressources naturelles) ;
- la loi de 1976 portant code du domaine de l'Etat ;
- le décret de 1980 portant organisation des parcours du bétail.

Les textes sectoriels

Ce sont principalement les codes suivants :

- le code forestier ;
- le code de l'environnement ;
- le code de l'eau ;
- le code de la chasse et de la gestion de la faune et
- le code minier.

Cadre institutionnel

A l'origine, les missions des différentes structures étatiques ne faisaient pas de référence explicite à la lutte contre la désertification. Les changements ont été opérés après les crises de sécheresse des années 1970. Ces changements ont surtout concerné : (i) les départements ministériels (Ministères spécifiques s'occupant de la protection de la nature, de l'environnement, de l'hydraulique...etc.), (ii) les sociétés régionales de développement ainsi que les structures de recherche et (iii) les projets.

En plus de ces changements, d'autres structures ont été créées. C'est en particulier le cas du Conseil Supérieur des Ressources Naturelles et de l'Environnement (CONSERE) ainsi que du Centre de Suivi Ecologique (CSE).

Du Point de vue du financement acquis pour les activités ayant un lien direct ou indirect avec les objectifs du PAN

En attendant la mise en place de financements, le Sénégal, avec ses partenaires au développement, a eu à injecter 151,86 milliards de FCA en financement direct de 1992 à 2001 soit une moyenne de 15,19 milliards de FCA par an (cf Tableau N°1). En comparant ce chiffre avec la moyenne d'avant 1992 estimée à 5 milliards de FCFA¹ par an, nous pouvons dire qu'avec l'amélioration du cadre institutionnel ainsi que la volonté des partenaires au développement d'impulser le secteur, qu'il y a eu une volonté de répondre aux problèmes environnementaux. En effet, nous constatons que le volume d'investissement annuel a connu un accroissement de l'ordre de 304%.

Tableau N°1 : Contribution des projets du secteur de l'environnement dans la lutte contre la désertification.

Intitulé du Projet	Volume de financement en millions de \$ US				Populatio n
	Etat	Part bilatéral	Part multilatéral	ONG	
PADF	3,7	9,1			
PGCRN	5	20			1
PAGF	2,4		8,4		0,8
Ceinture Verte	0,4				
PAPF1	0,04	1,51			
PAPF2	0,04	3,1			
POGV			6,8		
Centre Forêt Thiés	0,4	1,25			
Durable	0,0002	1,3			

¹ Source : PTIP DCEF/MEF.

PNDS					
PAEP		3,8			
PAM/volet foresterie	0,016		1,21		
Pronasef	0,3	1,5			
Réseau Afr. 2000			0,63		0,03
PADV	0,19		0,88		0,2
Projet d'amengt pépinières for.	0,06	4,75			
PAGERNAI		28,3			
PSPI	0,012	4,97			
Sensibilisati on LCD		0,11			
Mise en œuvre PAN/LCD		0,24			
FTPP		0,09			
Renforceme nt CERAAS			1,9		
PFIE			1,07		
PRECOBA	0,095	3,26			
PACGPRN		2,01			
PROGONA	0,095	7,21			
PROVERS	0,04	1,57			
PREVINOB A		3,79			
PROWALO	0,1	4,042			
Recherche sur amélio. Jach.			3,01		
Green syst.			0,015	0,1	
Promotion Agr bio				0,2	0,03
ANAFA				0,02	0,03
FEGPAB				0,003	
Foresterie communaut aire	16		6,5		
PRONAT	1,34	5,3			
PRS	0,4	16,7			
CTL/Nord		0,7			
Progrena			1,3		
Progede	1,2	8,8	9,9		
GERT				0,32	
FRK		1,92			
PPFS		3,39			
ADARS				0,11	
AADIS				0,34	
Grpe planif GRN					
CARITAS				0,57	
Sous-total 1	31,845	140,402	41,615	1,663	2,09

Part relative /sous-total 1	14,67815907	64,71480261	19,18139706	0,766518402	0,96333341
PGIES	8,367		19,74		
PRL	0,314	24,3			
PCBM					
PAGEF					
Projet AGIR					
DMP / recherche			1,655		
DMP / réduction dégradation terres			0,15		
DMP / renforcement capacité			0,135		
PROGIRNA					
Amngt mangrove PC et Delta S		2,74			
TOTAL	72,371	307,844	104,91	3,326	2,38
Part relative / au fin Total	14,78434601	62,88806585	21,43159194	0,679453577	0,486199493

Par ailleurs, en considérant le volume des financements futurs (projets dont les instructions sont très avancées), il est estimé jusqu'à 2007 à 342,7 milliards de FCFA soit un financement moyen annuel durant la période 1992/2007 de 22,85 milliards de FCA.

Cet accroissement du volume de financement est le fait principalement, durant la période de 1992 à 2001, des partenaires bilatéraux (64,7% du volume total), suivi de l'effort des partenaires multilatéraux (18,9%) et de celui de l'Etat (14,7% du volume total compte non tenu des exonération douanières et fiscales). En marge de ces principaux bailleurs, il faut noter la part non négligeable des bénéficiaires (0,94%) et les ONG² (0,76%). Notons entre autres, le fait qu'en élargissant la base de calcul au volume de financement futur, l'effort des partenaires bilatéraux passe de 64,7% à 62,9% du volume total de financement et que celui des partenaires multilatéraux et de l'Etat passe respectivement de 18,9% à 21,2% et de 14,7% à 14,8%.

Ainsi donc, il ressort de l'analyse des données que les plus grands efforts financiers consentis dans le secteur de la GRN sont le fait, par ordre de croissance, des partenaires bilatéraux, des partenaires multilatéraux, de l'Etat, des bénéficiaires et des ONG.

De plus, sur l'ensemble des activités financées, 25% ont porté sur des actions d'agroforesterie, 13% sur la lutte anti érosive et 11% sur la lutte contre l'infertilité des sols. Ce qui a permis de consentir un effort pour le reboisement et la conservation des sols, de 1993 à 2001, de 11.500.000 plants en moyenne par an pour environ 11.500 hectares. De plus des actions de domestication des espèces forestières ainsi que la mise en place de parcelles conservatoires ont été entreprises avec la recherche.

² Il s'agit des ONG qui ont bien voulu donner des indications sur leur volume de financement.

Par ailleurs, les ONG ont eu à effectuer des actions de lutte contre la dégradation des ressources naturelles (salinisation, érosion hydrique, protections des formations naturelles etc....) pour un volume financier estimé à 1% du total du financement des activités de GRNE.

En sus de ce financement direct, notons que sur une période identique, l'Etat et ses partenaires au développement ont eu à injecter près de 170 milliards de FCA représentant ainsi la contribution indirecte des secteurs de l'agriculture, de l'élevage et de l'hydraulique rurale dans l'atteinte des objectifs du PAN (cf Tableau N°2 et 3).

Tableau N°2 : Contribution des projets du secteur agricole dans la lutte contre la désertification.

Contribution des projets du secteur agricole dans le financement des activités de GRN					
Intitulé du Projet	Volume de financement en millions de \$ US				
	Etat	Part bilatéral	Part multilatéral	Structures fin	Population
PADV	1,87		8,99		0,09
POGV	0,8		15,54		3,1
PSSA	4,25	1,31	3,32		
PRODAMII	1,41		9,82		0,7
PRIMOCAII	0,26	3,1			0,034
PAPASTII	0,39		2,31		
PROMER	0,99		6,28	0,97	1,35
PAPELII	2,68		12,9		
Phosphatage de fonds	11,45				
SAED	11,46	71,76	22,42	0,46	1,25
Projet Digue Anit-sel	0,56				
PPMEH	0,904	2,04			
LOCUSTOX		2,53			
Stock, eau ruissellement	0,08		1,26		
Aménagement vallée Baïla	1,07		1,74		0,13
Appui bassin Anambé	1,62				
Dév Culture Asperge		0,43			
Appui maraîchers diamniadio		0,14			
Hortibak		1,35			
Proges	0,59	13,21			
Peodulas	1,43		5,71		
Sous Total 1	41,814	95,87	90,29	1,43	6,634
Part relative / sous total 1	17,7149442	40,6163414	38,2523153	0,60583465	2,8105644

Tableau N°3 : Contribution des projets du secteur de l'hydraulique rurale dans la lutte contre la désertification.

Contribution des projets du secteur de l'hydraulique rurale dans le financement des activités de GRN					
Intitulé du Projet	Volume de financement en millions de \$ US				
	Etat	Part bilatéral	Part multilatéral	Sturctur es fin	Population
Lutte anti-sel / BID	0,35		3,86		
Lutte anti-sel / BADEA	0,58		3,14		
Total					
Part relative / TOTAL	0,93		7		

Ainsi, il ressort de l’analyse des statistiques disponibles que le volume de financement direct et indirect injecté dans la lutte contre la désertification de 1992 à nos jours peut être estimé à environ 512³ milliards de FCA soit une moyenne de 34 milliards par an. Cependant, malgré cet effort important consentit par l’état et ses partenaires au développement, la désertification gagne du terrain avec son corollaire : la pauvreté

Tableau N°4 : Corrélation entre les causes et les solutions.

CAUSES (C1 à C4)	SOLUTIONS (S1 à S4)
<u>Causes Directes</u> C1 : Activités Anthropiques • Déforestation ; • Défrichement ; • feux de brousse ; • pratiques agricoles inadaptées ; • surpâturage ; • activités Bio-industrielles. C2 : Eco-climatiques • Sécheresse (faiblesse et irrégularité des précipitations, forte demande climatique) ;	<u>Solutions des causes directes.</u> S1 : Solutions aux causes anthropiques • programme de reboisement villageois et en régie ; • mise en défens ; • pratique de la jachère ; • réalisation et ouverture de pare-feu ; • promotion des essences fourragères, création de banque fourragère ; • mise en place d’activités génératrices de revenus ; • aménagement de parcours pour le bétail. S2 : Solutions aux causes éco-climatiques. • Elaboration de système de gestion et de retenues des eaux de pluie ou de ruissellement ;

³ Il faut ici prendre les chiffres comme valeur indicative et non comme valeur absolue. Ceci en raison du fait que les données ne sont pas exhaustives. Vraisemblablement, l’effort consentit est nettement supérieur à ce qui est mentionné.

• Salinisation, acidification ; • Erosions éolienne et hydrique ; • Pauvreté des sols ; • perte de couvert végétal	• Reboiser avec des essences adaptées aux conditions de déficit hydrique ; • Promouvoir l'agroforesterie en zone semi-aride ; • Promouvoir les techniques de défense et restauration des sols ; • Promouvoir les techniques de fixation des dunes ; • Promouvoir les essences halophiles, traitement chimique des sols salés ou acides. intensification, cultures fourragères ; • Emploi MO, MM et phosphatage de fond • Pratique de jachère
<u>Causes Indirectes</u>	<u>Solutions aux causes Indirectes</u>
C3 : Causes socio-économiques	S3 Solutions aux causes socio-économiques
• pauvreté et pression humaine et animale sur les RN ; • ignorance (faible efficience des programmes d'IEC)	• promouvoir les activités génératrices de revenus ; • augmenter l'investissement public relatif aux services sociaux de base ; • renforcer les capacités techniques des acteurs ; • promouvoir la valorisation des ressources naturelles.
C4: Causes relatives aux politiques et aux cadre Institutionnelles	S4 : Solutions aux problèmes politiques et institutionnels
• problème de dégradation des terres non prise en compte dans les politiques macro-économique ; • prolifération des programmes sectoriels ; • prolifération des institutions ; • coordination de l'aide au développement ; • question foncière	• internalisation de la lutte contre la désertification dans les politiques macro-économique et stratégies nationales (LCP, DRSP, LCS ...) ; • intégrer la désertification dans les programmes. sectoriels et raisonner en terme de développement durable ; • inscrire la lutte contre la désertification. et les effets de la sécheresse dans tous les projets ; • harmoniser les programmes ; • promouvoir le développement durable ; • faciliter les accords de partenariat ; • promouvoir la sécurité foncière.

Forced Migrations due to Degradation of Arid Lands: Concepts, Debate and Policy Requirements

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Introduction

Environmental issues have started to be seen in the broader context of human security since the end of the Cold War which marked the end of political bipolarity and the narrow, mainly militaristic notion of security predominating the security discourse at the time (see Brauch, 2005). Environmental sustainability and ecosystem health started being recognised as being threatened by impacts of careless industrial development, short-sighted agricultural practices, exhaustion of environmental resources, disregard of recycling and renewal of material and energy fluxes, and even by direct human interference, pollution or wilful destruction. Desertification (or land degradation in dryland regions) has been recognised by the UN system as a major environmental threat exacerbating poverty for some 30 years now (particularly since the 1977 United Nations Conference on Desertification) but it was only in 1996 that the United Nations Convention to Combat Desertification came into force (see UN, 1994 for more details on the Convention).

In parallel, the topic of migration has always been addressed through passionate and, at times, controversial debates both in receiving countries and countries of out-migration. At the time of writing, in the last quarter of 2006, the issue of migration has come to the forefront again. For example, Spain and Italy have seen an increasing number of Northwest African migrants arriving on the shores of their most accessible coasts. Bilateral agreements between France and Senegal and between Spain and Gambia were struck in order to better control potential illegal migrations at the source from African countries to European ones. In addition, high-level delegations from the EU and Africa met in Libya in November 2006 to discuss issues related to both legal and illegal migrations. Another example of attempts to deal with illegal migrations can be taken from the American continent where the United States passed a bill allowing the construction of a controversial wall along portions of their border with Mexico (House Resolution 6061: Secure Fence Act of 2006).

It is by no means implied here that the migration issues cited above are necessarily linked to environmental degradation, including desertification, but it is important to highlight them to understand the context within which the environmentally-driven migration debate is taking place. Migrations have various root causes including economic factors (poverty, unemployment), social factors (poor welfare or education), environmental factors (degradation of ecosystems), or degraded security conditions (disrespect for human rights, persecution of minority groups, armed conflicts, etc.) (Boswell and Crisp, 2004). Migrations are usually in response to perceived or actual differentials and disparities between regions or countries (GCIM, 2005), although other factors such as demography, and the level of poverty (not always the major reason for migration) also play pivotal roles (Hatton and Williamson, 2003). With the exception of when one's life is directly threatened, the decision to migrate is often taken because of a variety of "push" and "pull" factors, and rarely from a single individual constraint. However, in the past couple of decades (when environmental degradation started to be included in the concept of human security) and in particular since a paper by El-Hinnawi (1985) on environmental refugees, there has been a debate as to whether environmental degradation is a major cause of migration throughout the world. Despite the twenty years that have elapsed since this paper,

the debate is still raging with respect to definitions of what constitutes an “environmental refugee”, the number of routes taken by the migrants, and whether or not it is wise or necessary to have a new category of migrants and/or refugees.

The objectives of this paper are to promote a reflection on the interrelationships between desertification and migrations and to suggest the coordinated implementation of five policy action points that should be considered rapidly in order to anticipate and prepare, should large-scale desertification/drought-driven migrations realise themselves in the future.

Desertification and Ecosystem Services

Desertification is the ultimate process of land degradation in drylands. It is estimated that drylands cover some 41% of the land surface of the Earth and that they are home to more than 2 billion people who experience relatively low human well-being and development indicators, including high infant mortality and low GNP per capita (MA, 2005a). The low level of human well-being is not only due to the low provisioning of services by dryland ecosystems but also, for example, due to low levels of health and educational infrastructures and political marginalisation prevailing in some dryland areas (MA, 2005a). It is important to mention here the on-going debate concerning the extent and rate of desertification, as this may have implications when attempting to address the issue of environmental migrations. Indeed, the concept of environmental migrations and refugees is not accepted by all and the argument that desertification is not as serious an issue as depicted in much of the “environmental” literature can be and is used to criticise the concept of environmental refugees itself (e.g. Black, 2001). Verón et al. (2006) showed that assessment methods to quantify desertification have changed in time and that the coexistence of conflicting definitions and divergent estimates of the extent of desertification have led to scepticism and inaction or insufficient actions with respect to addressing the problem. The review of Verón et al. (2006) demonstrated that the variability of assessment tools at various points in time have led authors and media to either dramatise the extent and rate of desertification or to minimise them. This is why the Millennium Ecosystem Assessment (MA, 2005b:101) highlights that the “shortcomings of available assessments point to the need for a systematic global monitoring program, leading to development of a scientifically credible, consistent baseline of the state of (...) desertification”. This would then foster evidence-based discussions on the theme of desertification and migrations.

Ecosystems provide a wide range of services to society including products (e.g. food, fuel, and fibre), regulating factors (e.g. climate regulation), and spiritual and aesthetic benefits (MA, 2005a). Ecosystems are affected by direct and indirect drivers which interact with each other, operate in feedback loops and determine the level of services ecosystems can provide to society. The Millennium Ecosystem Assessment (MA) identified direct drivers as climate change, nutrient pollution, land conversion leading to habitat change, overexploitation, and invasive species and diseases; and indirect drivers as demographic, economic, socio-political, scientific and technological, and cultural and religious ones (MA, 2005a). Ecosystems are however highly dynamic and in constant fluxes and rarely if ever in an equilibrium state. The implication is that ecosystems have their own resilience and even though they are constantly affected by anthropogenic and natural factors, they can still provide adequate levels of services to society. What is emphasised here is that at times the degradation can become serious enough (as in desertification) that the provision of services is severely compromised which can then serve as one of several triggers for migrations. In addition, social, economic, cultural and political factors shape the relationship between society and the ecosystems of which it is part of and from which it extracts services. Thus, ecosystem degradation, including desertification, is in itself generated by a complex intermix of factors. These factors can then be targeted by

concrete actions and policies to reduce, stop and/or reverse the degradation processes.

The MA (2005a) has revealed an alarming degradation of ecosystems worldwide and thus of the services that could be provided to society by these ecosystems. The General Synthesis Report of the MA (2005b) highlights, among other points that:

- Fifteen of twenty-four ecosystem services analysed are being degraded or utilised in an unsustainable way, mainly through anthropogenic actions to increase the supply of specific services.
- These actions could further accelerate the degradation of ecosystems although more scientific evidence of this is required.
- The poor are the ones suffering the most from the decline in ecosystem services, with the rural poor being particularly vulnerable to changes in ecosystem services.

Particularly highlighted by the MA (2005c) is the fact that 2 billion people living in arid, semi-arid and subhumid regions are extremely vulnerable to the loss of ecosystem services, including water supply. The Desertification Synthesis of the MA (2005d), which directly addresses the situation in dry regions, highlights in particular that (not an exhaustive list):

- 10 to 20 percent of drylands are already degraded (highlighting the fact that there is uncertainty in the measurement of the extent of desertification).
- Pressure is increasing on dryland ecosystems for providing services such as food, and water for humans, livestock, irrigation, and sanitation.
- Climate change is likely to increase water scarcity in regions that are already under water stress, as they accommodate close to a third of world population but harbour only 8% of global renewable freshwater resources.
- Droughts are becoming more frequent and their continuous occurrences can overcome the coping mechanisms of communities.

These and all the other factors and impacts identified in the MA increase the stress on some communities and will make the achievement of the Millennium Development Goals extremely hard to be reached and sustained in certain parts of the world.

In dryland areas, the loss of ecosystem services and the repetition of droughts have forced dryland communities to look for ways to cope with scarcity of resources that can last several years (MA, 2005b). A major problem arises when these coping mechanisms are exhausted by the extended duration of the scarcity. When the coping mechanisms and adaptation strategies of communities are overwhelmed by the loss of ecosystem services, droughts and loss of land productivity can become important factors triggering the movement of people from drylands to other areas (MA, 2005d).

Given the empirical evidence of this exodus from many dryland areas of the world, the above mentioned academic debate on whether there are environmental migrants/refugees or not becomes superfluous and jeopardises the urgent development of knowledge-based policies. Scientific “concerns” instead of the pragmatic application of the precautionary principle paralyse both the scientific and the policy making communities. It is the strong conviction of the authors that in the face of the unfolding human tragedy with considerable political explosiveness, the “regular” sequential approach of science-policy-action cannot be afforded. Instead, a simultaneous, though iterative approach is advised, and is presented in the next section.

Desertification and Migrations: Policy Suggestions

Links between desertification and migrations

The cause-effect relationship between desertification and migrations was flagged at various conferences worldwide and by different stakeholders. Following an International Year of Deserts and Desertification (IYDD) event in Montpellier, France (the Désertif'Actions Conference – September 2006), people from civil society pointed out the relationship and their opinions were taken up in the French national press. This was the case for a representative of the Senegalese Prabioc association who stated that in desertified areas “farmers cannot anymore satisfy their basic needs, move to cities, towards the coasts, or to developed countries¹” (our translation). A similar statement was made by an NGO representative from Mali². Other examples include the Montpellier Appeal which emerged from the Désertif'Actions Conference and which stated that land degradation “[...] leads to precariousness and poverty conditions, and to an increasingly large marginalisation which worsen migratory flows, political instability and economic losses” (Désertif'Actions, 2006); a press release by the United Nations University (UNU-EHS, 2005); and the organisation of a specific IYDD conference on desertification and migrations in Almeria, Spain (October 2006) which built on the 1994 international symposium on the same topic and held in the same location (see Almeria Statement, 1994). All the statements above remain general, however, with the cause-effect relationships not being systematically described or quantified. This is most likely due to the fact that given the complexity of the interaction (both land degradation and migrations are complex processes that occur because of a wide range of drivers), quantification is difficult if not impossible. Notwithstanding this critical comment due to the lack of definitional clarity and quantifications, both the IYDD and above-mentioned conferences (and in particular Almeria I and II) are crucial benchmark events marking the emergence of political concern and reflecting the need for comprehensive action. It is the joint obligation of the scientific, professional, legal, policy making and humanitarian communities to build their coordinated action plans and their implementation on the foundations provided by these statements.

Difficulties of quantification

Some scientists have attempted measuring the extent of environmental migrations worldwide. This is a complicated exercise because of the diversity of factors that come into play and their complex interactions (Döös, 1997). Quantifications are further complicated by the fact that these migrations are mostly internal (at least in an initial phase). Nevertheless, estimates of migration fluxes have been published: 135 million who could be at risk of being displaced as a consequence of severe desertification (Almeria Statement, 1994); or 25 million in 1995 with a possible doubling of that number by 2010 with a potential of 200 million due to global warming impacts – not specific to drylands (Myers, 2002, 2005). It is now estimated that there are more environmental refugees around the world than there are refugees from other categories. All these figures, their estimation methods and the underlying assumptions behind them are criticised and debated. While the scientific debate is welcome and necessary, it should not lead to endless discussion paralysing further policy actions.

Some attempts at measuring at the national level the relationships between desertification and/or repetitive drought on the one hand and migrations on the other are relatively recent. For example, it is estimated that close to two out of three families from the Malian region of Kayes have a member of their household who has

¹ La constante avancée du désert est la cause oubliée des migrations africaines. Le Monde, 25 September 2006.

² La désertification produit des exodes massifs. Libération, 25 September 2006.

emigrated overseas (in Togola, 2006). For the same country, persistent droughts have forced people from the North to migrate to other West African regions. West Africa is the main recipient of migrants from Mali, the region having received 2.1 million migrants out of a total of 2.6 (2001 estimates), keeping in mind that the country had approximately 11.1 million inhabitants in 2003 (in Togola, 2006). The specific proportion of people migrating out of Mali because of desertification was not specified by Togola (2006). A second example can be taken from Mexico. A paper commissioned by the US Commission on Immigration Reform looked at the interlinkages between unsustainable land and water use and migrations from Mexico to the USA. The report concluded that migrations were probably due to a set of factors that includes large wage differential between the two countries and extensive migrant network in the USA ("pull" factors) but also emphasised the fact that, based on the Mexican Government's data, approximately 900,000 people leave arid and semi-arid areas every year because of their inability to make a living from the land due to dry conditions and soil erosion (Schwartz and Notoni, 1994). As a parenthesis, it is noteworthy that the report further suggested that a better quantification of environmental migrants needed to be carried out and that the US Government would need to look beyond traditional immigration policy (e.g. border control and employer sanctions) to address the root causes of the problem (e.g. international cooperation, technical support).

Framing the issue

Because of the complexity of the interactions between desertification and migrations, the concepts of environmental migrations and refugees are not commonly accepted and critics of the concept sometimes use the argument that environmental degradation in general and desertification in particular are not as serious issues as depicted in much of the literature. In addition, critics often use the valid argument that migrations have many root causes to dismiss the need for a specific new category of migrations or to argue that the terminology "environmental refugee" is misleading and too narrow at best as it focuses on only one of many potential or real "push" factors (e.g. Black, 2001; Castles, 2002). However, environmental degradation in general, and desertification in particular, are serious problems that can be exacerbated by several social, economic, political and global environmental factors and could thus become one of the major "push" factors in the future. The Millennium Ecosystem Assessment considers that "droughts and loss of land productivity are considered predominant factors in the migration of people from drylands to other areas" and "these migrations often create environmental refugees (...)" (MA, 2005a: 625, 645) as drought impacts income and food security in environments where few if any alternative livelihood opportunities exist. We note here that drought and desertification are not equivalent but because desertification is the consequence of land degradation, it is understood that climatic droughts would have a bigger chance of becoming agronomic droughts (thus affecting agricultural production) in desertified areas.

Although migration models are useful tools for the prediction of migration fluxes (if they account for all push and pull factors), Hatton and Williamson (2003) argue that future trends in migrations will probably be driven more by policies which are difficult to model. Sound policy recommendations which are based on facts and consider all factors advanced by proponents and critics of the concept of environmental migrations/refugees are therefore required. When dealing with the concept of environmental migrations, the question becomes: is there a specific need for a new category of migrant or refugee? The environment we shape is, by definition, in constant flux and as highlighted above, there is increasing evidence that the new equilibrium that ecosystems may reach through inherent and anthropogenic changes cannot sustainably supply dryland populations with required essential services. It is therefore likely that increased stresses on ecosystems will have direct and indirect

impacts on societies which, when their other coping mechanisms are overcome (for desertification, engaging in wage labour, borrowing of food, sale of livestock, etc.), will have no other option but to migrate as a permanent or temporary adaptation strategy.

We are still at the beginning of an unavoidably long process. Yet, the aim must be clear. It is to gain recognition in order to assist a potentially emerging new category of migrants. While the multiple reasons and their respective weights case-by-case make it fairly difficult to assign individuals or groups of migrants into well defined categories like political, economic, ethnic or even environmental migrants/refugees, there are potential sub-classes which may be useful to indicate the motivation (root causes) to move and the urgency to receive assistance. Various authors have proposed different environmental migrant/refugee categories (see for example Black, 2005; Flintan, 2001). Concerning environmental-related mass movement of people, we propose to distinguish between:

- Environmentally motivated migration;
- Environmentally forced migration, and;
- Environmental refugees.

This latter class may include also disaster refugees (e.g. due to severe drought). While the environmentally motivated migrant “may leave” a steadily deteriorating environment in order to avoid the worse, the environmentally forced migrant “has to leave”. These two categories may imply the option to decide to stay or not to stay, or when to leave, though these questions are already part of the survival dilemma (Brauch, 2005). The distinction between environmentally forced migration and environmental refugees could be sought in the swiftness of necessary actions. The environmental refugees “flee” rather than “migrate”. Another distinguishing criterion could be sought in environmental assessment. Would it be possible to rehabilitate the degraded land to undo migration, or should people be allowed to seek permanent refuge (and livelihoods) elsewhere? Farmers whose livelihood was destroyed by irrevocable desertification clearly need similar status and assistance than people fleeing from violence, war, ethnic cleansing or other harassment, irrespective of whether they crossed a border or not. The authors argue that internationally agreed standards are needed to identify these or similar sub-groups in order to devise appropriate strategies, measures and assistance programmes on how to assist those falling into the different categories. These standards could possibly be discussed within the emerging UN structures dealing with migrations (see below). It has been reported that individuals who could fall under the above environment-related categories could receive assistance from UNHCR and other humanitarian agencies occasionally. It is to be noted that without recognition status and corresponding mandating of the respective aid organisations, this assistance, based on human solidarity and compassion, would not be sustainable. In order to avoid potential human disasters at a massive scale, institutional empowerment and funding are needed.

Even critics of the concept of environmental migrants or refugees such as Black (2001) contend that should environmental refugees be included in a future international convention, the scientific and empirical basis of the fluxes and specific needs will require further elaboration. Similar points of view were elaborated in a brief review on the subject presented by Flintan (2001). Castles (2002) argued that environmental refugee terminology and conceptualisation is inadequate, but nevertheless did not dismiss the fact that environmental factors can be very important for the triggering of migration in certain circumstances. This latter fact is also highlighted by Oliver-Smith (2006), who argues that the environment cannot be the single cause of migrations, but at the same time cannot be dismissed as one of several factors triggering migrations. No one can disagree with the need to address

these issues more scientifically and systematically, but the fuzziness of the concept as it stands now, and the difficulty in estimating the number of people concerned and migration routes, should not be a reason not to act and move forward with adequate policies. Lonergan and Swain (1999: 2), who carried out a cautious analysis of the relationships between environmental degradation and migrations, nevertheless note that “Although the estimates and projections of environmental refugees are based almost entirely on anecdotal evidence and intuitive judgements, it is important not to trivialize the role environmental change and resource depletion may play in population movement”.

Policy suggestions

If one agrees with the statement above from Lonergan and Swain (1999) while still recognising that the cause-effect relationships are fuzzy at best, then we put forward that a precautionary principle should apply and serves as the basis of the following five-pronged policy approach to address the issue of environmental degradation (including desertification) and migrations (see also Bogardi and Renaud, 2006):

Requirement for a strong scientific basis: There is a need to put in place programmes to allow a better understanding between the cause-effects mechanisms between degradation of dryland ecosystems and migrations. This echoes ideas put forward in 1994 at the end of the International Symposium on Desertification and Migrations in Almeria (see Almeria Statement, 1994). Most reports on the topic of environmental migrations recommend further quantification and research and few, if any, research activities have attempted rigorous quantification. This now needs to be addressed. In addition, there is a need to develop proper definitions of environmentally motivated and/or forced migrations, environmental migrants/refugees. All this can only be achieved if there is a political recognition of the importance of the problem, if the research topic is accepted by major funding organisations, if long-term, sustained funding for research is made available, and if research cooperation between emigration and immigration countries as well as international organisations is achieved. In early 2007, the project EACH-FOR (Environmental Change and Forced Migration Scenarios) funded by the European Commission will be launched. While the concept and expected results are steps in the right direction, neither the project duration (2 years) nor the scope (migrations towards Europe) are sufficient to answer all questions.

Increasing awareness: It is important to raise worldwide knowledge-based public and political awareness of the issue and its environmental, social and economic dimensions. This step is particularly timely and important as the debate on migrations is high on the agenda of many countries/regions and as the UN is currently addressing the issue of migrations through relatively new mechanisms (see below).

Improving legislation: Following the two steps above, there is then a need to put in place a framework for recognition of environmental migrants/refugees, such as in a Convention or in parts of Intergovernmental Environmental Treaties. It is not suggested here that the 1951 Convention be amended (as, for example, was put forward by Conisbee and Simms, 2003), as adding a new category of refugees to that convention could weaken the case of categories of refugees already covered by it, a legitimate worry put forward by Castles (2002) and Gemenne et al. (2006), for example. However, individuals who are clearly displaced by environmental degradation processes (even if mixed with other socio-economic factors as will often be the case) should be protected adequately by an international mechanism that would afford them certain rights. Bilateral arrangements are already put in place with respect to sea-level rise, but this should be systematised (possibly in other forms) for the most pressing environmental degradation issues, including desertification.

Giving the means for adequate humanitarian aid: There is a need to empower the relevant entities in the United Nations system and other major assistance organisations to provide aid to environmental refugees. This can best be achieved if there is an international mechanism in place recognising this category of migrants/refugees.

Strengthening institutions: The final suggestion is that concepts need to be devised and institutions reinforced or created in order to be able to assist the flux of forced environmental migrants, both at the international and national levels.

These actions should be implemented with all other envisaged policy actions that directly address the multi-dimensional problem of desertification itself. UNU and its topically relevant and interested Centres and Programmes can certainly not address all the points listed above but can contribute to several components in research and policy development jointly with other UN agencies dealing with the subject.

The UN system and migrations

These policy recommendations could feed into the current process going on within the UN system regarding how migrations should be addressed internationally. There are, at the moment no specific distinctions being made in terms of the “push” or “pull” factors which generate migrations, so environmental migrations are not recognised specifically within this debate yet. The chronology of events within the UN system is as follows (UN, 2006a):

- The “new thinking” on the topic of migrations originated when it was acknowledged that international migrations were linked with development at the 1994 International Conference on Population and Development.
- In 2003, the General Assembly decided to hold a High-Level Dialogue on the subject of international migrations and development. The outcome of the dialogue was to be the identification of ways to maximise the development benefits of international migration and minimise its negative impacts.
- In 2003, the Global Commission on International Migration was launched and one of its recommendations to the UN Secretary-General in 2005 (GCIM, 2005) was to establish a high-level inter-institutional group to ensure a more coherent and effective institutional response to the opportunities and challenges presented by international migration.
- In addition, the International Labour Conference adopted in 2004 a resolution requesting the International Labour Office to implement a plan of action on migrant workers.
- Following further consultations within the UN system, the Secretary General established the Global Migration Group which contributes inputs to the Secretary General’s report for the High-Level Dialogue.
- In January 2006 the Secretary-General appointed a Special Representative on International Migration and Development.
- The outcome of the High-Level Dialogue was a proposal by the Secretary-General to establish a consultative Forum to offer Governments a venue to discuss issues related to international migration and development. This forum is not meant to produce negotiated outcomes between Member States, but it would foster increased cooperation between governments (UN, 2006b).

The September 2006 High-Level Dialogue also highlighted that it “(...) was essential to address the root causes of international migration to ensure that people migrated out of choice rather than necessity” (UN, 2006b:2) with poverty being one of several factors forcing or encouraging people to migrate. Environmental degradation in

general, and desertification in particular, being one such root cause, it is urgent to address the issue of environmental migrants/refugees consistently through policies and science. As there is a broad consensus that migration is most likely to increase substantially, there is the urgent need to prepare potential immigration countries to cope with the expected influx of migrants regardless of whether the immigration country is developed or developing. The UN initiative is especially strong in its claim to view migration as a positive process contributing to keep global economic and social balance, to account for cultural enrichment in spite of the undeniable stress that migration implies. A strong humanitarian/solidarity issue is associated with the acceptance of incoming migrants/refugees.

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Désertification et société civile : une nouvelle donnée ?

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Le forum DESERTIF' ACTIONS réuni à Montpellier (France) du 21 au 23 septembre 2006 par les associations CARI (France), Both ENDS (Pays bas) et ENDA LEADF (Sénégal) , en collaboration avec Dryland Coordination (Norvège), la Fédération Internationale des Producteurs Agricoles (FIPA) et la RCC (Italie) ainsi que leurs partenaires associatifs et institutionnels constitue une étape importante pour tous ceux qui sont impliqués dans la lutte contre la désertification. Mais aussi pour ceux pour qui ne le sont pas ou qui hésitent à s'y investir.

Pour la première fois depuis les négociations et l'entrée en vigueur de la Convention des Nations Unies pour la Lutte Contre la Désertification, un forum réunissant un échantillon significatif d'acteurs de la société civile de tous les continents s'est exprimé sans équivoque sur ce problème grave à l'attention des citoyens, des scientifiques et des décideurs.

La première idée forte qui s'est dégagée de DESERTIF' ACTIONS est l'affirmation que la désertification a mauvaise presse, qu'elle est mal perçue et mal comprise mais qu'elle n'est pas une fatalité et quelle peut et doit être combattue. En particulier parce qu'elle ruine déjà l'avenir de millions de personnes, et aussi parce qu'elle menace des millions d'autres sur les 2,5 milliards de personnes qui vivent dans ces zones et pour qui il n'y a pas d'alternative crédible que de vivre là où elle sévit. C'est d'abord parce que la désertification est inacceptable dans son ampleur et ses conséquences sur la vie des gens et la pérennité des écosystèmes que la lutte contre la désertification est une cause de dimension mondiale.

La seconde idée forte de DESERTIF' ACTIONS est que l'on commence seulement à pouvoir évaluer de façon globale les conséquences de la désertification et qu'il devient dès lors plus facile d'expliquer les raisons pour lesquelles il faut se mobiliser. L'état des lieux sur la question présenté par des scientifiques au début de DESERTIF' ACTIONS a insisté sur les liens avec les questions du changement climatique non seulement en termes d'aggravation de la désertification, mais aussi sur la réduction des capacités d'adaptation qui en découlent. Il en est de même pour la biodiversité, en particulier celle à fort endémisme, sur laquelle s'exerce une surexploitation et la destruction des habitats. Le lien a explicitement été fait avec les flux migratoires et leur augmentation prévisible pour cause de raréfaction des ressources naturelles liées à la désertification et à la modification du cycle de l'eau. Enfin, et c'est un fait nouveau, les questions des pertes économiques liées à la désertification indiquent des montants évalués à 42 milliards de dollars qui oblitérent, dans de nombreux pays, toute perspective de développement.

La troisième idée significative de DESERTIF' ACTION est que la lutte contre la désertification se situe à des niveaux d'organisation et d'action très variés et rien de significatif ne peut être réalisé sans la participation et la coopération de la société civile dans toutes ses composantes – scientifiques, associations, organisations d'agriculteurs, opérateurs économiques et autorités locales – qui doit donc s'organiser comme partie prenante aux décisions et à la mise en œuvre du plan multilatéral au plan local.

Enfin le DESERTIF' ACTIONS a aussi mis en évidence des signes d'espoir par l'éclairage porté sur un grand nombre d'initiatives déterminées entreprises par des

acteurs de la société civile, dont bon nombre d'initiatives économiques tendant à prouver que les zones arides ont un potentiel très largement sous-valorisé pour cause de manque d'investissement approprié.

Les pistes ouvertes par le concept original de DESERTIF' ACTIONS – mixité des acteurs participants autant géographique que socio-professionnelle, dimension culturelle et rencontre avec le grand public, co-animation avec des scientifiques - sont nombreuses et ne demandent qu'à être mise en oeuvre par la prise en compte à tous les niveaux requis de l'Appel de Montpellier pour la lutte contre la Désertification dont nous encourageons la diffusion la plus large. De plus, DESERTIF' ACTIONS s'inscrit dans une période de grands bouleversements dans la perception des grands problèmes d'environnement par l'opinion publique et dont il faut chercher à profiter de la dynamique.

Le Forum en résumé

Les participants

Des participants sont venus de tous les continents. Bien que la majorité de ces participants soient des représentants d'ONG, d'autres catégories de la société civile ont également été bien représentées, comme les scientifiques, les agriculteurs et les institutionnels. Seul le secteur privé a fait défaut malgré plusieurs invitations et relances de la part des organisateurs.

L'événement a regroupé 209 participants, soit :

- Plus de 110 ONG issues de 49 pays : Afrique du Sud, Burkina Faso, Burundi, Cameroun, Congo, Djibouti, Ethiopie, Kenya, Mali, Mauritanie, Namibie, Niger, Ouganda, Sénégal, Soudan, Tchad, Togo, Zimbabwe, Canada, Argentine, Bolivie, Brésil, Chili, Cuba, Haïti, Pérou, Chine, Inde, Philippines, Allemagne, Finlande, France, Italie, Pays bas, Royaume Uni, Norvège, Moldavie, Tadjikistan, Algérie, Jordanie, Liban, Maroc, Syrie, Tunisie, Emirats Arabes Unis, Iran, Pakistan ;
- les Nations Unies ;
- Une trentaine d'organismes et de bénévoles ;
- Des scientifiques : le **Comité Scientifique Français de la Désertification**, l'IRD, le CIRAD, l'IAMM, l'OSS, ainsi que quelques scientifiques étrangers parmi les participants pris en charge ;
- Des Institutionnels : le Ministère des Affaires Etrangères, le Ministère de l'Ecologie et du Développement Durable, l'Agence française pour le Développement, le Secrétariat de l'UNCCD, la GTZ, le CILSS, le Mécanisme Mondial, le Fonds international de Développement Agricole, le PNUD etc. ;
- Des Collectivités locales : la Mairie de Montpellier, le Conseil Général de l'Hérault, le Conseil Régional de Picardie, des maires du Mali, du Niger etc. ;
- Des agriculteurs issus d'organisations agricoles membres de la Fédération Internationale des Producteurs Agricoles (FIPA).

Les bailleurs

Le Désertif'Actions a bénéficié de 200 000 euros de financements de la part du Ministère des affaires étrangères (MAE), du Ministère de l'écologie et du développement durable (MEDD), de l'Agence française de développement (AFD) et du Fonds français pour l'environnement mondial (FFEM) pour la France, du Mécanisme Mondial (MM) et du Fonds international de développement agricole (FIDA) pour l'international.

De plus, la Ville de Montpellier et le Conseil Général de l'Hérault ont apporté leur soutien en nature.

Les Objectifs

Désertif'Actions dans la continuité du sommet de Johannesburg

Le sens global du forum Désertif'Actions est de permettre la rencontre des organisations de la société civile travaillant dans les zones arides dans le cadre de la Convention des Nations-Unies pour la Lutte contre la Désertification (UNCCD) et d'autres accords multilatéraux pour communiquer sur l'importance du travail dans les zones arides à une large audience d'ONG, de collectivités locales, d'institutions internationales et au secteur privé. Ce forum fait suite à l'appel lancé en faveur d'un soutien plus accru pour la mise en oeuvre de la Convention des Nations Unies de lutte contre la désertification, lors du dernier sommet mondial sur le développement durable à Johannesburg. Celui-ci ouvre la voie pour une mobilisation renouvelée des acteurs de la société civile.

Aussi, le pool des organisations de la société civile organisant cette rencontre (CARI, Enda tiers monde, Both Ends), met-il en exergue le « *décalage entre l'ampleur du phénomène de désertification et la portée limitée des actions entreprises, jusqu'ici, par les différents groupes d'acteurs*

(i) *et entre la faible mobilisation des acteurs de la société civile, comparativement à la place qui leur est accordée, en tant que partenaires à part entière des pouvoirs publics* »

(ii) dans le texte de la Convention.

Le forum a trois objectifs et sujets spécifiques :

1. rendre la question des zones arides plus prioritaire dans les agendas politiques nationaux et internationaux.
2. explorer le potentiel économique innovant des zones arides en vue d'accroître le revenu des communautés locales.
3. faire entrer le rôle des organisations de la société civile et leurs réseaux nationaux/internationaux dans une stratégie.

Outre ces objectifs spécifiques, les trois ateliers du forum ont eu pour mission de définir au moins quatre recommandations en direction des décideurs, des donateurs, et des institutions internationales sur la manière dont ils devraient soutenir et renforcer les activités de la société civile pour réduire la pauvreté dans les zones arides. Ces recommandations ont contribué à l'élaboration d'un « Appel de Montpellier pour les zones arides » qui comporte aussi une prise de position sur la valeur des zones arides et leur importance pour le mode de vie de nombreuses populations, ainsi qu'une stratégie pour une implication claire des organisations de la société civile.

Eléments de contexte

Le rôle des zones arides dans l'écosystème global est incontestable : elles occupent 30% de la surface du globe, elles sont réparties sur tous les continents, et la biodiversité des espèces qui les composent est endémique. Cette caractéristique unique doit être mise en rapport avec un second constat tout aussi éloquent : un

milliard d'hommes et de femmes vivent dans ces régions et sont parmi les plus pauvres de la planète. L'évolution négative des zones arides en termes de désertification est avérée comme un problème clé, un enjeu pour tous du présent et du futur.

Malgré de forts engagements, de nombreux acteurs de terrain agissent souvent avec de faibles moyens et ont de grandes difficultés à se faire entendre ; ils ont de plus en plus de mal à endiguer l'accroissement des problèmes liés à la dégradation du milieu, en premier lieu celle des terres, et leurs conséquences alarmantes sur la vie et le revenu des populations rurales.

Les politiques publiques nationales et les cadres de référence internationaux, dont la Convention des Nations Unies sur la Lutte contre la Désertification, sont en échec pour réunir la masse critique de volontés et de moyens indispensables à une dynamique collective d'action. L'absence de consensus sur une stratégie d'intervention cohérente, ainsi que sur la définition d'objectifs prioritaires, limite fortement la portée effective des efforts engagés sur le terrain.

Le monde scientifique a réalisé de nombreux travaux sectoriels sur le sujet, mais ceux-ci sont souvent mal connus et très peu valorisés par les acteurs de la lutte contre la désertification à tous les niveaux de l'action. Par ailleurs, il n'a pas réussi à ce jour à produire une connaissance globale du sujet et constituer un argumentaire solide de nature à peser – à l'instar des travaux sur le changement climatique - sur les décisions politiques.

Trois constats significatifs du débat international posent question :

- la disparition progressive de la lutte contre la dégradation des terres et du développement des zones arides dans l'agenda politique des donateurs malgré quelques rappels incantatoires dans les déclarations internationales ;
- un accroissement de l'intérêt des institutions multilatérales telles que la Banque Mondiale pour les zones arides centré majoritairement sur les aspects économiques ;
- la persistance d'une faible implication de la société civile, aussi bien dans les pays du sud que dans les pays du nord, pour mettre en commun ses atouts pour l'action et peser sur les choix et orientations des politiques.

La démarche du forum

Ces évolutions conjuguées risquent à court terme de mener au désengagement de la communauté internationale ou à des options de développement non durables aussi bien pour ces territoires que pour les populations qui y vivent. C'est pourquoi nous pensons que les organisations de la société civile devraient s'investir en tant que parties prenantes, déterminer les actions possibles, identifier des options de développement durables alternatives et avoir une discussion stratégique sur les arguments et moyens pour peser de toutes leurs forces dans la fixation des priorités des décideurs.

Une telle démarche s'appuie obligatoirement sur la construction d'arguments recevables à faire valoir dans la compétition entre vraies et fausses urgences mondiales. C'est pour établir le diagnostic, réunir les éléments du plaidoyer et définir ensemble les étapes et les objectifs stratégiques à atteindre que Desertif'Actions propose de mettre ces questions au débat. Un forum électronique lancé en juin 2006 et la fourniture par les participants de 90 contributions ont porté sur un ensemble de questions ouvertes mentionnées dans le chapitre suivant pour introduire le travail préliminaire des participants à travers leurs contributions et les messages échangés sur le e-forum.

Les Éléments saillants ressortis du forum

Priorité des zones arides dans les agendas nationaux et internationaux

Les PAN

Il est nécessaire de faire remonter les PAN au niveau d'une stratégie nationale négociée avec tous les acteurs, et notamment ceux de la société civile incluant par exemple les organisations de femmes, les syndicats de producteurs, etc. En effet, la société civile a pu être impliquée dans la formulation de la plupart des PAN et dans la négociation de leurs priorités.

Il y a un besoin de développer des outils décentralisés pour élaborer les PAN et pour les mettre en oeuvre, à la fois au niveau local et au niveau régional. De nouveaux acteurs doivent donc émerger comme parties prenantes dans les négociations.

Afin d'opérationnaliser les PAN, on peut recommander de faire une évaluation des PAN déjà élaborés pour déterminer les raisons de l'échec ou de la réussite de leur mise en oeuvre. Il faudrait aussi définir dans les PAN des objectifs temporels et quantitatifs à atteindre assortis de systèmes adaptés de suivi-évaluation. La participation de la société civile dans toutes ces étapes de la redynamisation des PAN doit être assurée.

Tout le monde est d'accord sur l'insuffisance des moyens donnés aux PAN. Un mainstreaming est nécessaire à plusieurs niveaux : au niveau national, les gouvernements doivent mieux montrer leur intérêt et leur engagement dans la lutte contre la désertification ; alors, les donateurs suivront. Mais il faut aussi un mécanisme spécifique pour canaliser les fonds : par exemple, l'approche chef de file a été mentionnée. Ce n'est que dans le décloisonnement et la concertation des acteurs dans des plates-formes que les choses pourront avancer.

L'action de la société civile

La société civile est l'acteur principal de promotion des zones arides et de la lutte contre la désertification au niveau national et international. Elle doit entre autres s'engager dans des actions de communication et de formation, pour montrer que la désertification est un problème mondial et souligner l'importance de la synergie entre les trois conventions.

Il y a un besoin accru de synergie et d'alliances entre les différents acteurs pour obtenir des résultats dans les zones arides.

La nature de la société civile rend nécessaire une meilleure alliance entre la société civile du nord et du sud. Cette alliance permettra de rendre plus efficace les mécanismes d'actions à différents niveaux. Les alliances entre société civile du nord et du sud doivent s'incarner dans des partenariats qui valorisent les avantages comparatifs respectifs et qui se préoccupent de tous les niveaux de mise en oeuvre des PAN et pas seulement au niveau de l'action de terrain.

Au niveau local, la société civile doit s'impliquer dans le renforcement de la gouvernance locale en terme de gestion des ressources naturelles.

Il faudrait que les points focaux et les organes nationaux de coordination (ONC) soient représentatifs de tous les acteurs, ce qui nécessite qu'ils prennent mieux en compte la voix des organisations communautaires de base : groupement de producteurs, notamment.

Formation et capacité

Les participants ont souligné le besoin d'une synergie dans la formation et le renforcement des capacités des acteurs à tous les niveaux et ils demandent un engagement ferme sur le long terme des bailleurs à ce sujet.

Ce renforcement des capacités doit s'adresser non seulement à la société civile mais aussi aux politiques et aux administrations concernés, aux différentes échelles de décision et d'action. Il doit favoriser un dialogue multi-acteurs et des échanges sud-sud, notamment d'expériences entre pays, en incluant les services décentralisés des pays.

La société civile souhaite aussi affirmer sa compétence en matière de formation et de renforcement des capacités, en particulier auprès des autres acteurs. La reconnaissance de ce rôle permettra la diffusion d'idées nouvelles aux décideurs pour la mise en oeuvre de projets de LCD.

Les participants souhaitent enfin préciser que le succès de la Déclaration de Paris aussi appelée Nouvelle Architecture de l'Aide Internationale dépend fortement de l'engagement des bailleurs à renforcer les capacités des acteurs de la société civile, car tous les acteurs doivent savoir comment accéder aux fonds disponibles et être en mesure de le faire.

Les demandes aux bailleurs

La société civile demande au FEM d'accroître son implication dans la LCD et de favoriser l'action de la société civile en :

- augmentant les fonds consacrés à la LCD ;
- favorisant la participation de la société civile dans l'accès à ces fonds et dans leur utilisation ;
- leur facilitant l'accès aux fonds ;
- augmentant l'enveloppe consacrée aux petits projets (programme des petites subventions).

Les différents bailleurs doivent se coordonner entre eux pour améliorer l'efficacité des actions de LCD. À ce titre, société civile et gouvernements devraient s'associer pour assurer cette meilleure coordination des bailleurs.

Il y a un besoin de développer une approche fonds, une alternative à l'approche projet, pour mettre des moyens plus accessibles à la disposition des acteurs locaux. Cela permettrait notamment d'assurer la continuité des actions de LCD sur le terrain. L'exemple des fonds nationaux de désertification a été plusieurs fois cité.

Les demandes à la CCD

Pour donner un nouvel essor à la Convention, il est nécessaire de définir des objectifs de LC à moyen et long terme qui soient clairs et identifiables par tous.

La société civile demande que soient reconsidérés la fonction et le mandat du CST dans le but qu'il devienne un organe indépendant et susceptible d'éclairer utilement les États.

La société civile demande enfin aux Parties d'attacher plus d'importance au fond des débats lors des CRIC et des COP et de ne pas se focaliser uniquement sur les aspects financiers et budgétaires. Les COP et CRIC doivent se doter d'une méthode de travail qui focalise sur la substance (le fond) de la LCD moins que sur le protocole.

La recherche et la société civile

Pour ce qui concerne la recherche dans les zones arides, l'engagement des pays et de la communauté internationale est en diminution constante depuis plusieurs années.

La société civile demande aux pays et à la communauté internationale de maintenir le niveau d'investissement dans les zones arides et disséminer les résultats déjà existants aux acteurs et aux utilisateurs. La communauté scientifique et la société civile doivent développer leurs liens pour promouvoir des partenariats de recherche : définition de thèmes de recherche et élaboration de méthodes de travail, en privilégiant les approches pluridisciplinaires.

Potentiel économique et développement des zones arides***Quels types de produits et activités devront être développés pour valoriser les zones arides ?***

1. Développer des produits à haute valeur ajoutée : les productions devront être mises en valeur par le développement de labels et des systèmes de certification et de qualité, en veillant à l'harmonisation de tous ces systèmes et au respect des cahiers des charges.
2. Diversification et développement d'activités non agricoles et transformation locale des produits pour générer des revenus complémentaires, notamment pour réduire la pression sur les ressources naturelles (sources d'énergies renouvelables, plantes médicinales et aromatiques, fruits séchés, etc.).
3. Développement de systèmes de communication pour améliorer la visibilité et mettre en avant la spécificité des produits locaux des zones arides auprès des consommateurs et des industriels, notamment par la mise en place d'un label « produits des zones arides ».
4. Reconnaissance du rôle du pastoralisme comme un élément essentiel de la gestion durable des zones arides.

La recherche en réponse aux besoins de la société civile

1. Développer des nouvelles recherches et valoriser celles qui existent déjà pour construire un argumentaire économique, social et politique afin de démontrer les avantages comparatifs et les atouts des zones arides.
2. Identifier des produits des zones arides ayant un potentiel économique. Il est pour cela nécessaire de procéder en même temps à une identification des marchés.
3. Nécessité d'investir dans la recherche pour développer des produits innovants à partir de produits traditionnels et de techniques protectrices de l'environnement (agriculture de conservation, par exemple).
4. Inciter la communauté scientifique à mettre en place les procédures permettant de prendre en compte les besoins des acteurs locaux et les faire participer à la création et à la validation des connaissances.
5. En parallèle, un espace de concertation doit être mis en place pour identifier des solutions dans le but d'équilibrer les différents intérêts des différentes parties prenantes (pasteurs, organisations agricoles, communautés rurales, secteur privé, pouvoirs publics et collectivités locales).

Rôle des acteurs, des pouvoirs publics, de la société civile, des producteurs

1. Les potentiels économiques existent. Il est nécessaire de développer un langage direct en direction des décideurs pour favoriser un traitement spécifique des zones arides en matière de politiques agricoles.

2. Pour convaincre les décideurs (aux niveaux national et international) d'intégrer la lutte contre la désertification dans les politiques de développement et de lutte contre la pauvreté, il est nécessaire de construire un argumentaire en lien avec des enjeux nationaux et globaux tels que la problématique des migrations, l'adaptation aux changements climatiques, la prévention des crises et des conflits. L'objectif étant de montrer que les zones arides contribuent au développement des pays.

3. Prise en charge par les collectivités nationales et internationales (différents acteurs à différents niveaux) des coûts liés à la protection de l'environnement.

4. Création par les autorités locales et nationales d'environnements favorables (mesures incitatives, cadre réglementaire) pour l'émergence de regroupements d'acteurs locaux tels que les organisations professionnelles d'agriculteurs et de pasteurs, la création de structures de micro crédits, des associations d'usagers pour la gestion des ressources naturelles, etc. Ceci inclue également la mise en place par les acteurs locaux de mécanismes financiers pour réduire la vulnérabilité des populations aux variations climatiques annuelles en garantissant un revenu minimum.

5. Le rôle des organisations agricoles est central et multiple pour développer les potentiels économiques des zones arides, semi-arides et sub-humides sèches, et garantir des revenus décents pour les agriculteurs, en mettant à leur disposition les services suivants :

- Planification et gestion de la production en fonction des opportunités de marché ;
- Conseils aux producteurs (vulgarisation) en matière de pratiques agricoles durables et de première transformation ;
- Achats groupés d'intrants et conseils en modalités d'utilisation ;
- Recherche de marchés, négociation des prix ;
- Renforcement des capacités des agriculteurs en matière de leadership.

6. La participation effective des représentants agricoles ainsi que des populations des zones arides à la formulation des politiques publiques est nécessaire.

7. Il est nécessaire d'agir sur les règles de commerce international (OMC - accords de commerce régionaux) afin de permettre l'accès aux marchés internationaux.

8. Les gouvernements nationaux doivent fixer des règles d'éligibilité des programmes de développement ruraux intégrant la viabilité économique, l'acceptabilité sociologique (répondant à une demande locale) et la durabilité écologique.

Renforcement des capacités

1. Il est important de renforcer les capacités des populations locales (producteurs) en matière de connaissance de l'ensemble des filières (collecte, transformation et commercialisation).

2. Le rôle des femmes est important pour la valorisation économique des productions locales et traditionnelles.

Un espace sous contrainte : besoin d'équilibre

Il est impératif de trouver un équilibre entre l'intensification des productions locales et la protection de l'environnement. Cet équilibre doit aussi se manifester entre les groupes d'utilisateurs (agriculture – élevage) pour réguler les conflits d'intérêt.

Rôles et stratégies des organisations de la société civile***1. Les perceptions de la désertification, favorisent-elles l'engagement des acteurs de la société civile dans la mise en œuvre de la convention ?***

- Les perceptions de la désertification sont multiples et différentes en fonction des perspectives régionales (particulièrement au Nord et au Sud), de même que les perspectives des différentes parties prenantes et les modèles économiques et politiques qui renseignent sur ses perspectives.
- La confusion entre « déserts » et « désertification » est courante !
- La désertification est vue comme une peste ou une malédiction contre laquelle on ne peut rien faire !
- La désertification est causée par la pauvreté mais en retour elle entraîne aussi la pauvreté.
- Les pauvres n'ont pas d'autres choix que de dégrader l'environnement !

Certaines de ces perceptions incitent à l'action, mais d'autres n'en incitent pas. Le lien entre pauvreté et désertification est un point fort de mobilisation, particulièrement dans le cadre des objectifs du Millénaire pour le développement.

2. Renforcer la société civile dans les pays du Nord

Les grandes campagnes médiatiques en cours, y compris les médias de masse, de sensibilisation et de conscientisation, doivent cibler les décideurs et tous les segments de la société, y compris les jeunes qui doivent user des arguments scientifiques pour souligner les liens entre les inégalités en matière de commerce, de pauvreté, de migration, et de changement climatique. La désertification est un phénomène global qui a un impact à la fois sur les pays du Sud comme sur ceux du Nord et tous doivent en partager la responsabilité.

3. Renforcer la société civile dans les pays du Sud

La structure des réseaux de l'organisation de la société civile (OSC) et la coordination de l'action de la société civile à tous les niveaux (local, régional, et global) doivent être conceptualisées en partant de la base.

L'information et la sensibilisation (y compris par les médias de masse) sont nécessaires pour sensibiliser les décideurs et le public et pour mobiliser la société civile. Les autorités au niveau local doivent être conscientes des succès réalisés dans la lutte. Les points focaux nationaux ont un rôle clé à jouer.

4. Les nouvelles stratégies requises pour les organisations de la société civile dans les pays du Sud : liens et mécanismes pour créer des synergies opérationnelles entre les différentes parties prenantes (société civile du Nord et du Sud, la communauté scientifique, les gouvernements, etc.)

Il est nécessaire d'avoir une structure mondiale dirigeante formalisée pour coordonner les positions de la société civile en ce qui concerne la convention, pour constituer un pont entre le Nord et le Sud, les lobbys nationaux et les décideurs au niveau international, et pour mobiliser les fonds pour les activités de la société civile. Cette structure devra s'appuyer et promouvoir la connaissance de la communauté

scientifique et celle des communautés locales, et devra veiller à ce que les organisations de la société civile contribuent, de par leur expertise et leurs connaissances, à la connaissance de la communauté scientifique.

5. *Susciter des motivations pour une intégration effective de la lutte contre la désertification dans les objectifs de développement du millénaire, dans les accords multilatéraux sur l'environnement, et dans les stratégies de réduction de la pauvreté*

La société civile doit développer une stratégie globale pour promouvoir des stratégies entre toutes les conventions et intégrer les actions qui contribuent à la réalisation des OMD et de trouver des solutions relatives aux problèmes. La mise en oeuvre des OMD de manière isolée avec l'UNCCD et les autres MEA est contreproductive.

En reconnaissant que la paix sociale est essentielle pour un développement durable, les organisations de la société civile encouragent fortement les gouvernements et la communauté internationale (y compris les organisations bilatérales et multilatérales pertinentes) d'intégrer les questions relatives à la désertification et à la migration forcée, dans les politiques et stratégies de développement, dans les programmes et dans les projets.

Les engagements pris par les gouvernements et la communauté internationale doivent être respectés, et la société civile doit jouer son rôle de contrôleur de conformité.

Les expériences en terme de réalisations réussies des synergies dans la mise en oeuvre de la convention doivent être documentées et présentées pour servir d'exemple.

Les indicateurs pour le contrôle et l'évaluation du succès de l'intégration doivent être développés et utilisés. Les OSC doivent jouer un rôle central dans le contrôle de la mise en oeuvre de la CCD.

6. *Le contexte, les conditions et le soutien dont la société civile a besoin pour augmenter sa contribution à la mise en oeuvre des plans d'actions pour lutter contre la désertification*

La contribution des organisations de la société civile dans la mise en oeuvre de l'UNCCD doit être reconnue par les gouvernements et les organisations bilatérales et multilatérales. Les organisations de la société civile doivent partager l'information et veiller à ce que leurs contributions soient clairement comprises et générer du respect pour les OSC. Une attention particulière doit être donnée à la contribution potentielle des jeunes générations pour lutter contre la désertification.

Les ONG qui ont beaucoup de ressources, les Parties de la convention, les organisations bilatérales et multilatérales doivent contribuer au renforcement des capacités en matière de développement des organisations de la société civile (capacités institutionnelles, etc.).

Les coopérations Sud-Sud et Nord-Sud doivent être renforcées dans le cadre d'un organe de coordination mondiale.

Policy Feedback from GEF – IYDD Events

Jos Lubbers
GEF Secretariat

Introduction

The GEF Council in November 2005 noted that the International Year of Deserts and Desertification offers a unique opportunity for the GEF to contribute to raising global awareness of the threats of land degradation and avenues for addressing the challenges of land degradation and sustainable development. It was decided to support a number of activities.

1. Production of a report in cooperation with the Global Mechanism on “Resource mobilization and the Status of Funding of Activities related to Land Degradation”
2. Contribution to the use of indicators for sustainable land management at the UNESCO international scientific conference on the future of arid lands (Tunis, June 2006)
3. Organization of a Forum at the GEF Assembly on sustainable land and water management (Cape Town, August 2006)
4. The Algiers Policy Imperative Joint International Conference (Algiers, December, 2006)

During the Cape Town Forum, an international audience of 250 experts and policy makers discussed the results of the report on resources mobilization, the Tunis scientific conference and lessons from GEF land and water activities. A high-level roundtable meeting summarized the discussions and agreed to issue conclusions and recommendations in the Cape Town Statement. The full report of the Cape Town Forum and the report “Resource mobilization and the Status of Funding of Activities related to Land Degradation” are available.

Also in this International Year of Deserts and Desertification, GEF-3 moved into GEF-4 with a successful replenishment, the appointment of a new CEO, and a whole range of innovations in progress including a new GEF strategy for Land Degradation.

This paper will present an overview of the extent of Land Degradation, the response to the problem of Land Degradation and recommendations for Sustainable Land Management drawing on the above mentioned IYDD activities, and the new GEF strategic directions for Sustainable Land Management.

The Extent of Land Degradation

A global issue

Increasing demands on land from global economic growth, expanding cities, and rural people are driving unprecedented land use change. Land use change is often driving soil erosion, water scarcity and salinity, nutrient overdraft, pollution and forest loss - undermining the ecosystems that support our habitat, economy and society.

Land degradation is not just a collection of local problems; it is a global issue responsible for climate change, loss of biodiversity, rural poverty, and the migration of people to cities and across borders. Land degradation affects an estimated 2.6 billion people in more than 100 countries and more than 33 percent of the earth's land surface. Around 73 percent of rangelands in drylands are currently being degraded,

together with 47 percent of marginal rain-fed croplands and a significant percentage of irrigated croplands. It is estimated that 5 million to 7 million hectares per year have gone out of production because of land degradation. Deforestation is one of the major causes.

Global environmental impact

Desertification and deforestation have strong global environmental impacts. Land degradation interrupts the carbon cycle and disturbs the carbon pools in soil and above-ground vegetation. Estimates of historical contributions of agriculture to atmospheric CO₂ suggest that LD has a very significant impact, through raising CO₂ concentrations, on climate.

The disruption of ecosystems reduces the biodiversity of the vegetation and the sub soil. Land-use change will have strong effects but exact data are scarce and the variability in the sensitivity of different ecosystems to LD and the biodiversity they contain require further study. The effects of deforestation on global biodiversity are large and well documented.

International freshwater basins and marine ecosystems are polluted as a consequence of LD, with increased sedimentation and eutrophication of wetlands, waterways and coastal areas.

Poverty link

Extreme land degradation and extreme poverty go hand in hand in drylands, where a combination of unsustainable land management and fluctuating weather conditions increase the vulnerability of the communities.

In the poorest countries, especially in Africa, LD is a threat to food security. Food needs are increasing faster than food production because of population growth, lower rates of new land being put into production and declining yields. The poorest of the poor depend heavily on forests for part of their income and put extra stress on these ecosystems when rangelands and croplands cannot fulfill and sustain their livelihood.

Land degradation is an environmental issue and, at the same time, a development issue. Sustainable land management is essential to both combating degradation of ecosystems and to improving human well-being. The GEF's mandate is to assist in the protection of the global environment and thereby promote environmentally sound and sustainable economic development. The effectiveness in securing global environmental benefits is enhanced if local interests are well addressed and sustainable development goes hand in hand with the maintaining or recovering of environmental services.

Economy

An economic analysis estimated the global costs of lost productivity as a result of land degradation at 65 billion USD annually (Dregne and Chou, 1992 and inflation adjusted). However there is no commonly accepted calculation method, especially in developing countries where common property is widespread and data are difficult to obtain. In addition to productivity losses, there are off-side impacts of erosion, food insecurity, poverty and lost environmental services. Very little has been done to assess these costs in space and time.

The Response

International and national

A global convention (UNCCD) to agree on policy and for coordinated action and reporting is in place. Affected parties to the convention have developed policies and national action programs (NAP's). In some countries, SLM is now a national priority with policies integrated in national development frameworks and with growing national budgets for SLM. Many other countries are just beginning to develop national awareness and policy for SLM, but lack all basic capacity. GEF projects can support both kinds of countries with the implementation of well-developed projects including basic policy and capacity development.

The GEF has a Focal Area on Land Degradation (Desertification and Deforestation) with an Operational Strategy for Land Degradation. The GEF has provided a new impetus to efforts to combat land degradation through its many linkage projects and through its Operational Program 15 on Sustainable Land Management (SLM) which started in 2003 to support innovative and catalytic activities through investments, capacity building, projects, and framework processes such as Country Pilot Partnerships (CPP). SLM is being carried out in national development programs and donor cooperation frameworks through GEF's collaboration with the UN Convention to Combat Desertification (UNCCD) and the Global Mechanism. These initiatives are beginning to make a difference and need to be continued and expanded.

Investments

Information on financial investments in SLM and its impact is very difficult to obtain.

On-farm investment should be borne by the farmer, but this is only likely to happen if the farmer has appropriate information, a dependable market, and secure land tenure to justify long term investments of labor and capital. Off-farm investments required to support the process will have to be borne by the public sector. The data on what is currently invested in sustainable land management or in combating desertification is very incomplete. This is particularly the case with regards to governments' own investments to support an enabling environment for SLM. The bilateral and multilateral investments are estimated at 4 billion USD annually. Better analysis and accounting procedures of both country and donor investments and priorities are needed. UNCCD, OECD and GM are working on a standardization of reporting.

The GEF, during GEF-3 (2002 – 2006), allocated 197.3 million USD to activities addressing land degradation as a threat to biodiversity, international water bodies, and global and regional climate patterns. In the same period, 259.7 million USD was allocated to address land degradation under the new LD focal area. The total co-financing was 2.3 billion USD. The demand for GEF support is high and given the limited resources available, the strategy to support catalytic and innovative activities, and for cost effective reasons, is to focus on prevention of land degradation and not to include rehabilitation of degraded lands.

The evaluation of the impact has not yet begun because implementation of the projects in the LD Focal Area has just started or will start during the beginning of GEF-4. The GEF will develop a system of indicators in consultation with the UNCCD Committee for Science and Technology which will be used for monitoring, evaluation and reporting purposes.

Integrated approach

The Millennium Ecosystem Assessment produced strong recommendations towards Integrated Natural Resources Management to maintain the environmental services. The GEF builds upon these lessons and upon the lessons from the GEF LD Focal Area to develop a GEF-wide integrated approach. In SLM projects, it is common practice to account for the effects of activities not only on land and water improvement, but also on biodiversity of international importance, international waters and climate change. The focal area silo structure of the GEF, with each having its financial allocation and focal area specific objectives related to the global environmental conventions, limits the possibilities for integrated project and program development. Under the GEF-4 period, policy and operational change will better facilitate opportunities for an integrated approach with synergistic effects on the global environment. There is also a lack of expertise and capacity in countries and international agencies to facilitate the integration of SLM activities into country programs and policies. The co-operation between ministries and between governments, local communities, NGOs and the private sector needs improvement. The GEF Resource Allocation Framework will enable countries to take a stronger leading role in GEF program development which offers opportunities to combine GEF resources for integrated environmental approaches.

Challenges and policy recommendations

Taking into account the extent of the problem of land degradation and the given current capacity for SLM at national and international level, it will be a big challenge to reverse the negative global extent and global environmental impact of land degradation in the near future through activities and investments. Experience with policy implementation and interventions have shown that one-dimensional technical solutions for land degradation are the exception and that comprehensive long term approaches and engagements are needed.

Barrier removal for Sustainable Land Management

One of the strategies for the GEF-4 period (2006-2009) aims at long term engagements to achieve system-wide change, and will focus on barrier removal for Sustainable Land Management. Barrier removal is aimed at policy, institutional, technical, capacity and financial barriers to SLM. Activities will be developed to remove the barriers to SLM at the country level.

Many years of experience with technical projects in the field of rangeland, forest and cropland management have shown that technical approaches can especially be useful and sustainable if an enabling environment is in place.

Policy, institutional, technical, capacity and financial barriers have plagued both donor and recipient systems with the implementation and sustainable impact of land management programs. Such barriers include government and international pricing policies, centralization of government control, the lack of local institutions (such as market and extension services), and the lack of local decision-making structures. Other barriers may include policy and legislative issues such as the link between land tenure and the ability to invest in improvements, the impact of taxation and subsidies on production and distribution, the role of health and educational services, and access to labor and effective extension services. Technical barriers and shortage of capacity are a result of lack of knowledge sharing systems including inadequate education, extension services and other forms of information exchange. Conflicts between modern and traditional systems of management may also be a factor.

The key to removing these barriers is the realization that the problem is multifaceted and important, and responses need to be incorporated into the decision-making process on all sides. SLM cannot be achieved if national policy is not in place and if it is not appropriately incorporated in national development strategies. National policy enforcement needs to be supported with national budgets for SLM which are as such an expression of the government's commitment to SLM.

Country Partnership Programs

One of the more promising instruments through which barriers will be removed is partnership building.

The GEF developed a model for country partnerships which, during GEF-3, led to the first integrated Country Partnership Programs (CPP) in Namibia, Cuba, the Central Asian Republics (CACILM) and Burkina Faso. Country Partnerships for Vietnam and Ethiopia as well as the regional Strategic Investment Program for Africa (SIP) are in preparation.

A review of the early experiences with CPP's in Namibia and Burkina Faso shows the following preliminary results.

1. Inter-sectoral integration and mainstreaming of SLM

At the local level, communities have an integrated approach to natural resources management which is usually not supported with a national cross-sectoral policy environment. The CPP brings different sectoral ministries, NGOs and private sector partners together. Resources are focused on these partnerships to support integrated approaches. The CPP process seems to be supportive of the mainstreaming of SLM in national development policies. The national initiatives and policy areas that fall within the CPP mechanism include: combating of desertification, biodiversity conservation, poverty reduction, rural development, land-use planning and capacity building at various levels. The CPP brings these all together and provides a means of turning the various statements of intent into focused action with defined outputs and outcomes in mind. Long term engagement is the point of departure.

2. Donor coordination

In both Burkina Faso and Namibia, other donors in the land and natural resources sector are generally positive about working within a CPP framework, since they feel that their initiatives will have a greater chance of success because of a more conducive operational environment through enhanced political focus and support, policy harmonisation, improved incentives, and a better alignment of technical staff from both government and civil society in multi-agency and multi-sectoral partnerships.

3. From project based design to program based design

The program design builds upon the previous project approach and brings partners together under an umbrella framework for sustainable land management. Shared objectives and monitoring frameworks will provide more synergy and reduce transaction costs.

4. Country commitment ownership and country drivenes

Countries show great interest in CPPs. The CPPs in Namibia and Burkina Faso are seen to be an enabling framework set at the national level, but being largely designed and driven at the local level they address local issues, challenges and opportunities.

As such, they represent a dynamic and flexible mechanism to respond to local and differing conditions and priorities - an international mechanism with national frame-setting and local design, thereby ensuring national and local relevance. The CPP stimulates country ownership and leadership role, and facilitates the development of national capacity to formulate SLM strategies, programs and projects.

Major achievements to be expected at the local level:

- Secure tenure
- Devolution and removal of bureaucratic barriers
- Local institutional mechanisms for management of common property resources
- Integrated technical support systems and tools
- Improved Capacity

Major achievements to be expected at the national level:

- Stronger national ownership
- Policy harmonisation & strengthening
- Integration, collaboration and mainstreaming

Knowledge management

SLM involves a combination of scientific knowledge, local knowledge and know-how, innovation, and community-driven action. New capacity for knowledge management and exchange plays a key role; transparent knowledge-sharing and feedback are important GEF principles.

New operational knowledge will be generated to better understand underlying factors of Land Degradation and to help GEF and other interventions to lift barriers to SLM. Knowledge will be disseminated and shared in a transparent way for use by decision makers in governments, NGOs, communities, scientific institutions and the private sector. Knowledge will be made accessible, and if possible, through existing knowledge networks.

The assessment and monitoring of the global and regional levels of the status and dynamics of land use/land cover change will be important. A global indicator system will be developed to enable countries to measure the impact of SLM activities on the status and health of the environment and people's livelihoods. Reporting and information exchange will be facilitated if an internationally-agreed set of indicators is in place.

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SESSION 2:

NEW POLICY DIRECTIONS
TO MAINSTREAM
DESERTIFICATION POLICIES

Pour des Politiques plus efficaces de lutte contre la désertification

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Les politiques de lutte contre la désertification menées jusqu'à maintenant n'ont donné que peu de résultats probants. Dans tous les pays touchés par ce phénomène, les signes qui le caractérisent ne semblent pas avoir diminué d'intensité depuis une trentaine d'années. Comment expliquer cela ?

1. La Désertification continue de progresser

L'utilisation de satellites météorologiques a montré déjà qu'entre 1980 et 1984 le désert du Sahara a connu une extension durant la période de 1980 à 1990. Il serait passé de 8.633.000 km² en 1980 à 9.982.000 km² en 1984 (Tucker, Dregne & Wilbur, 1985). En utilisant la méthode des surfaces albédo, d'autres chercheurs ont montré la progression de la désertification des terres du Sahel entre 1980 et 1995 (Nicholson, Tuckker & Ba).

Au Mexique, l'utilisation d'un satellite à balayage a montré – durant la période 1995-1998 - la régression du couvert végétal et donc une augmentation de la dénudation du sol et la disparition progressive de la végétation (Pelgrum *et al*, 1996).

Le Rapport de synthèse de l'Évaluation des Écosystèmes pour le Millénaire (EM) établi par le PNUE à la demande des Nations Unies (2005) indique « qu'environ 60% (15 sur 24) des services d'origine écosystémique¹ étudiés dans le cadre de l'Évaluation des Écosystèmes pour le Millénaire sont en cours de dégradation ou d'exploitation de manière non rationnelle, dont l'eau douce, la pêche intensive, la purification de l'air et de l'eau, la régulation du climat aux échelles régionales et locales, les risques de catastrophe naturelle, et les parasites ». Pour ce qui est particulièrement de la désertification, il ajoute que « les pressions exercées sur les écosystèmes des zones arides excèdent déjà les niveaux de durabilité pour quelques services d'origine écosystémique, tels que la formation de sols et l'approvisionnement en eau, et lesdites pressions sont en augmentation ». Bien plus, « la dégradation des services d'origine écosystémique pourrait même s'accroître de manière significative au cours de la première moitié de ce siècle ». Le rapport souligne que « la dégradation des services d'origine écosystémique est déjà une barrière de taille à l'atteinte des Objectifs du Millénaire pour le Développement (OMD) arrêtés par la communauté internationale en septembre 2000, et les conséquences néfastes de cette dégradation pourraient s'amplifier dans les 50 années à venir. Tout cela est dû au fait que la plupart des forces responsables des changements² au niveau des écosystèmes restent constantes ou progressent en intensité dans la plupart des écosystèmes. En effet, dans les quatre scénarios envisagés par l'EM³,

¹ « Les services que procurent les écosystèmes sont les bénéfices que les humains tirent des écosystèmes. Ceux-ci comprennent des services de prélèvement tels que la nourriture, l'eau, le bois de construction et la fibre; des services de régulation qui affectent le climat, les inondations, la maladie, les déchets et la qualité de l'eau; des services culturels qui procurent des bénéfices récréatifs, esthétiques et spirituels; et des services d'auto-entretien tels que la formation des sols, la photosynthèse et le cycle nutritif. L'espèce humaine, quoique protégée des changements environnementaux par la culture et la technologie, est en fin de compte fondamentalement dépendante du flux de services d'origine écosystémique » (PNUE, 2005).

² Ces forces sont la population, la technologie et le style de vie.

³ Les quatre scénarios sont les suivants :

Orchestration globale – Société mondialement inter-connectée, se concentrant sur le commerce mondial et la libéralisation économique, adoptant une approche réactive aux problèmes d'écosystème, prenant également des mesures fortes pour réduire la pauvreté et l'inégalité et investir dans les secteurs d'utilité publique tels que l'infrastructure et l'éducation. La croissance économique

on s'attend à ce que les pressions exercées sur des écosystèmes continuent de s'accroître au cours de la première moitié du 21^{ème} siècle.

2. Pourquoi ?

2.1. L'inefficacité des politiques au niveau national

De façon générale, l'inefficacité des politiques au niveau national provient du fait qu'elles s'attaquent surtout aux symptômes de la désertification et peu aux causes profondes.

Des politiques créant peu d'emplois par rapport à la demande de travail

La désertification se manifeste particulièrement dans les régions arides du monde et est due principalement aux actions anthropiques qui renforcent les effets négatifs des sécheresses souvent récurrentes : surcharge en bétail des pâturages naturels et mise en culture en sec de terres marginales très soumises à l'érosion éolienne et hydrique. Ces actions anthropiques sont dues à deux types d'agents : les populations pauvres des zones en voie de désertification et les gros éleveurs utilisant les parcours naturels.

Les populations pauvres participent au processus de désertification du fait qu'elles n'ont pas d'autres alternatives pour produire leur subsistance que de labourer des parcelles de parcours et/ou d'élever quelques têtes de bétail en mode extensif. Terres de culture et parcours sont gratuits et d'accès quasiment libre (pas de prix à payer pour les unités fourragères prélevées par les animaux ni de rente à payer pour l'utilisation agricole de la terre).

Les plus ou moins gros éleveurs – souvent absentéistes (habitant en ville mais possédant des troupeaux sur les zones pastorales) - participent au processus de désertification en ce qu'ils mettent sur les zones pastorales des quantités d'animaux trop importantes par rapport à un renouvellement normal des végétaux naturels palatables, appliquant le principe de « premier arrivé, premier servi » sur des terres pastorales qui sont juridiquement et généralement d'accès libre.

Il est évident que les politiques à mener - pour éviter la désertification résultant des comportements de ces deux types de population - doivent être différentes si on veut neutraliser les effets négatifs sur l'environnement des uns ou des autres

Pour les populations pauvres, la solution est de leur offrir une alternative à la décapitalisation de ressources naturelles qu'elles provoquent en leur créant suffisamment d'emplois rémunérés, ces emplois pouvant être soit des emplois agricoles, soit des emplois non agricoles (industries, services). Or, cette création d'emplois a été particulièrement faible – par rapport au nombre d'emplois à créer -

dans ce scénario est le plus élevé des quatre, tandis qu'on lui attribue le niveau de population le moins élevé en 2050.

Ordre suivant la force – Monde régionalisé et fragmenté, préoccupé par des soucis de sécurité et de protection, mettant l'accent surtout sur des marchés régionaux, prêtant peu d'attention aux biens d'utilité publique, et adoptant une approche réactive face aux problèmes d'écosystème. Les taux de croissance économique sont les plus bas de tous les scénarios (particulièrement bas dans les pays en développement, et régressent avec le temps, pendant que le taux de croissance démographique est le plus élevé.

Mosaïque d'adaptation – Suivant ce scénario, les écosystèmes à l'échelle des bassins versants régionaux sont le centre d'intérêt de l'activité politique et économique. Les institutions locales sont renforcées et les stratégies de gestion locale des écosystèmes sont courantes; les sociétés développent une approche fortement proactive à la gestion des écosystèmes. Les taux de croissance économiques sont quelque peu bas au départ mais augmentent avec le temps, et la population en 2050 est presque aussi importante que dans le cas du scénario précédent (*ordre suivant la force*).

Techno jardin - Monde inter-connecté à l'échelle globale, s'appuyant fortement sur une technologie bien au point dans le domaine environnemental, faisant usage d'écosystèmes parfaitement gérés, et souvent créés conceptuellement pour la délivrance de services d'origine écosystémique, adoptant une approche proactive à la gestion des écosystèmes dans un effort de prévention des problèmes. La croissance économique est relativement élevée et s'accroît pendant que la population en 2050 est à la position moyenne des scénarios.

dans les pays concernés par la désertification. Dans les pays sahéliens, particulièrement touchés par la désertification, cela est dû à une FBCF beaucoup trop faible (cf. tableau ci-dessous) elle-même due à un faible développement économique.

	2000	2001	2002	2003	2004	2005
Algérie	24	27	30	30	32	32
Mali	25	31	19	24	19	24
Sénégal	21	19	17	21	23	..
Niger	11	12	14	14	16	19
Burkina	23	19	18	19	19	21

Source: World Development Indicators database

Mais même dans des pays financièrement plus aisés, comme l'Algérie par exemple, le problème demeure du fait de l'énormité des ressources à investir pour lutter efficacement contre la désertification, mais aussi du fait de la mauvaise qualité de la gouvernance globale. Ainsi, l'Algérie a-t-elle accru significativement les emplois en milieu rural steppique depuis le milieu des années quatre-vingt particulièrement en recrutant plus d'employés dans l'administration (multiplication du nombre de communes en 1985) et en promouvant la petite agriculture irriguée dont les superficies se sont notablement accrues (surtout depuis la mise en œuvre en 2000 du plan national de développement agricole- PNDA). Mais, malgré cela, le taux de chômage n'a pas diminué dans les zones rurales - et steppiques en particulier : une récente étude du Ministère de l'Emploi et de la Solidarité indique que 61 % des communes classées pauvres se trouvent dans les Hauts Plateaux (où se trouvent les zones steppiques) et montre que le taux de pauvreté y reste préoccupant (Djamel, 2006).

Des politiques inefficaces en matière de gestion durable des parcours naturels

La politique à mener vis-à-vis des grands éleveurs - qui surchargent de bétail les parcours naturels et ainsi les dégradent - est soit de les responsabiliser dans la gestion et l'entretien de ces parcours, soit de les inciter à réorienter l'emploi de leurs capitaux ailleurs que vers l'exploitation minière des parcours. Ces politiques peuvent recourir à des méthodes administratives de limitation d'introduction de cheptels dans des zones déterminées à des périodes données (mises en défense) et/ou une plus grande fiscalisation de la détention de cheptels – qui serait une façon de leur faire payer les unités fourragères qu'ils prélèvent gratuitement sur les parcours⁴. Ces politiques rencontrent la résistance des gros éleveurs dont l'influence est grande sur les pouvoirs centraux des différents pays concernés par la désertification. C'est sans doute en partie pour cette raison qu'aucun pays n'a réussi à concevoir et à appliquer une politique de gestion durable des parcours naturels. Ainsi, en Algérie, le code pastoral promulgué en 1976 n'a jamais été appliqué et la tentative d'organiser les parcours steppique ébauchée par le Haut Commissariat au Développement de la Steppe (HCDS) au début des années quatre vingt a fait rapidement long feu. Beaucoup des actions que finance l'Etat sur les zones steppiques - (réalisation de points d'eau, de pistes, de mise en défens,...) - profite plus aux gros éleveurs qu'aux moyens et petits agro-pasteurs. Les gros éleveurs ont même réussi à faire vendre aux enchères par les municipalités les onéreuses mises en défens réalisées par le HCDS – sur des terres que tout le monde a le droit d'utiliser, riches comme pauvres, du fait qu'elles sont propriété soit de l'Etat soit des collectivités locales -, écartant ainsi de l'utilisation de ces réalisations les plus pauvres des pasteurs et agro-pasteurs. Si cela permet aux communes – généralement pauvres - d'encaisser

⁴ Durant la période coloniale, les éleveurs sur parcours devaient payer une redevance pour chaque tête de bétail mise sur les parcours. Cette pratique a disparu au lendemain de l'indépendance.

quelques ressources pour renflouer leurs finances, cela ne va guère dans le sens d'une lutte plus efficace contre la pauvreté et contre la désertification. D'autant plus que les superficies ainsi mises en défens se voient utilisées de façon intensive par les éleveurs qui les ont achetées et redeviennent très rapidement aussi dégradées qu'elles l'ont été avant leur mise en défens. Comment expliquer cette absence de recherche de techniques de gestion durable des parcours si ce n'est pas par l'absence de volonté des autorités chargées du développement de la steppe ? Comment expliquer cette absence de volonté si ce n'est pas par la collusion tacite de ces autorités avec les grands éleveurs extensifs ?

Des politiques insuffisantes en matière de recherche scientifique

Si la recherche scientifique en matière de connaissance des phénomènes physiques de la désertification a relativement bien progressé à travers le monde, celle qui touche la gestion durable des parcours naturels reste embryonnaire dans tous les pays touchés par la désertification. Pour agir efficacement contre celle-ci et préparer les bonnes décisions, il importe de bien connaître les éléments et les mécanismes qui l'expliquent : populations, groupes sociaux, types de systèmes de production et leurs logiques de fonctionnement, types d'institutions concernées et relations entre ces institutions, ... Il faut aussi savoir comment la désertification est liée aux politiques économiques et sociales globales qui ont été menées et disposer d'une évaluation fiable des politiques de lutte contre la désertification. Or, ces éléments et ces mécanismes sont peu connus ou n'existent que de façon fragmentaire. L'exemple de l'Algérie – pays où les responsables politiques sont pourtant très sensibles au phénomène – le montre de façon éloquent. Si les programmes nationaux de recherche (PNR) élaborés à la fin des années quatre-vingt-dix comportent effectivement l'étude de la désertification, bien peu de projets de recherche ont été menés dans ce domaine et encore de façon erratique, non coordonnée. L'Institut National de la Recherche Agronomique (INRA) – principale institution concernée par le problème – n'affecte qu'une petite équipe (basée à Djelfa) aux 30 millions d'hectares que couvrent les zones steppiques. Il est vrai que cet institut ne dispose que de moyens dérisoires par rapport aux besoins en recherche de l'agriculture et du développement rural. Le Haut Commissariat au Développement de la Steppe – qui dispose pourtant d'une centaine d'ingénieurs agronomes et écologistes – ne mène aucune recherche, arguant que la recherche ne relève pas de ses missions.

Comment expliquer la faiblesse de la recherche scientifique sur les zones soumises à la désertification, et particulièrement la recherche orientée vers la gestion durable des parcours de ces zones ?

Si dans les pays sahéliens, cela s'expliquerait en grande partie par la faiblesse des ressources dont disposent ces pays – quoique cela puisse faire aussi l'objet de débats contradictoires⁵ –, dans un pays comme l'Algérie, cette explication reste insuffisante. En effet, de façon générale, le pays a largement les moyens de financer ce type de recherche ne serait-ce qu'en économisant sur des postes de dépense non prioritaires, et il y en a un certain nombre⁶ ! Plusieurs faits expliquent cela. D'abord, les décideurs qui allouent les fonds à la recherche ne se donnent pas les moyens (par incompetence ou par négligence) de distinguer les recherches prioritaires des recherches qui le sont moins. De ce fait, ils octroient aux différents programmes de recherche qui leur sont présentés des ressources d'autant plus faibles qu'ils veulent satisfaire le plus de chercheurs présentant un projet. Par ailleurs, la recherche ne

⁵ On pourrait affirmer que, quel que soit leur niveau de ressources, les pays sahéliens devraient avoir comme priorité principale de trouver les techniques permettant d'assurer la gestion durable de leurs pâturages naturels, cela se justifiant par le fait que ces pâturages constituent l'une de leur principale source de création de richesses.

⁶ Beaucoup de services de l'Etat disposent, par exemple, de coûteux et nombreux véhicules tout terrain qui ne roulent que de façon rarissime sur des terrains réellement trop accidentés pour autoriser des véhicules moins sophistiqués.

semble pas être une priorité forte des décideurs au niveau central : si la loi de programmation quinquennale de la recherche de 1998 a été une bouffée d'oxygène pour la recherche, aucune autre loi n'est venue la prolonger depuis trois ans, date de la fin de son application en 2003. Le fait de laisser un secteur aussi important sans financement pendant plus de trois ans prouve, s'il en était besoin, du peu d'attention que les décideurs lui accordent.

L'utilisation inefficace des ressources budgétaires

Quand des ressources sont affectées à des actions contre la désertification, elles sont parfois utilisées de façon relativement inefficace. L'exemple le plus emblématique en ce domaine est celui du « barrage vert » dont la réalisation a commencé en Algérie au début des années soixante-dix. Mais d'autres exemples existent.

Pendant une trentaine d'années (1970-2000), l'Algérie a, en effet, entrepris de réaliser une bande de reboisement d'une profondeur de 10 à 20 kilomètres allant de la frontière marocaine à la frontière tunisienne, en suivant approximativement la ligne de l'Atlas Saharien sur son versant Nord et, généralement, entre les isohyètes 200 et 300 mm. Effectués d'abord par l'armée grâce aux appels du service national militaire, les travaux ont été poursuivis à partir du milieu des années quatre-vingt par l'administration des forêts au moyen d'entreprises publiques forestières. 35 ans après le début de sa réalisation, que peut-on dire de ce fameux "barrage vert" ?

Les superficies reboisées se montent à environ 122 680 ha (cf. tableau en annexe), 150 000 ha selon d'autres sources (document anonyme de la Direction Générale des Forêts). C'est une goutte d'eau (un peu plus de 10 %) dans l'océan des superficies à reboiser prévues initialement (1,2 millions d'hectares) et surtout dans l'océan des superficies steppiques à protéger (20 à 30 millions d'hectares). Le taux de réussite des plantations a été relativement faible (36 %), ce qui signifie que les superficies qui seraient encore boisées ne représenteraient qu'un peu plus de l'équivalent de 44 000 ha. Par ailleurs, les pins d'Alep – qui constituent l'essentiel des plantations – ont été attaqués par la chenille processionnaire, laquelle a occasionné – et occasionne encore – des dégâts considérables. Actuellement, au lieu d'avoir une bande continue d'arbres, seuls subsistent des bosquets relativement réduits d'arbres en masse, parfois des arbres isolés dans l'immensité de la steppe.

Le coût de cette oeuvre – qui se voulait gigantesque pour montrer, à l'époque, que l'Algérie était capable, elle aussi, d'effectuer des grands travaux à la chinoise – n'a pas été évalué a posteriori, ni par les services forestiers, ni par les services économiques du gouvernement, pas plus que n'ont été évalués les bénéfices que le pays a pu en tirer. Cette absence d'évaluation – qui ne concerne pas que le secteur des forêts mais est systématique en Algérie – s'explique par la répugnance des administrations responsables des travaux à montrer publiquement les faiblesses de leur gestion, et par l'inexistence de mécanismes fiables de contrôle et d'évaluation parlementaire des dépenses publiques. Sur la base du coût actuel du reboisement⁷, le budget de l'Etat a dû déboursier environ 2,5 milliards de DA (162 millions de dollars), sans compter les coûts indirects (coûts des administrations gestionnaires).

L'impact sur l'amélioration des conditions climatiques et sur le rythme de la dégradation des parcours steppiques a, bien sûr, été quasiment nul, pour ne pas dire tout simplement nul. Un voyage par grands vents à travers la steppe vers la fin de l'été et le début de l'automne – quand les sols sont bien secs – se fait dans de nombreuses zones dans d'opaques nuages de poussière, résultat d'une érosion

⁷ 80 000 DA l'hectare de reboisement (y compris l'entretien des plantations au cours des deux premières années).

éolienne intense. De nombreuses zones sont ensablées, de nombreuses autres ont été décapées jusqu'à apparition de la roche mère.

On aurait pu penser que l'échec du « barrage vert » constituerait une expérience dont on tirerait les leçons. Apparemment il n'en est rien puisque le plan national de reboisement⁸ prévoit de réaliser plus de 330 000 ha de « Reboisement de protection et de lutte contre la désertification ». Certes, les autorités forestières, sans bannir complètement le pin d'Alep, vont en diminuer l'utilisation pour le reboisement et le remplacer par d'autres essences. Mais quelle que soit l'essence utilisée, il est extrêmement coûteux de faire réussir⁹ des arbres forestiers sous une pluviométrie de 100 à 250 ou 300 millimètres de précipitations, par ailleurs très irrégulière.

L'expérience du « barrage vert » algérien aurait aussi pu servir à l'Afrique sahélienne comme exemple à ne pas faire. Or, ne voila-t-il pas que les présidents nigériens et sénégalais se sont mis en tête de fédérer les Etats sahéliens pour réaliser une « muraille verte », bande de reboisement forestier qui irait de l'Atlantique à l'Océan Indien pour lutter contre l'avancée du désert.

Les autres exemples d'utilisation inefficace des ressources budgétaires se trouvent dans les actions similaires à la précédente : plantations d'arbustes fourragers, mise en défens et autres aménagements pastoraux qui, bien qu'utiles, s'attaquent davantage aux symptômes du mal qu'au mal lui-même. Le mal est la perpétuation des actions et comportements anthropiques (dont on a parlé précédemment) qui accentuent les effets désertifiant des sécheresses récurrentes. C'est en menant des politiques fortes diminuant – ou mieux, supprimant – ces actions et comportements qu'on attaquera le mal à la racine. C'est en créant des emplois en nombre suffisant pour les populations pastorales et agropastorales pauvres et en concevant sous forme participative des plans de gestion des parcours qui s'imposent aux grands éleveurs qu'on résoudra durablement le problème de la désertification causé par les actions anthropiques.

2.2. L'inefficacité de l'action internationale de lutte contre la désertification

La « communauté internationale » - à travers ses émanations institutionnelles - parle beaucoup de la désertification mais agit relativement peu pour lutter contre le phénomène. Cette communauté était consciente depuis longtemps de la gravité des problèmes (économiques, sociaux et environnementaux) posés par la désertification dans toutes les régions du monde. La Conférence des Nations Unies sur la désertification (UNCOD) a adopté en 1977 un Plan d'action pour lutter contre la désertification (PACD). Malheureusement, en dépit de cette initiative et d'autres efforts, le Programme des Nations Unies pour l'environnement (PNUE) devait conclure en 1991 que la dégradation des sols dans les zones arides, semi-arides et subhumides sèches s'était aggravée malgré quelques "cas sporadiques de réussite".

En 1995, la Commission pour le Développement Durable note encore avec « une grande préoccupation » que « le sixième environ de la superficie totale des terres arables de la planète a été endommagé par la dégradation des sols d'origine anthropique » et souligne la nécessité d'un « partenariat à l'échelle mondiale pour protéger les écosystèmes terrestres et les remettre en état » (Commission on Sustainable Development, 1995). Elle demande à ce que « les efforts entrepris par les pays en développement pour mobiliser les ressources financières nécessaires à

⁸ Le Plan National de reboisement 2000-2020 prévoit la réalisation de plantations forestières pour l'ensemble du pays sur environ 1 246 000 ha.

⁹ Par « réussir » on entend faire prendre un arbre pour qu'il puisse vivre pendant une durée considérée comme normale à son espèce.

l'application efficace de l'ensemble d'Action 21, et notamment des chapitres sur les terres ... doivent être secondés par la communauté internationale » notamment grâce au « partage des connaissances scientifiques » et au « transfert de techniques écologiquement rationnelles, au besoin à des conditions de faveur définies d'un commun accord, comme le prévoit le chapitre 34, sont décisifs pour la réalisation des objectifs d'Action 21 ». La Commission invite par ailleurs dans le même rapport « les gouvernements, les donateurs bilatéraux, les institutions financières multilatérales, les organismes techniques spécialisés et les organisations non gouvernementales à accorder un rang de priorité élevé au développement rural des zones à faible potentiel et à s'attacher en particulier à améliorer durablement la productivité des agriculteurs ».

Depuis ce rapport de 1995 a été créée La Convention pour Combattre la Désertification qui a été adoptée à Paris le 17 juin 1994 et est entrée en vigueur le 26 décembre 1996, 90 jours après sa ratification par 50 pays. Plus de 179 pays étaient Parties à la Convention en mars 2002. La Conférence des Parties (COP), qui est l'organe suprême gouvernant la Convention, a tenu sa première session en octobre 1997 à Rome (Italie). Pour mettre en œuvre la CCD, les pays touchés par la désertification se sont engagés à produire des plans d'action nationaux (PAN) de lutte contre la désertification, plans qui sont renforcés par des programmes d'action aux niveaux sous-régional (PASR) et régional (PAR).

De façon générale, les plans d'action nationaux rencontrent des difficultés dans leur financement du fait de la pauvreté des pays concernés par la désertification et des moyens limités dont disposent les institutions internationales intéressées par le problème. Ainsi, en Algérie, le rapport de suivi du PAN établi en 2004 montre que la contribution des organismes internationaux aux projets de lutte contre la désertification est faible par rapport à la contribution nationale. Sept projets menés par la Direction Générale des Forêts (principale institution algérienne chargée de la lutte contre la désertification) ont bénéficié à hauteur de 77 % de financement extérieurs (FIDA, FEM, Banque mondiale), l'essentiel des ressources allouées l'étant sous forme de prêts (DGF, 2004). Par ailleurs, les projets ainsi financés ne sont pas mis en œuvre toujours de façon directe sur les zones les plus touchées par le phénomène de désertification. Par exemple, sur les sept projets algériens mentionnés précédemment, six ne concernent pas les zones steppiques - que, pourtant, le PAN Algérie qualifie de plus soumises à la désertification -, le septième étant un projet concernant toutes les régions puisque portant sur la réalisation d'aires protégées.

En conclusion, la lutte contre la désertification ne peut être efficace que si :

- Les actions de lutte visent les racines du mal :
 - o La pauvreté : création d'emplois permanents pour les populations pauvres afin que celles-ci cessent – ou tout du moins diminuent - leur pression sur les terres soumises à ce phénomène ;
 - o L'utilisation minière des parcours par les grands éleveurs : conception participative et application de plans de gestion des parcours (pâturages) qui imposent à ces grands éleveurs des règles d'utilisation durables de ces parcours (limitation éventuelle des quantités de cheptel mises sur certains parcours à certaines saisons, paiement de taxes d'usage des parcours proportionnelles à la quantité de cheptel) ;
- La communauté internationale s'implique financièrement, technologiquement et scientifiquement de façon beaucoup plus forte.

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TerrAfrica – Plateforme partenariale pour l'intégration de la gestion des terres dans l'agenda politique international

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Généralités

Les terres sèches occupent 40% des terres émergées du globe et abritent 2 milliards de personnes dont environ 38% en Afrique Sub-Saharienne (ASS). Sous dominance totale de climats hyperarides et arides, la population subsaharienne vit grâce aux services fournis par les ressources naturelles, les activités agricoles, pastorales et forestières.

En plus des catastrophes naturelles de plus en plus fréquentes en Afrique subsaharienne, les sécheresses, l'invasion acridienne, et les inondations - dont les conséquences se traduisent souvent par les famines et des pertes économiques importantes - la région connaît également des épisodes de conflits armés qui constituent des freins à son développement.

Malgré l'importance des ressources naturelles de la région (pétrole, gaz, eau ...), la majorité des pays qui la constituent sont des pays très pauvres et fortement endettés, avec par conséquent un pourcentage élevé de population sous-alimentée et un accès très limité à l'eau potable.

En outre, l'ASS est la région la plus touchée par le SIDA dans le monde avec plus de 25 millions de personnes séropositives. Cette situation désastreuse est aggravée par un niveau d'éducation qui est le plus faible au monde et un taux d'analphabétisme des plus importants.

La mauvaise gestion des ressources naturelles a conduit à une importante dégradation des terres de la région. Celle-ci est en outre très menacée par les changements climatiques, elle est dépourvue de ressources techniques pour y faire face. Ces facteurs expliquent la faible évolution de l'indice de développement humain dans la région.

Il est urgent de sensibiliser les décideurs et le public sur les défis auxquels la région est confrontée, et d'entreprendre les actions concrètes nécessaires à l'amplification de la gestion durable des ressources naturelles.

Impacts de la dégradation des terres

Les tendances actuelles de la dégradation des terres et leur mauvaise gestion en ASS nuisent gravement aux services de l'écosystème. Le coût de la dégradation des terres est estimé à une perte de 3% du PIB agricole en Afrique, soit une perte du revenu annuel brut de plus de 9 milliards de \$US. Le coût de la réhabilitation des terres dégradées est largement inférieur, il est estimé à 1,9 milliards de \$US par an. La dégradation des terres affecte 65% de la population active africaine. La poursuite des procédures actuelles de gestion aurait pour conséquences en 2025, la disparition des deux tiers des terres arables, et un manque cruel d'eau dans plus de 25 pays du continent. La dégradation des terres constitue un frein pour atteindre les OMD en ASS.

Toutes les parties prenantes sont d'accord sur le fait qu'il est urgent d'instaurer des pratiques de Gestion Durable des Terres (GDT) et qu'il est primordial pour y arriver

de lever les obstacles majeurs à la croissance économique en ASS. Ces obstacles sont de natures très différentes, institutionnels et sectoriels, politiques et financiers, de mise en œuvre, de suivi-évaluation et de gestion des connaissances. La levée de ces goulots d'étranglement passe par la création d'un environnement adéquat permettant d'amplifier et d'intégrer la GDT au niveau national. Afin d'y aboutir, il est nécessaire de mettre en place un cadre unique et cohérent avec une approche intégrée et plus globale, et un mécanisme de coordination efficient.

L'Initiative TerrAfrica

C'est sur la base de ce constat, et dans l'objectif d'amplifier la GDT, que la Banque Mondiale a lancé l'initiative TerrAfrica sous la forme d'une plateforme partenariale construite autour d'un programme de travail basé sur 3 Lignes d'Activités mutuellement renforcées:

- LA 1 : Création d'une coalition
- LA 2 : Gestion des connaissances
- LA 3 : Investissements

TerrAfrica se situe au centre des préoccupations internationales sur le développement, elle se présente comme un mécanisme partenarial fédérateur facilitant la synergie entre les principales initiatives internationales lancées depuis les années 1980 pour assurer un environnement durable. Elle constitue un soutien efficace à la mise en œuvre des Accords Multilatéraux sur l'Environnement issus du processus de Rio (UNCCD, UNCCC, UNCBD), et leur synergie. Elle apporte en outre un appui substantiel à la mise en œuvre du NEPAD, particulièrement à son Programme Détaillé de Développement Agricole pour l'Afrique (PDDAA) ainsi que son Plan d'action Environnemental. A travers la mobilisation des ressources financières et non-financières pour l'amplification des pratiques de Gestion Durable des Terres, TerrAfrica constitue un outil efficient pour la mise en œuvre des Stratégies Nationales de Réduction de la Pauvreté (DSRP) et contribue ainsi à la réalisation des Objectifs du Millénaire pour le Développement (OMD), notamment le 1er relatif à la Réduction de l'extrême pauvreté et la faim, et le 7ème visant à assurer un environnement durable.

En se basant sur les leçons apprises des expériences précédentes, TerrAfrica intègre les principes de partenariat, de gestion de la connaissance et de l'investissement harmonisé, aligné et amplifié au niveau national afin de créer un environnement favorable pour renforcer et financer les stratégies nationales de la Gestion Durable des Terres (GDT).

Plan opérationnel

La mise en œuvre de TerrAfrica repose sur un Plan opérationnel conçu pour lever directement les obstacles qui empêchent actuellement l'amplification de la GDT. Afin de supprimer ces goulots d'étranglement, sept objectifs sont poursuivis autour de trois thèmes principaux, ou Lignes d'Activité (LA) :

- Ligne d'Activité 1 - Création de Coalition : le but des activités menées ici est de créer des coalitions stratégiques africaines aux niveaux régional et global qui renforceront le dialogue politique et aboutiront à une vision commune pour le financement et la mise en œuvre de la GDT.
 - o *Objectif 1. Créer des coalitions et des partenariats stratégiques ayant une identité africaine pour la GDT aux niveaux régional et mondial.*

- o *Objectif 2. Développer un dialogue et un plaidoyer ouverts au niveau régional sur les priorités stratégiques, les conditions déterminantes, et les mécanismes de mise en œuvre.*
- Ligne d'Activité 2 - Gestion des Connaissances : Les activités visent ici à soutenir les mécanismes de grande qualité qui vont générer et diffuser les connaissances, et canaliser les financements effectifs sur le terrain.
 - o *Objectif 3. Soutenir les réseaux d'informations de grande qualité au niveau régional.*
 - o *Objectif 4. Identifier et créer des bases analytiques plus solides.*
 - o *Objectif 5. Harmoniser les systèmes de suivi-évaluation.*
- Ligne d'activité 3 – Investissements : Il s'agit dans cette ligne d'activités d'augmenter les investissements en permettant l'amplification des fonds aux niveaux local, national et sous-régional, et en favorisant la mobilisation des fonds additionnels pour les activités de la GDT.
 - o *Objectif 6. Plaidoyer pour l'intégration de la GDT dans les stratégies de développement et le dialogue politique aux niveaux sous-régional, national et local.*
 - o *Objectif 7. Développer, mobiliser, et harmoniser les investissements aux niveaux sous-régional national et local.*

Derrière chaque objectif, des lignes de produit sont spécifiées donnant lieu aux activités nécessaires à mener et définissant les résultats à atteindre. C'est sur la base de cette structure organisationnelle qu'est défini le programme d'activité annuel de TerrAfrica.

Partenariat

Le succès de TerrAfrica réside à travers l'action commune. En agissant à travers ce programme commun, les partenaires augmentent leur propre effort, organisent et amplifient leurs actions conformément à leurs avantages comparatifs.

Le partenariat est basé sur les principes suivants :

- Appropriation par les pays africains
- Transparence et responsabilité
- Action basée sur le partenariat
- Large participation
- Subsidiarité fondée sur les avantages comparatifs des partenaires
- Performances et résultats mesurables et durables

Les principes qui régissent TerrAfrica sont :

- Harmonisation et alignement – augmentation de l'efficacité et de la durabilité des efforts directs de chaque acteur.
- Ressources communes – travailler ensemble via un partenariat régional pour réduire les coûts de transaction.
- Réseaux de connaissance - faciliter et renforcer les dialogues politiques par l'accès aux connaissances des partenaires et aux réseaux opérationnels.
- Avantages comparatifs - permettre à chaque acteur d'avoir un rôle plus fort et plus efficace pour avancer la GDT.

A travers sa mise en œuvre, TerrAfrica permettra :

- **le soutien technique et politique des documents de stratégie de développement des pays**, par exemple, Banque Mondiale « CAS », stratégie assistance commune pays, DSRP ;

- **d'établir des liens avec les programmes stratégiques** - Banque Mondiale, plan d'action pour l'Afrique (PAA) et le nouveau partenariat pour le développement de l'Afrique (NEPAD) ;
- **de permettre l'accès à la connaissance technique et politique pour la mise en œuvre amplifiée de la GDT** ;
- **de faciliter et appuyer l'accès aux fonds des bailleurs multilatéraux** : (Fond de Mobilisation de TerrAfrica) pour soutenir le travail analytique au niveau national.

Structure de gouvernance

TerrAfrica dispose d'une structure de décision à deux niveaux : au niveau national et au niveau de la plateforme régionale ASS, les connaissances et les expériences étant partagées au niveau régional ASS. Cette structure s'enracine dans les interactions entre les pays ayant adopté l'approche de TerrAfrica et leurs partenaires pour le développement au niveau national. TerrAfrica offre des instruments pour collecter les expériences nationales et pour présenter au niveau de la plateforme régionale ASS les questions qui ne trouvent pas de réponse au niveau national (Figure 1, ci-dessous).

Au niveau régional, TerrAfrica a une structure d'organisation bien définie qui fonctionne à travers :

- Un Comité Exécutif
- Un Forum Consultatif
- Un Secrétariat

Au niveau National, TerrAfrica encourage le développement de partenaires afin d'adapter l'approche de la plateforme aux besoins des pays. Cette approche tient compte des structures existantes et en tire profit, plutôt que de reproduire les efforts en cours.

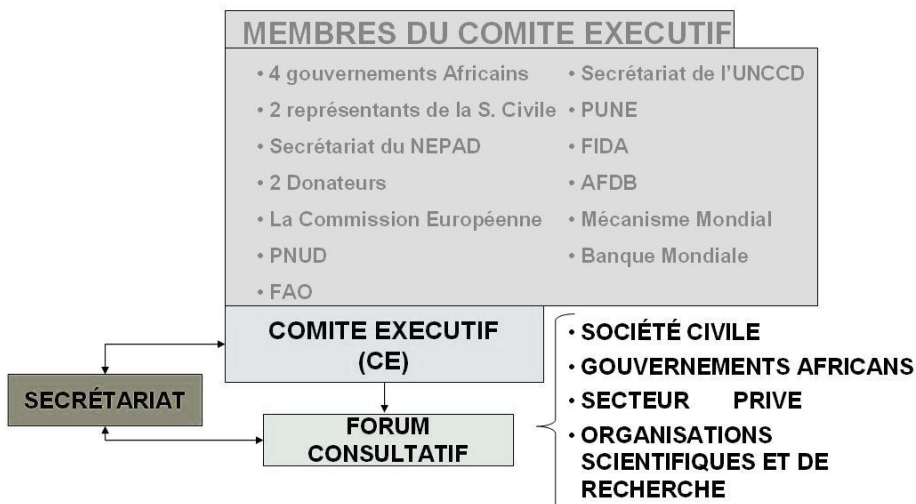


Figure 1. Structure de gouvernance de TerrAfrica.

Mobilisation des ressources

Afin de faciliter la réalisation des objectifs de TerrAfrica, plusieurs outils mobilisateurs ont été conçus et mis en place :

- **Fonds de Mobilisation TerrAfrica (FMT)**
Le FMT est un fonds fiduciaire multi-bailleurs administré par la Banque Mondiale. Il est initialement créé pour un montant cumulatif de 15 milliards \$US. Le FMT offre un mécanisme de financement souple pour faire face à des besoins ciblés, particulièrement pour la création de coalitions (LA1) et la gestion des connaissances (LA2). Il peut aussi occasionnellement couvrir certaines actions de la ligne 3 comme le dialogue national, l'intégration et la gestion des fonds ...etc.
- **Le Programme d'Investissement Stratégique (PIS)**
Le Fond pour l'Environnement Mondial (FEM) PIS alimentera un mécanisme financier stratégique et programmatique pour la GDT en ASS. Il s'agit d'un programme échelonné sur 12 ans pour amplifier la GDT en ASS. Il fonctionnera comme un cadre intermédiaire pour la planification et la mise en œuvre des fonds du FEM. En augmentant l'efficacité des mécanismes de mise en œuvre, le PIS est conçu pour rendre plus efficace l'utilisation des ressources du FEM.
- **La Stratégie Nationale d'Engagement (SNE)**
La SNE n'est pas une prescription étape-par-étape pour l'enclenchement au niveau du pays. Il s'agit d'un large guide élaboré par le pays sur la façon dont le processus d'enclenchement devrait être conduit. Il s'agit d'un cadre qui traduit l'engagement du pays dans TerrAfrica et la stratégie pour sa mise en œuvre.
- **Le Cadre National d'Investissement dans la GDT (CNIG)**
Le CNIG a pour objectif d'intégrer et amplifier la GDT pour sécuriser les services de l'écosystème et améliorer les conditions de vie des populations locales. Il permettra d'améliorer la qualité des investissements, de diminuer le coût des transactions, de mobiliser le co-financement catalytique, stratégique et rentable ; de promouvoir l'utilisation des indicateurs de S&E précis et comparables et d'augmenter l'intégration de la GDT. Le CNIG traitera et s'adaptera aux conditions spécifiques de chaque pays. C'est un outil pour les pays pour aligner les secteurs, les acteurs, et les donateurs autour d'une feuille de route opérationnelle.

Conclusion

TerrAfrica est une initiative régionale pour permettre aux gouvernements d'Afrique sub-saharienne, à la communauté du développement internationale et aux autres parties prenantes mondiales, régionales et nationales de mieux travailler ensemble pour l'augmentation des financements et l'intégration dans les programmes de développement d'une GDT qui soit efficace, économiquement rentable et sous la conduite des pays concernés. Il s'agit d'un effort collectif et ouvert en faveur de l'ASS.

A travers sa mise en place, TerrAfrica traduit l'importance accordée par la communauté internationale à la GDT. Sa mise en œuvre permettra la visibilité politique de la GDT et catalysera la formation de coalitions et le partage d'une vision commune pour inscrire la GDT au premier rang des priorités internationales.

Global Changes in Pastoral Policy

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Introduction

In direct contrast to popular opinion, pastoralism is essential to dryland ecosystem health and it is one of the few production systems that are genuinely environmentally friendly to the drylands. Furthermore, and also in contrast to popular opinion, pastoralism is one of the most economically viable and sustainable means of managing the drylands. Nevertheless, many governments, particularly in the developing world, still consider pastoralism to be the scourge of both development and the environment and they create policies that deliberately or inadvertently undermine it. Yet some governments are increasingly recognising the value of pastoralism and are beginning to accommodate pastoral mobility within policy.

Failure to support mobile pastoralism and efforts to replace it with other livelihood systems will increase poverty and degradation in the drylands. Overcoming desertification requires the enabling of mobile pastoralists, who are the best custodians of the drylands. Enabling pastoral mobility requires wide-spread policy change, to allow basic service provision and security as much as land rights and equitable markets. This policy change needs to be informed by good practice and strong evidence, and successful experiences and sound data are now being exposed which are making such change possible.

Examples are presented of policy changes that have enhanced mobile pastoralism and enabled more effective and sustainable management of the drylands. This paper draws on recent economic and policy studies of The World Initiative for Sustainable Pastoralism (WISP). WISP is a global network for knowledge management on pastoralism and sustainable rangeland management.

Global Changes in Pastoral Policy

It is being increasingly recognised that pastoralism is a global phenomenon: not something confined to the poorest corners of Africa, but something practiced in the marginal environments of Europe, Asia, North and South America, Oceania and Africa. In many countries, pastoralism is a modern industry that supports many livelihoods and makes an important contribution to the global supply of high-quality foods and materials. It is also a vital environmental management system that is actively promoted in some countries to enhance biodiversity and ecosystem integrity, and thus boost rural economies and tourist industries.

Pastoralism often draws greatest global attention when it experiences livelihood failure, as in the case of African pastoralism at times of drought. Yet such failures should not be considered to typify pastoralism: worldwide, pastoralism is not associated with vulnerability or food insecurity and such outcomes prevail only in the poorest countries. Nevertheless, many of Africa's poorest countries certainly have a sizeable pastoral population and therefore many pastoralists do face frequent livelihood failures.

Pastoralism is also frequently cited as a major factor in desertification, yet recent advance in the understanding of dryland ecology indicates that many rangelands are grazing dependent and high levels of stocking can be sustainable, providing mobility is an integral part of the management system. Rather than being a cause of

degradation in the drylands, it is very likely that mobile pastoralism is vital for drylands ecosystem health and stability. In such uncertain environments, policy makers are realising the environmental importance of mobile pastoralism, and with new evidence on the economic strengths of pastoralism, policy changes are being made to protect pastoralism and to enhance pastoral mobility.

Pastoralists: The Best Custodians of the Drylands

There has been a significant re-thinking of rangeland ecology in the past two decades and a major change in understanding of how to enhance 'non-equilibrium' systems, such as the semi-arid and arid rangelands. In such environments, standard concepts of carrying capacity are inappropriate, and opportunistic pastoral systems, involving mobility and fluctuation in herd size, are more sustainable than constant stocking rates (Behnke and Abel, 1996).

Most dryland ecosystems are more ecologically resilient than previously believed. Where mobile livestock management continues unhampered, it has resulted in biodiversity conservation, improved livelihoods, and sustainable land management. Where mobility is constrained by land use/land tenure changes, sedentarisation and policy disincentives, it has led to serious overgrazing, land degradation, and poverty (UNDP, 2005). Under proper management where mobility is not constrained, livestock are in fact beneficial to rangeland biodiversity and productivity. Grazers and grasses have co-evolved in many rangeland ecosystems and grazing species play an integral role in maintaining fundamental biological processes in the drylands, such as water and mineral cycling or seed dispersal (Savory, 1999).

Other land use options in the drylands have been aggressively promoted in the past and may well have become a permanent fixture of the drylands, but few of them can actively enhance biodiversity or reverse land degradation. Pastoralism, on the other hand, can be used to actively manage dryland ecosystems and enhance biodiversity, and therefore enhancing pastoralism has to be central to any efforts to overcome desertification.

Pastoralism: The Most Economically Viable Means of Managing the Drylands

Criticism of pastoralism is levelled from a number of different angles: it is environmentally irrational, it is economically unviable, or it is socially backwards. Yet none of these allegations have any technical merit, or any corroborative evidence. On the contrary, much evidence points to the opposite of these statements.

In Sub-Saharan Africa, mobile pastoralism has been shown to outperform other livestock systems in the drylands by a staggering 2 to 10 times. Policy makers have long advocated replacing mobile pastoral systems, which in Africa are essentially dairy production systems, with non-mobile meat-production enterprises, such as those found in the USA and Australia. Aside from the loss in ecosystem health that is associated with these less mobile systems, a study from the 1980s showed that Australian ranches generated only 16% of the energy and 30% of the protein per hectare of Southern Ethiopian pastoral systems (Scoones, 1995).

In developing countries where pastoralism is a significant activity, it contributes significant GDP and foreign exchange earnings: 42% of agricultural GDP in Kazakhstan (World Bank, 2005), one third of GDP and export earnings in Mongolia (UNDP, 2003), 25% of agricultural GDP in Morocco (Berkat, 1995), 8.5% of total GDP in Uganda (Muhereza and Ossiya, 2004). In Kenya, the pastoral dominated national livestock herd produces 10% of GDP (Republic of Kenya, 2000). Ethiopia's pastoralist-dominated livestock sector contributes more than 20% of the country's total GDP (Aklilu, 2002).

Data on the contribution of pastoralism to national economies are often incomplete and despite the striking contributions cited above, the real value of pastoralism remains overwhelmingly under-estimated. In many developing countries, the majority of livestock is traded informally and is not captured in official records. Forward and backward linkages to the wider economy are often ignored and the huge subsistence economy is rarely valued. Furthermore, the indirect values of pastoralism remain almost entirely unestimated, yet pastoralists play a significant role in providing inputs to tourism and to agriculture, in enabling the production of a range of non-pastoral dryland products and in providing an array of ecological and rangeland services. When the direct and indirect values of pastoralism are taken into account, it appears highly competitive with other land use forms in the drylands, and the cost of restricting pastoralism, which occurs when key resources are diverted for alternative uses, becomes much more serious (WISP, 2006).

The Continued Undermining of Pastoralism

Mobility is not something that many governments care to countenance and many developing countries actively try to prevent mobility. Prejudice against mobile livestock keepers often runs deep, particularly in countries where they form an ethnic and linguistic minority, and policy-makers prove remarkably resilient to the economic and environmental facts in favour of pastoralism.

Extensive livestock production systems are being made unsustainable as a result of legal, economic, social and political disincentives and barriers. Many pastoralists have no choice but to settle, as rangelands are encroached, market access diminishes, and support services are concentrated in towns and urban centres. When pastoral land is lost to cultivation, not only is that piece of cultivated land often less biodiverse, but the wider rangeland ecosystem health deteriorates as a result of the constraint on pastoralism.

Similarly, when pastoralists settle, land is heavily degraded around the settlement and ecosystem health in the wider rangelands deteriorates as a result of under-grazing. Sedentarisation has been shown to lead to poverty, because of over-grazing around settlements, insecurity of land tenure, and reduced productivity of agro-pastoral systems. Confiscation of pastoral lands leads to conflicts in drylands, especially between mobile pastoralists and sedentary farmers.

In many countries, unsupportive and antipathetic policies lead to pastoralism fulfilling the fears of policy-makers, causing degradation and poverty as a result of restricted mobility, loss of key resources or absence of services. Some countries explicitly pursue policies to settle pastoralists, whilst others may be more ambivalent, yet still fail to support pastoralism with appropriate policy. As a result, pastoralists often face pressures to restrict their own mobility, whether it is in order to access immobile services and markets, or to protect key natural resources from expropriation by cultivators.

Investment of labour in livestock production is often penalised by policy disincentives and market failures, which makes unremunerative, subsistence cultivation disproportionately attractive. This not only contributes to desertification but also to poverty, and although the increased cultivation of the drylands may not be reversible, it is not necessary to continue the trend of cultivation at the expense of pastoralism. Neither is it appropriate for existing cultivation to constrain pastoralism, either through annexation of key resource patches, or blocking of transhumance corridors, and synergies between the two production systems are essential.

Government Support for Pastoralism

In most of Europe, pastoralism takes place in areas of High Nature Value (HNV), and in many places it is pastoralism that has created this High Nature Value after many hundreds of years of existence. Since much of this land often cannot be used for other, more intensive forms of agriculture, the abandonment of pastoralism results in total abandonment of the land, and thus in the loss its pastoralism-related HNV. This was recognised by the Third International Conference on "Biodiversity in Europe" and the 8th meeting of the Council of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS) in 2004, Madrid, which recommends support for pastoralism using traditional practices that can maintain biological diversity in mountain ecosystems.

Some Asian countries provide good examples of how supportive social policies can enable pastoral mobility. In Iran and Mongolia, government investment in appropriate service delivery has ensured that pastoralists are relatively well educated and are in a better position to enhance their own production system as they know best. Better educated pastoralists are not only more capable of developing pastoralism from within, but are better equipped to operate in markets and have a greater range of options for complementary income generation and non-pastoral employment.

Throughout Africa, governments have begun to promote community based animal health service delivery with appropriate policy and institutional support. The same countries often remain resistant to similar advances in human health service delivery, but changes are gradually occurring in response to demand from pastoralists. Decentralisation policies in many countries are facilitating the enabling of pastoralism, by giving mobile pastoralists a greater say in development interventions, greater engagement in governance institutions and thereby reducing their marginalisation.

Land rights and access rights, particularly the protection of transhumance corridors, are vital to the system-integrity of pastoralism. The Spanish government, for example, actively protects its transhumance corridors to enable pastoralists to move freely and extensively between grazing grounds.

Market failures also can be overcome with appropriate policies and interventions. In Pakistan, small-scale cultivation by pastoralists was necessary when grain prices were high and livestock prices low, but the opening of a major highway through the country's pastoral areas has led to mobile pastoralism being enhanced as a result of greater access to grain markets and the conversion of cultivated land into improved forage plots (Ehlers and Kreutzman, 2000).

Overcoming Desertification Requires the Enabling of Mobile Pastoralists

Pastoralists have to play a significant role in reversing desertification. If pastoralism continues to be undermined, poverty in the drylands will increase, with well documented impacts on degradation. If mobility is constrained then ecosystem health will continue to decline and degradation will follow. Overcoming desertification therefore requires investment in pastoralists. However, decades of under-investment, and curtailment of rights and restriction of development have left a big legacy to overcome.

Despite all the claims made in its favour, a great deal can be done to enhance pastoralism: transhumance can be protected and regulated; production technologies can be tested and adopted and new complementary production systems can be explored; market failures have to be overcome; financial services must be provided and adopted; and new ways are needed to protect customary tenure within modern law. All these developments imply major change for pastoralists, many of whom

currently lack the information and the education to make informed choices over the changes they adopt, and many of whom are not routinely consulted over development issues. Enabling pastoralists therefore requires education and empowerment, and the creation of institutions that are accountable to them.

Enabling Pastoral Mobility Requires Widespread Policy Change

Enabling mobile pastoralism by enabling pastoralists means not only investing in the production system, but investing in legal and support systems, and in appropriate governance and service delivery. Pastoral mobility has been enhanced in Chad and Ethiopia through training and support of community health workers and midwives. Throughout Africa and Asia, mobility has been enhanced through the training and support of community animal health workers.

Environmental benefits have been observed in Mongolia as a result of government support for Community Organization, which has restored mobility, improved protection and rehabilitation of bushes, pasture and water, and enhanced biodiversity. In Switzerland, pastoralists have reacted to the loss of production subsidies by investing more in environmental protection for the sake of enhancing tourism and capturing the benefits of ecological quality. In Ethiopia, decentralisation has provided opportunities for pastoralists to develop collaboration between modern and customary governance institutions. In Kenya, pastoralists are gaining a voice in government and are using this to negotiate for their rights, over land and resources, and for security and investment.

Good Policy is Being Driven by Good Practice

The case for pastoralism is strong, yet many governments still seem to intrinsically dislike the concept of mobility. Nevertheless, there is a growing support for mobile pastoralism around the world and a number of national governments are implementing policies to enhance mobility and enable the development of pastoralists. These experiences have a knock-on effect, illustrating the possibilities to other policy-makers who are at a loss to know how to overcome poverty and degradation in the drylands, and enabling pastoralists to develop and promote a vision of sustainable, modern pastoralism.

Often the positive experiences in pastoral development are hidden away in the remote corners of the world where pastoralism is carried out. When the experiences are brought to light, they often fail to overcome the entrenched beliefs of many people that pastoralism is backwards. Yet not all pastoralists are poor, and not all pastoralism damages the environment, which should beg the question of why such phenomena exist in some countries and not others. This paper has outlined some of the core reasons for this: exclusion, misunderstanding and underinvestment.

The degree to which some governments are now investing in pastoral mobility shows that old prejudices can be pushed aside for the sake of the economy and the environment. Indeed, when the true value of pastoralism is recognised, few governments, and few conservationists, are likely to tolerate the loss of pastoralism and are more likely to invest in pastoralism to ensure that livestock remain part of the landscape. In developing countries, there is also a very important question to be asked about the cost of eroding the pastoral system, in terms of the large number of impoverished and destitute people that will need support. If pastoralism continues to be ignored or eroded, it will be an increasing burden on the environment and the economies of developing countries. When pastoralism is accepted and invested in, it will ensure environmental protection and enhance development.

The World Initiative for Sustainable Pastoralism (WISP)

WISP is a global knowledge management network that is designed to help overcome the policy and information gaps that constrain pastoralism. The initiative is a three year GEF-funded project, implemented by UNDP and executed by IUCN (The World Conservation Union). It is an advocacy and capacity-building project that seeks a greater recognition of the importance of sustainable pastoral development for both poverty reduction and environmental management. WISP enables pastoralists to sustainably manage drylands resources and to demonstrate that their land use and production system is an effective and efficient way of harnessing the natural resources of the world's drylands.

WISP works in a consultative manner through global, regional and national partnerships to ensure that appropriate policies, legal mechanisms and support systems are established to enhance the economic, social and ecological sustainability of the pastoral livelihood system. WISP provides the social, economic and environmental arguments for pastoralism to improve perceptions of pastoralism as a viable and sustainable resource management system.

More information on WISP is available at www.iucn.org/wisp.

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Payments for Environmental Services as a Means to Combat Desertification? Reflection on the Case of the Rangelands in West Asia and North Africa

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1. Introduction

As with many other livestock systems, extensive livestock systems have a triple role through their economical, social and environmental functions. First, through the production of food and primary materials, these systems can contribute to a large share of agricultural GDP (Hatfield and Davies, 2006), but as the demand in livestock products is growing fast in developing countries, this economic function is increasingly carried over by intensive systems. Second, livestock represents the main asset to many poor pastoralist and agro-pastoralist households; they also have a social role through sustaining rural activities and fighting against poverty. Finally, if the extensive systems are well managed, they can provide an important range of environmental services. This last role is by far the comparative advantage of the driest and most vulnerable regions of Central Asia, West Asia and North Africa (CWANA). However, although the economic and social roles have been supported by incentives policies (feed subsidies, drought management, or livestock market protection) and infrastructures investments, the provision of environmental services has not been appreciated.

This unbalanced incentive structure is one of the causes of desertification: while it is well recognized today that feed subsidies and other measures to support the extensive livestock system have contributed to the increased animal pressure on the rangelands, the non-valuation of environmental services (ES) is leading to myopic behavior of land users as they have no economic reason to consider these services in their long-term decision making. Better balanced policies and interventions in the rangelands are needed to value all three roles. This argument is not new; Grice and Hodgkinson (2002) remind us that 20 years ago scientists were saying:

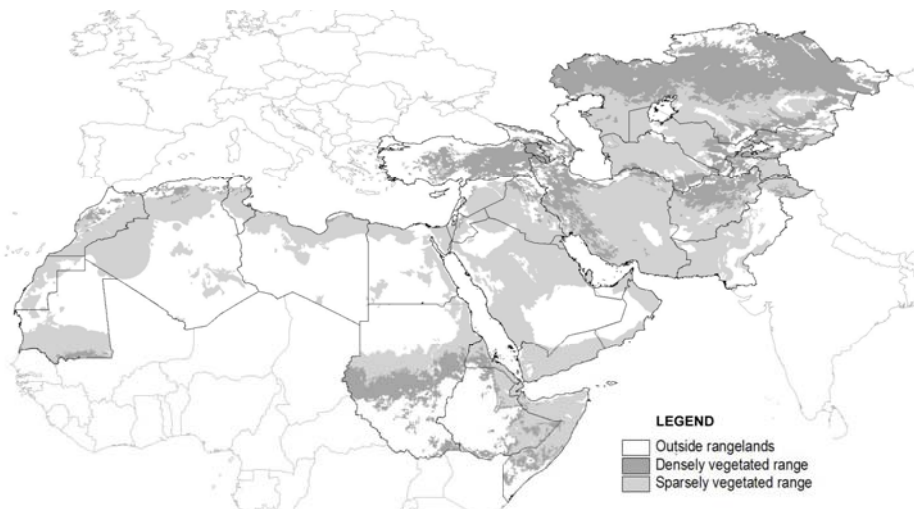
'It [the II International Rangeland Congress] did not adequately address rangeland products other than livestock. [...] More attention to other goods and services will help develop the flexibility needed for the proper use of the rangelands' - Box (1986).

As new economic instruments are now being developed to internalize environmental services with market transactions - payments for environmental services (PES) being one of them - this offers a good opportunity to fully review the nature of interventions in the rangelands. PES is based on the principle that providers of environmental services should be compensated for their costs and that the beneficiaries should pay for it. Payment schemes have been developed for forest protection (Landell-Mills and Porras, 2002), biodiversity conservation (Pagiola et al., 2004) and watershed management (Kosoy et al., 2006). It is not yet a common approach for rangeland management, apart from the Natural Resources Conservation Services (NRCS) grassland reserve program in the USA and pilot project in silvopastoral systems in Latin America. This paper seeks to evaluate whether PES could be a viable option for combating land degradation in the dry rangelands of CWANA.

After putting PES in perspective with alternative policies to combat rangeland degradation (Section 2), this paper discusses in Section 3 the knowledge gaps that have to be filled to develop PES schemes and in Section 4 the institutional issues to ensure the success of such schemes before concluding in a last section.

2. Putting rangeland degradation and PES in context

Central and West Asia and North Africa contain about 60% rangelands (about 13,500,000 km²), of which one third can be considered 'densely vegetated' and two thirds 'sparsely vegetated' (Celis and al., 2007; Figure 1). Sparsely vegetated rangelands roughly portray the composition of dry rangelands, as the distribution of both densely and sparsely vegetated rangelands is closely related to the distribution of precipitation. These rangelands are severely degraded. In North Africa, for example, the perennial phytomass of the steppic vegetation has decreased from 1000-1500 kg DM ha⁻¹ to 200-500 kg DM ha⁻¹ in 50 years (Le Houerou, 2000). Short and long-term climatic drought variability, which affects the availability of grazing resources and sometimes also livestock drinking water supplies, associated to land use change, fuel wood collection and improper grazing practices (overgrazing and early grazing) are the main causes of rangeland degradation (Gintzburger and al., 2006; Aidoud et al, 2006).



Source: ICARDA Land Use/Land Cover Map of CWANA, base year 1993

Figure 1. Rangelands of CWANA.

When considering PES as a possible approach to control rangeland degradation, three main cases have to be considered: i) the rehabilitation of severely degraded land i.e. land that are beyond natural recovery, ii) the improved management of the rangelands for the restoration of the less degraded land and for the rehabilitated land, and iii) the prevention of further degradation by unsustainable land use change and the collection of fuel wood. It will be important to compare the expected costs and benefits provided by PES programs with those of alternative policies to combat rangeland degradation for each of these three objectives.

Rehabilitating severely degraded rangelands¹

The rehabilitation of degraded rangelands portrays the main intervention of governments in West Asia and North Africa rangelands management. In 2000, Gintzburger et al. (2000) estimated that 250,000ha of WANA rangelands were planted with saltbushes (*Atriplex*) and 500,000ha of North Africa with cactus. After a resting period, pastoralists could purchase grazing licenses to access natural reserves or shrub plantations when the government opens them (in the dry years generally). They have been implemented on traditional land, which generated a de facto rejection from the communities who had traditional claims on it.

To minimize the problems of monitoring and enforcement of these government-led plantations, several shrub plantation projects have been implemented with specific social groups, such as extended families or pastoral cooperatives, as key custodians. The groups are compensated during the shrub-growing period (2–3 years) based on the opportunity cost of grazing foregone, and group members are guaranteed exclusive use of the areas. This approach is consistent with other PES programs in different parts of the world, that is, acknowledgement of the foregone opportunities during initial stages is explicitly recognized. However, a legal framework for large-scale adoption is still lacking and success has been moderate after the implementation period due to a lack of assurance of future benefits. Clearly, considering conditional and continuous compensation is a key for the success of PES. In addition, the rehabilitation can not be successful unless an adequate managed utilization of the land is introduced and the causes that brought the degradation about are mitigated (Le Houerou, 2000). Therefore, rangeland rehabilitation has to be considered simultaneously with consideration of these two other issues.

Better promoting grazing management

Improving grazing management is a second important objective. A well managed utilization of the rangeland is necessary to maintain the productivity level of non-degraded rangelands and newly restored and rehabilitated land. Controlled access and limited grazing can also be used to restore some land that are not yet completely degraded and can even produce better results than absolute enclosure (Le Houerou, 2000). But improved grazing management represents a great challenge; most of the rangelands in the arid areas of the CWANA region are common-pool or open access resources, making their use subject to the 'tragedy of the commons'. Improving collective ability to exploit the pastoral resources in an optimal way (by applying the optimum grazing pressure) should bring direct benefits to herders in terms of improved productivity of the range and the subsequent cost-saving of feeds. This objective is not in contradiction with land users' interest - as it was in the implementation of plantations - and compensation is less justified. Measures for facilitating community-based collective action could then be a better alternative than PES. However, collective action has a cost, which increases with the level of land degradation or resource scarcity (Bardhan, 1993; Stafford, 2002) and PES schemes could provide an additional incentive for herders to engage in collective action.

Preventing unsustainable land use change and intensive fuel wood collection

As farming became more mechanized and with continuing population pressure, rangeland has been ploughed and converted to cropland, thus destroying the protective vegetation covers. For example, it has been estimated that rangeland

¹ Afforestation and reforestation (planting of trees) is not considered in this paper as we focus on the dry rangelands, and tree planting is mostly successful above the 200 mm isohyet (Le Houerou, 2000).

areas have decreased by 10% in Morocco and Tunisia and 14% in Algeria between the mid 1970s and the mid 1990s (Abdelguerfi et al., 2000). Current PES programs in forest ecosystems pay farmers for the opportunity cost of keeping the forest as such (vs. clearing it for cultivation). Similarly, PES could be developed with the objective of preventing further transformation of rangelands. With rangelands, the opportunity cost of the transformation of rangeland into cropland is almost zero, as very often cultivation is employed as a way of land appropriation and not for the expected forage/feed production (Floret et al., 1993). Therefore, PES could be implemented at low cost, but this has to be compared with alternative solutions such as land tenure reforms or regulations. Syria adopted this last formula in 1994 by banning the cultivation of lands below the 200 mm precipitation isohyets. However, the enforcement costs are high and a recent survey showed that half the communities are still cultivating part of their land (Dutilly-Diane et al., 2006a).

Fuel wood harvesting is an other important cause of rangeland degradation with an estimated 4 to 6 tons of fuel wood collection per family per year (Gintzburger et al., 2006). PES scheme could also be implemented to compensate wood collectors for the cost of using alternative energy sources (gas).

For each of these three objectives, we can see that PES might not necessary be the cheapest or most effective option. However, we will see in Section 4 that most of the alternative options available (land tenure reforms, organizing collective action at the community level) are in fact conditional to the implementation of PES and not a substitute. Also, if we consider that providing financial incentives to land users to manage their land in a sustainable way is necessary, in the next step we review whether the rangelands provide enough ES, and if these can be marketed.

3. Quantifying Environmental Services, Identifying Beneficiaries and Targeting the Payments

Quantifying ES

Four main public services could be provided by well-managed rangelands (Dutilly-Diane and al., 2006b), and these are:

Wind erosion reduction: Frequency and severity of dust storms can be reduced to almost negligible proportions, which will translate into less crop and infrastructure damages, less respiratory diseases, and less negative ecological impacts.

Carbon sequestration: Although the average is low for per-unit-area soil organic carbon levels in the CWANA rangelands (about 5 kg C.m⁻²), the vast areas of rangelands translate an enormous total organic carbon pool with approximately 66 Giga-ton.

Conservation of biodiversity: Plant and animal biodiversity can be improved (food-chain recovery).

Improved water productivity and flood erosion control: Surface runoff generated by large storms will slow down and subsequent damages caused by flash-floods will decrease. Water use in situ can then be increased, and better natural infiltration will result in the recharge of groundwater.

It is likely that single ES benefits will be relatively small per unit area. Also, merging them through the bundling of services (Landell-Mills et al., 2002) could increase the chance of funding in the global arena, and the payment each provider will receive.

Table 1. Principal benefits and beneficiaries of sustainable rangeland management at various spatial scale (after Dutilly-Diane et al., 2006b)

Scale	Environmental services supplied	Benefits	Beneficiaries / demanders	Monitoring
Global scale	Increased carbon sequestration	Mitigation of global climate change	International community / countries, private companies	Soil sampling, eddy flux towers, static chambers, vegetation cover by remote sensing
	Enhanced plant and animal biodiversity	Enhanced resource base for future generation	Conservation groups, tourism industry, private companies	Survey of key eco-indicators
	Dust storms reduction	Improved air quality and health, decreased maintenance costs in infrastructure and industry and damages in agricultural production systems.	Urban populations, tourism industry, government	Remote sensing
National scale	Increased aquifer recharge	Increased water availability	Water users	Groundwater levels, groundwater use
	Flood reduction	Decreased damage of infrastructure (roads, reservoirs), crops and houses.	State (public infrastructure), utility companies, downstream population	Stage heights at hydraulic structures, reservoir siltation, infrastructure damages
Local scale	Increased water productivity			
	Decrease of soil degradation Increase of plant biomass	Conserve livestock productivity	Local herders	Biomass survey, soil sampling, stocking rate monitoring

Identifying ES beneficiaries and valuing ES benefits

Some environmental services provided by healthy rangelands will benefit the global population (global good), whereas others will benefit specific groups at smaller scales (Table 1). The primary beneficiaries of carbon sequestration and biodiversity conservation would clearly be the “world” population. Their consumption cannot be attributed to well-identified beneficiaries; nonetheless, growing public awareness of the benefits of these goods has meant that governments, international NGOs and private companies are now paying for these services. Although the Kyoto protocol has been ratified by almost all CWANA countries, the CWANA rangelands are not eligible under the Clean Development Mechanism (CDM) in the first commitment period (2008-2012). However, a voluntary market for carbon offsets is emerging, where public or private organizations exchange carbon credits for reasons other than regulatory compliance (Taiyab, 2005). Although this market is small and based on highly variable prices (US\$5–35 per ton CO₂) and lacks transparency and standards, it is growing rapidly. It could represent a good alternative for the CWANA countries.

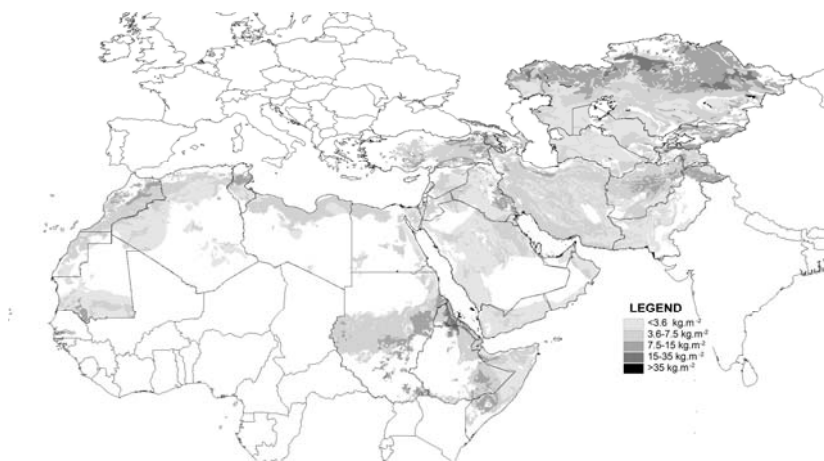
Dust-storms are recognized as having regional and sub-regional implications – for example, dust storms originating from the Gobi desert affect air quality in the Korean peninsula, Japan and even North America (MEA, 2005). Although clean air could be marketed the same way as carbon, biodiversity and water quality are, no market has been developed yet. Air quality is mainly considered from a pollution perspective, where the negative externalities (pollution) generators are being taxed. But a public good perspective could be emphasized where beneficiaries could contribute to enjoy dust-free air.

Finally, improved water regulation is beneficial through a local to national scale, and beneficiaries that could form the basis of effective purchasers might be identified. For example, sedimentation reduction will avoid damage to reservoirs, wells and waterways. In this case, reduced maintenance costs could be used to pay for services.

Once the beneficiaries are identified, ecosystem services will have to be valued to facilitate the development of markets and to compare it with the cost of changing land use to determine whether the underlying investments and changes are worth the effort. However, it is difficult to put a value on services because of the inherent spatial and temporal variability of the natural processes involved and their interdependent and intangible nature (Turner et al., 2003). Merging the three aspects of nature, economy, and society is the current challenge in valuing ecosystem services (Winkler, 2006).

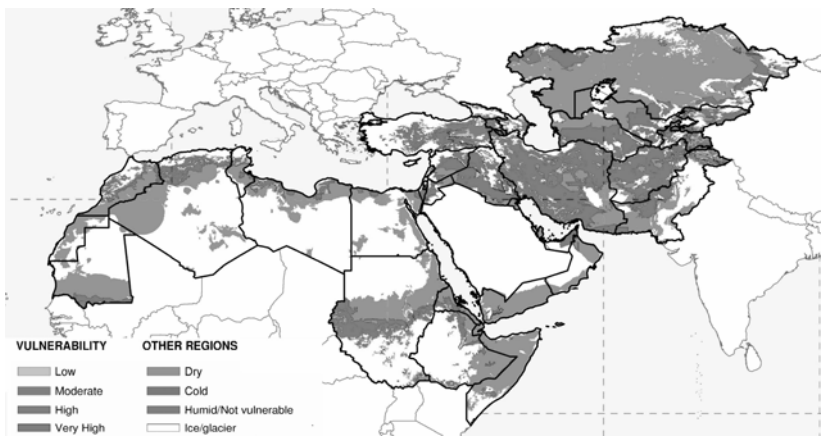
Targeting of payments and biophysical thresholds

To be efficient, PES schemes have to target the zones that are at high risk and/or provide high levels of ES. A priori, most of the CWANA rangelands are highly vulnerable to desertification (Figure 2). However, a finer analysis would be necessary to identify the zone at risk, as Figure 2 is indicative and has been designed with a built-in bias in the sense that the more arid an area is, the more vulnerable it is to desertification; many parts of the CWANA rangelands were not evaluated at all, simply because they are classified as ‘dry’.



Source: NRCS

Figure 2. Vulnerability to desertification in the CWANA rangelands.



Source: FAO, 1995

Figure 3. Organic carbon storage (in kg C.m⁻²) in the CWANA rangelands.

The provision level of different types of environmental services will also vary from one region to another and from one site to another. From current estimates, the rangelands of Central Asia offer great potential in carbon storage (Figure 3). In particular, the areas located in the northern part, where they are associated with Chernozem and Kastanozem soils, and the high-mountain areas, where they are associated with low temperatures and very slow OC-decomposition rates. Locating biodiversity hot spots will also be useful in programming PES. The WWF Ecoregions offers a useful mapping framework for obtaining a broad overview of different and unique biodiversity settings in the world. This system, designed as a basis for serving the conservation of flora, fauna and their habitats, differentiates 106 ecoregions in the CWANA rangelands, covering a minimum of 0.001% of CWANA to a maximum of 8.1%. Twenty six ecoregions cover 80% of the CWANA rangeland, providing evidence of the latter's high degree of biodiversity. Figure 4 shows the distribution of the 39 most prominent WWF ecoregions.

In order to match supply with demand, an institutional infrastructure will have to be developed (Pagiola et al., 2002) and transaction costs accounted. If they are too high, this will reduce the chances of significant payments going to ES providers. Three broad classes of transaction costs have to be considered: i) Search and negotiation costs are likely to be very high without some centralized clearing-house of information; ii) Monitoring costs are of two types: the costs of assessing land change and the costs of monitoring the impact of land use change on the level of provision of ES; iii) Enforcement costs consists of addressing the difficult questions of who has both the responsibility and the authority for enforcing compliance, what the punishments are for non-compliance, and who has the authority to extract punishments.

Then, consideration is needed to determine what will affect the capacity at the local level to provide ES. Given the common property structure that prevails at the local level, this capacity will depend on individual incentives to preserve or rehabilitate rangelands, as well as on the community's ability to organize ES supply and enforce any agreed management or rehabilitation plan. Individual incentives will depend on the technical options chosen, and a better economic analysis of the technologies and management options available is therefore crucial.

A final point that will have to be taken into account when planning PES is how heterogeneity amongst users is likely to affect the individuals' incentives to comply with ES programs within their community. Greater heterogeneity of users is likely to increase the costs of collective action for implementing any ES program. Users might differ in terms of what rangeland products they rely on (forage, fuel wood, medicinal herbs), exploitation levels (herd sizes), the degree of access and use, or total wealth (those with and without access to outside income), etc. Benefits to various PES programs are likely to differ across these different types of users, meaning that negotiating costs amongst users is likely to be quite high. The resulting distribution of costs and benefits to individuals will affect their likelihood to participate in the provision of ES, and thus the costs of monitoring and enforcement that the group as a whole will have to bear.

5. Perspectives

From this preliminary picture, it is clear that PES alone is not the panacea for combating desertification. Its realization requests important reforms in land tenure and land management practices, and the involvement of different actors; the government needs to provide an enabling institutional environment (appropriate property rights structure), communities should promote the coordination of herders' behaviours, and the herders themselves need to respect the management plans. Aside from the provision of financial incentives to land user, PES is offering a framework for directing and coordinating multiple stakeholders' actions toward sustainable land use. If all systems are properly planned, it could represent an effective tool for combating rangeland degradation.

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SESSION 3, PART I:
NATIONAL CASE STUDIES

Burkina Faso : Une Etude de cas

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Introduction

Pays enclavé et amoindri à bien des égards, la structure de l'économie du Burkina Faso est essentiellement basée sur la gestion des ressources naturelles et l'exploitation des terres.

En tant que principales activités économiques du pays, l'agriculture, l'élevage et la foresterie mobilisent environ 85% de la population et produisent près de 2/3 des richesses nationales.

La persistance du phénomène de la désertification et/ou dégradation des terres est à l'origine de la dégradation de 34% des terres arables du pays (92 348 km²). La dégradation de ce capital « terres » met en péril toute l'économie et partant, toute la stabilité sociopolitique.

La revue des politiques de lutte contre la désertification a révélé que le Burkina Faso a développé plusieurs initiatives institutionnelles pour faire face à la problématique de désertification et de dégradation des terres. A cet effet plusieurs cadres légaux, instruments politiques et stratégiques ainsi que des programmes et projets, dont certains suscités par les conventions et accords auxquels notre pays a adhéré, ont été élaborés pour atténuer les effets et impacts liés à la désertification. Au nombre de ceci, nous pouvons citer :

- La stratégie de lutte contre la pauvreté (CSLP) ;
- Le Programme d'Action National de lutte Contre la Désertification (PAN/LCD) ;
- La Stratégie de Développement Rural (SDR) ;
- Le Programme National de Gestion des Terroirs (PNGT) ;
- Plan d'Environnement pour le Développement Durable (PEDD) ;
- la Réorganisation Agraire et Foncière (RAF).

En dépit de ces efforts institutionnels déployés par notre pays, il subsiste plusieurs obstacles et barrières à la Gestion des Terres dont entres autres :

- La coordination insuffisante des actions de Lutte Contre la Désertification/Gestion des Ressources Naturelles, due notamment à l'absence d'une conscience écocitoyenne et d'une volonté d'aller dans la même direction chez la plupart des acteurs et de se doter d'une vision holistique à long terme et partagée par l'ensemble des acteurs du développement ;
- L'insécurité foncière due à l'absence d'une politique foncière nationale qui permette en milieu rural le contrôle de la tenure et de l'affectation des terres ;
- La faible capacité d'intervention des acteurs (en compétences et moyens de travail) ;
- La détérioration des termes de l'échange économique, telle la vente des produits agricoles d'exportations en dessous de leur coût de revient, du fait des subventions agricoles dans les pays développés.

Il ressort des évaluations des efforts des investissements de lutte contre la désertification, les principales recommandations et leçons ci-après pour la consolidation de la lutte contre la désertification :

- La nécessité de la coordination aux différents niveaux (local, régional, national) des différentes initiatives et actions en matière de gestion durable des ressources rurales ;
- La nécessité du transfert effectif aux collectivités territoriales (Régions, Communes rurales ou urbaines) et aux organisations communautaires de base de la responsabilité de la prise des décisions et de la gestion des ressources rurales ;
- La promotion de la sécurisation des ressources foncières au profit des producteurs, en particulier des femmes, des jeunes et des groupes minoritaires ;
- La promotion des pratiques d'affectation et de régénération des ressources rurales basées sur une logique adaptative locale, ainsi que sur des pratiques novatrices et/ou des pratiques basées sur le savoir local ;
- La consolidation du dialogue avec les organisations socioprofessionnelles sur les politiques relatives à la gestion des ressources rurales et au développement local.

En outre un cas de succès relatif à la réhabilitation de la capacité productive des terroirs, en particulier dans la Partie Nord du Plateau Central du Burkina Faso, entre 1980 et 2001, est présenté dans l'étude de cas comme exemple illustratif (de valorisation d'acquis en matière de lutte contre la désertification).

Il démontre que les investissements soutenus de la lutte contre la désertification peuvent rendre le processus de dégradation des sols réversibles et donner des résultats très positifs en matière :

- de restauration des terres dégradées ;
- de régénération de la végétation ;
- de sécurité alimentaire et de fixation des populations.

Ce cas participe du plaidoyer pour inciter au financement de la lutte contre la désertification et de l'hommage rendu par notre pays aux partenaires qui ont soutenu ces initiatives d'actions.

Au regard de la pertinence de ces résultats, il est important que nous recherchions à consolider et à dupliquer ces acquis de lutte contre la désertification à travers la sensibilisation et le soutien de nos braves populations, à intensifier ces efforts de développement.

Enfin, l'étude de cas du Burkina Faso assure une présentation succincte du mécanisme ou stratégie de suivi évaluation du PAN/LCD. Afin de renseigner les efforts de lutte contre la désertification, dispositif de suivi évaluation distingue trois niveaux de suivi, à savoir :

- le suivi d'exécution des interventions de LCD ;
- le suivi d'impact des interventions de LCD ;
- le suivi de la dynamique de la désertification.

1. Revue des politiques nationales de LCD

1.1. Revue des politiques de gestion des terres : ex. architecture législative et normative

Les orientations de gestion des terres sont traduites dans les outils politiques et législatifs ci-dessous :

- Le Cadre stratégique de lutte contre la pauvreté (CSLP) : il a pour ambition de concilier les nécessités de réformes structurelles et de redressement de l'économie avec les objectifs d'accroissement des revenus des pauvres et de transferts aux plus démunis. Le CSLP a été adopté par le Burkina Faso et approuvé par les institutions internationales en 2000. La première évaluation a été effectuée en 2002. Cependant, conscient du caractère limité des ressources dont il pourrait disposer et soucieux de réalisme dans son approche des problèmes, le Gouvernement a énoncé des priorités parmi lesquelles la gestion durable des ressources naturelles.
- Le Programme d'Action National de lutte Contre la Désertification (PAN/LCD) : il se veut être un cadre de référence pour l'action. Il est élaboré à partir des analyses critiques faites par les différentes composantes de la société sur, d'une part, les causes de la désertification, les solutions déjà appliquées et les résultats obtenus, et d'autre part, les nouvelles options à considérer en matière de lutte contre la désertification. Il a été adopté par le gouvernement en avril 2000, est appuyé par un programme opérationnel de mise en œuvre et appuyé actuellement par un programme national de partenariat pour la gestion durable des terres (CPP).
- La Lettre de Politique de Développement Rural Décentralisé (LPDRD) : au nombre des derniers-nés des stratégies en matière de stratégie opérationnelle de la gestion durable de l'environnement et des ressources naturelles, elle vient en appui au CSLP et le Programme National de Développement Rural Décentralisé qui en découle. Il sert de cadre fédérateur aux différents projets et programmes en cours et vise le développement des communautés à la base.
- L'élaboration des Textes d'application de la Réorganisation Agraire et Foncière (RAF) ainsi que des instruments de gestion de l'espace (Domaine Foncier National). La RAF date de 1984 et a été revue à plusieurs reprises. Elle définit le Domaine Foncier National (DFN) et organise les instances chargées de sa gestion. La RAF prévoit la responsabilisation des communautés villageoises pour la gestion des ressources naturelles et du foncier rural, et pour la mise en œuvre des programmes de développement. La RAF a en particulier instauré les Commissions Villageoises de Gestion des Terroirs (CVGT), dont la généralisation sur l'ensemble du territoire connaît quelques contraintes. Elle préconise l'élaboration des schémas National, régionaux et provinciaux pour assurer l'aménagement et la gestion des ressources du territoire.
- La Stratégie de Développement Rural (SDR) a été élaborée en fin 2003. Son objectif global est d'assurer une croissance soutenue du secteur rural en vue de contribuer à la lutte contre la pauvreté, au renforcement de la sécurité alimentaire et à la promotion d'un développement durable.
- Le Burkina Faso a ratifié la Convention Cadre des Nations Unies sur les changements climatiques (CCCC) le 2 septembre 1993. Une monographie complète sur la question des changements climatiques a été faite en 2002. En application des engagements pris, le Burkina Faso a adopté en 1997 une stratégie nationale de mise en œuvre de la CCCC. Un Programme d'Action National d'Adaptation aux changements climatiques (PANA) a été validé en octobre 2006 afin de susciter la mobilisation de financements requis pour

soutenir nos populations vulnérables à une adaptation aux changements climatiques.

- La Convention sur la diversité biologique : après son adoption en 1993, Burkina Faso a pu se doter de deux documents importants : la Monographie Nationale sur la Diversité Biologique, et la Stratégie Nationale et Plan d'Action en matière de Diversité Biologique et Rapport de pays à la Conférence des Parties.
- Le Programme National de Gestion des Terroirs (PNGT) : il a été mis en place en 1992. C'est un programme à caractère national doté d'une capacité incontestable de structuration de l'espace. Il participe à travers l'élaboration concertée des plans de gestion des terroirs à la responsabilisation des populations locales dans leur développement durable et à la mise en œuvre de la réorganisation agraire et foncière.
- Relu en 1994 suite à la Conférence des Nations Unies sur l'Environnement et le Développement (CNUED), un Plan d'Action National pour l'Environnement constitue actuellement l'Agenda 21 National du Burkina Faso et se veut un cadre de référence pour la planification des actions liées à l'environnement et à l'amélioration du cadre de vie. En vu d'intégrer les préoccupations environnementales dans le développement local, le PANE s'est muté en Plan d'Environnement pour le Développement Durable (PEDD), validé en 2004.
- Le Plan d'Action Forestier Tropical (PAFT), initié sous l'égide de la FAO. Ce plan constituait un cadre général stratégique proposé aux pays en voie de développement dont le Burkina Faso, pour réorienter, intensifier et harmoniser leurs politiques et pratiques forestières traditionnelles en vue de jeter les bases d'un développement socio-économique durable. Malheureusement, pour des raisons financières, le PAFT du Burkina Faso est resté à sa phase de planification stratégique. Il est actuellement remplacé par la Politique Forestière Nationale qui a été élaborée et adoptée en 1995. Sa mise en œuvre est assurée à travers plusieurs programmes dont : le Programme National d'Aménagement des Forêts (PNAF), le Programme National de Foresterie Villageoise (PNFV) et le Programme Sahel Burkinabé (PSB).
- Le Plan d'Action pour la Gestion Intégrée des Ressources en Eau (PAGIRE) a pour objectif principal de contribuer à la mise en œuvre d'une gestion intégrée des ressources en eau du pays, adaptée au contexte national, conforme aux orientations définies par le Gouvernement burkinabé (cf. loi d'orientation relative à la gestion de l'eau de 2001) et respectant les principes reconnus au plan international en matière de gestion durable et écologiquement rationnelle des ressources en eau. Ce plan fait suite à la mise en œuvre du programme GIRE en 1999 qui a fait l'état des lieux des ressources en eau du pays et de leur cadre de gestion en 2001.
- Le Plan Stratégique Opérationnel (PSO) est l'aboutissement d'une série de réflexions engagées par le Gouvernement depuis 1996 pour définir le profil de l'agriculture du pays à l'horizon 2010. Le PSO traduit clairement les actions prioritaires que le Gouvernement entend mettre en œuvre pour atteindre les objectifs assignés au secteur de l'agriculture et permettre au pays de relever d'importants défis.
- En matière de fertilité des sols, une Stratégie nationale de Gestion Intégrée de la Fertilité des Sols (SNGIFS) a été élaborée en 1999. Elle définit les grandes orientations et les actions en matière d'amélioration et de maintien de la fertilité des sols au Burkina visant à assurer une production agricole durable par la promotion des amendements des sols et des technologies complémentaires et le développement du marché des intrants et des produits agricoles.

- La Politique Nationale de Développement Durable de l'Agriculture Irriguée a été adoptée par le Gouvernement en 2005, pour opérationnaliser le Cadre Stratégique de Lutte contre la Pauvreté et la Stratégie de Développement Rural. La stratégie nationale de développement durable de l'agriculture irriguée vise la contribution aux Objectifs du millénaire pour le développement.

1.2. Description de la situation : ex. problèmes majeurs, perception du public, contexte politique, intérêt des décideurs

1.2.1. Problèmes majeurs :

- perte de la végétation et de la biodiversité florale et faunique ;
- diminution des substances nutritives du sol, du carbone biologique, de la biodiversité souterraine, et de l'acidification ;
- érosion éolienne et hydrique, et sédimentation à l'intérieur et autour des ressources stratégiques ;
- perte en matière de disponibilité, de qualité et de sûreté des eaux de surface et des eaux souterraines ;
- insécurité foncière ;
- pratiques agricoles non durables ;
- gestion non durable de l'espace, surpâturage et excès de cheptel ;
- gestion non durable des forêts et bois ;
- pression démographique ;
- pauvreté.

1.2.2. Intérêt des décideurs

La prise de conscience de la problématique de gestion durable des terres et la parfaite adhésion de l'administration publique, du secteur privé, de la société civile et de la coopération bilatérale et multilatérale au CSLP en tant que référence unique en matière d'orientation pour le développement, ouvre des perspectives fort prometteuses. La relecture en vue de la première mise en œuvre est intervenue en 2003 et prend désormais en compte l'aspect environnemental insuffisamment intégré dans la version initiale. Le CSLP constitue désormais le cadre de référence pour tous les plans et programmes du pays.

1.3. Analyse des politiques : ex. impact des politiques, feuille de route, défis de mise en œuvre, analyse des parties prenantes

1.3.1. Impact des politiques

Les **contraintes** au niveau des **politiques** : Il existe un certain nombre de lois, de stratégies et de plans d'actions (ex. : les réglementations de la Loi sur la Réforme Agraire et Foncière (RAF), le Programme d'Action National de Lutte Contre la Désertification (PAN/LCD), etc.) au niveau national, régional et sectoriel qui se chevauchent, augmentant ainsi l'inefficacité et les coûts de transaction. Ces instruments semblent exister juste pour cette raison, plutôt que de servir de mécanismes permettant d'agir, d'intervenir, de faciliter et d'élaborer. Certains sont dépassés au vu de l'accroissement de la pression en zone rurale. Les politiques ne sont pas bien appliquées sur le terrain du fait du manque de moyens et de main d'œuvre. Le temps consacré à l'application des lois est de loin moindre qu'au temps dévolu à leur élaboration. Des progrès notables ont été accomplis dans le domaine de **l'insécurité liée au droit foncier**. Des systèmes adéquats en vue de promouvoir le droit foncier/assurer le droit d'accès aux ressources pour la gestion des pâturages, attendent d'être développés. Bien qu'aucune preuve palpable n'indique que l'absence

de régime foncier constitue une contrainte à l'adoption de la conservation des terres, la migration a causé une occupation anarchique des terres et une apparition des conflits. On constate également une pression croissante sur les ressources stratégiques (zones protégées, cours d'eau, etc.). Des procédures de sommet vers le bas au niveau politique (RAF) ont rencontré des résistances au niveau local.

1.3.2. Analyse des parties prenantes

Les différentes stratégies, plans et programmes sont préparés sur la base des informations recueillies à travers : (i) les agences administratives ; (ii) les principaux projets et programmes sur la gestion durable des terres ; (iii) le réseau des associations et organisations communautaires de base impliquées, par exemple, dans la lutte contre la désertification ; et (iv) le cadre de concertation des partenaires financiers et techniques.

L'analyse des principaux rôles à jouer au sein de la gestion des terres a conduit à l'identification des **acteurs** suivants **au niveau gouvernemental** : (i) le Ministère des Finances (mobilisation des ressources internes et externes, coordination des bailleurs de fonds) ; (ii) le Ministère de l'Environnement (point focal de la CCD et en charge des stratégies et des interventions de la coordination dans le domaine de l'environnement) ; et (iii) le Ministère de l'Agriculture, de l'Eau et des Ressources Halieutiques (mise en œuvre des activités). D'autres ministères sont impliqués dans la gestion des terres, à savoir : le Ministère des Infrastructures, des Transports et de l'Habitat ; le Ministère du Commerce, de l'entreprise et de la Promotion de l'Artisanat ; le Ministère des Mines, des Carrières et de l'énergie ; le Ministère de l'Administration Territoriale et de la Décentralisation ; le Ministère de la Santé ; le Ministère de l'Enseignement Secondaire, Supérieur et de la Recherche scientifique ; le Ministère de l'Education de Base et de l'Alphabétisation ; et le Ministère de la Culture des Arts et du Tourisme.

1.4. Recommandations et leçons apprises : ex. succès, échecs, résultats généraux

Les principales recommandations peuvent être résumées ainsi qu'il suit :

- Les différentes initiatives et actions en matière de gestion durable des ressources rurales sont coordonnées de manière effective et efficace aux différents niveaux (local, régional, national).
- La responsabilité de la gestion et de la prise des décisions en matière de ressources rurales est effectivement transférée aux collectivités territoriales (Régions, Communes rurales ou urbaines) et aux organisations communautaires de base.
- Les producteurs, en particulier les femmes, les jeunes et les groupes minoritaires connaissent une amorce d'accès sécurisé aux ressources foncières.
- Des pratiques d'affectation et de régénération des ressources rurales basées sur une logique adaptative locale, ainsi que sur des pratiques novatrices et/ou des pratiques basées sur le savoir local sont promues, diffusées et utilisées.
- Les organisations socioprofessionnelles jouent un rôle actif dans le dialogue sur les politiques en matière de gestion des ressources rurales et de développement local.

Leçons apprises : cas de succès (Valorisation d'acquis en matière de lutte contre la désertification)

Ce cas de succès est relatif à la réhabilitation de la capacité productive des terroirs dans la Partie Nord du Plateau Central entre 1980 et 2001.

Plus que d'actualité, cet exemple de succès au Burkina, présente d'une part une photographie d'ensemble de l'état de la désertification au Burkina Faso. Il traduit d'autre part des résultats d'acquis en matière de lutte contre la désertification par une population autrefois désespérée.

Il est donc une interpellation des différents acteurs du monde rural burkinabé à plus d'optimisme et de détermination dans leurs initiatives en matière de lutte contre la désertification.

Le cas qui est présenté démontre, sur la base d'analyses biophysiques et socio-économiques, que le financement soutenu de la lutte contre la désertification peut rendre le processus de dégradation des sols réversibles et donner des résultats très positifs en matière de restauration des terres dégradées et régénération de la végétation, de sécurité alimentaire et de fixation des populations.

Ce cas participe du plaidoyer pour inciter au financement de la lutte contre la désertification et, en même temps, de l'hommage de notre pays à l'endroit des partenaires dont l'appui a permis, d'une part, d'atteindre ces résultats.

Au regard de la pertinence de ces résultats, il est important que nous recherchions à consolider et à dupliquer ces acquis de lutte contre la désertification à travers la sensibilisation et le soutien de nos braves populations, et à intensifier ces efforts de développement.

(Voir résumé du cas en annexe)

2. Stratégie nationale de suivi-évaluation

(L'exemple pris à ce niveau concerne le suivi-évaluation mis en place dans le cadre de la mise en œuvre du PAN/LCD)

La principale difficulté du MECV est de comptabiliser les multiples résultats qui démontrent une mise en œuvre de la LCD par plusieurs acteurs et qu'il faut affiner pour mieux situer les compétences dans le suivi et l'évaluation.

La mise en place d'un système unique de suivi et d'évaluation du PAN/LCD, dans l'esprit de la convergence des interventions, procède par un greffage de ce système sur les différents dispositifs de suivi /évaluation déjà en place, dans la mesure où chaque projet/programme ayant une composante LCD (si infime soit-elle) prévoit la collecte de données sur des variables, des calculs d'indices et la dérivation d'index en vue de quantifier des indicateurs qui lui sont propres.

La question qui se pose est la structuration de ce dispositif ramifié dans une vision opérationnelle. La méthodologie de développement de ce dispositif ramifié en vue de son déploiement consiste à partir de la description faite dans le PAN/LCD de l'adapter à la stratégie de mise en œuvre du PAN qui s'intègre au CSLP.

Le MECV prévoit avoir la capacité de passer des contrats avec des spécialistes pour :

- le recensement de tous les systèmes de suivi et d'évaluation des projets et programmes identifiés dans l'étude des besoins en financement additionnel pour le PAN/LCD ;
- l'identification des indicateurs consensuels qui mesurent la contribution à la CCD ;
- la possibilité de les rendre compatibles avec les besoins du PAN/LCD ;
- la proposition de systèmes de « reportage » qui permettent au MECV de recevoir régulièrement toutes les informations sur des résultats spatio-temporels ;
- la proposition d'un mode de communication simple et conviviale qui ne demande pas de travail supplémentaire aux différents responsables des systèmes de suivi et d'évaluation des projets/programmes ainsi que des Ministères et des bailleurs de fonds qui doivent rendre compte à leurs sièges.

La structure du mécanisme de suivi/évaluation du PAN/LCD sera la suivante :

- Une composante suivie d'exécution du PAN/LCD ;
- Une composante suivie d'impact de la LCD ;
- Une composante suivie de la dynamique de la désertification.

2.1. Suivi d'exécution du PAN/LCD

Il s'agit à travers ce dispositif de suivi, de mesurer les performances de la mise en œuvre du PAN/LCD, notamment au double plan des réalisations physiques (comparaison périodique du niveau d'exécution physique des activités en comparaison du planning détaillé de chaque composante du projet), mais également financières (niveau de décaissement et d'utilisation des ressources mobilisées, en relation avec les performances physiques).

Il sera tenu compte du fait que les taux de réalisation des activités de LCD viendront s'insérer dans les matrices de suivi opérationnel du CSLP, notamment dans le « Programme triennal d'actions prioritaires selon les objectifs et les Composantes du CSLP ». Les indicateurs de performance appliqués dans le suivi d'exécution du PAN/LCD seront repris dans la « Série d'indicateurs et de cibles axés sur la pauvreté et les performances sectorielles » du CSLP. Ces indicateurs de performance devraient en outre être ceux utilisés dans le cadre du suivi des politiques sectorielles, en l'occurrence le PAN/LCD. On distinguera pour les besoins du PAN/LCD deux niveaux spatio-temporels : le niveau national et le niveau local d'une part, et la programmation annuelle et triennale d'autre part.

2.2. Suivi d'impact du PAN/LCD

Les effets des activités de LCD sur l'« Environnement biophysique », l'« Environnement humain » et la « Bonne gouvernance » à travers les objectifs de chacun des sept domaines prioritaires sont visés par ce type de suivi. Deux échelles sont appliquées également conformément aux dispositions du PAN/LCD : le niveau national et le niveau local.

La nature des effets ciblés amène à viser un horizon beaucoup plus lointain pour certains objectifs que dans le cas du suivi d'exécution. L'horizon de 10 ou 15 ans est retenu comme repère dans le temps pour bon nombre de ces objectifs liés au champ d'application de niveau national ou régional.

Les indicateurs retenus dans ce cadre sont associés à des cibles dans le temps et dans l'espace. Le PAN/LCD fait référence pour les indicateurs de cette catégorie à ceux du « développement durable définis par les Nations Unies ainsi que les travaux du CST et du groupe de travail CILSS-OSS sur les indicateurs d'impact dont le Burkina Faso est membre ». Le CSLP quant à lui souhaite que soit pris en compte dans le cadre de la définition des indicateurs de pauvreté les « Objectifs de développement du millénaire » à l'horizon 2015, avec un suivi sur la base annuelle.

En outre, une quinzaine d'indicateurs d'impact ont été suggérés dans le document du PAN/LCD en ce qui concerne l'échelle nationale (y compris régionale).

Cependant, pour le niveau local retenu comme l'échelon prioritaire pour le suivi des effets et de l'efficacité du PAN et des PLD, le document du PAN « retient que les évaluations des impacts vont se faire par les populations concernées, avec des outils qu'elles maîtrisent », et que, « dans ce sens, les indicateurs à utiliser doivent être élaborés par les niveaux et acteurs concernés ».

2.3. Le Suivi de la dynamique de la désertification

Pour cette activité, l'on cherche à suivre à l'échelle du pays l'évolution du phénomène de la désertification dans son ensemble. C'est « l'observation systématique des dynamiques de la dégradation des terres dans les zones touchées », et on devrait ajouter « et de la pauvreté ». Cette observation va porter sur « l'évolution à court, moyen et long termes des facteurs physiques, biologiques, sociaux et économiques » en vue de « mieux comprendre et évaluer le poids respectif de l'action de l'homme et de l'action du climat sur l'évolution du phénomène de la désertification au Burkina Faso ».

On est en présence de plusieurs échelles : dans le temps on vise le court, mais surtout le moyen et le long terme. Sur l'échelle des causalités, on cherche à faire la part des choses entre la part de dégradation qui est imputable au climat, et celle qui est due à l'action de l'Homme. D'où la complexité de variables à observer et celle des combinaisons à faire en vue de pouvoir répondre à des questions fondamentales telles que : La LCD fait-elle des progrès au Burkina ? Si oui, dans quelle région et de combien ? Sur quelle période ? Quelles sont les tendances qui se dégagent ? etc. Un choix d'indicateurs pertinents, judicieusement sélectionnés et qui se combinent pour fournir une information utile à la formulation de réponses à ces questions fondamentales est un préalable de première priorité.

2.4. Outils d'analyse

Dans le développement de chacune des trois (3) composantes de suivi ci-dessus présentées, il est indispensable de disposer d'outils d'analyse puissants capables de prendre en charge, d'une part, la complexité de la conjonction des facteurs contribuant à la dégradation des terres et à la pauvreté dans la phase de modélisation des dispositifs de suivi-évaluation, et d'autre part, au cours des phases d'analyse des données et d'interprétation des résultats. Un tel outil basé sur la technologie d'aide à la prise de décision (« decision support systems ») est le GeoNetweaver™ mis au point par l'USAID. Doté d'un moteur permettant de bâtir une base de connaissance (« knowledge base »), cet outil permet de modéliser toutes sortes de phénomènes, en particulier de capturer les connaissances et le savoir-faire des populations locales dans la base de connaissance.

L'analyse de la structure du modèle, une fois les données de variables liées aux indicateurs de suivi d'exécution ou de suivi d'impact introduites, permet de montrer par un code de couleurs la performance de chaque composante constituant le

modèle. Ainsi on peut détecter les points faibles du dispositif et de son fonctionnement.

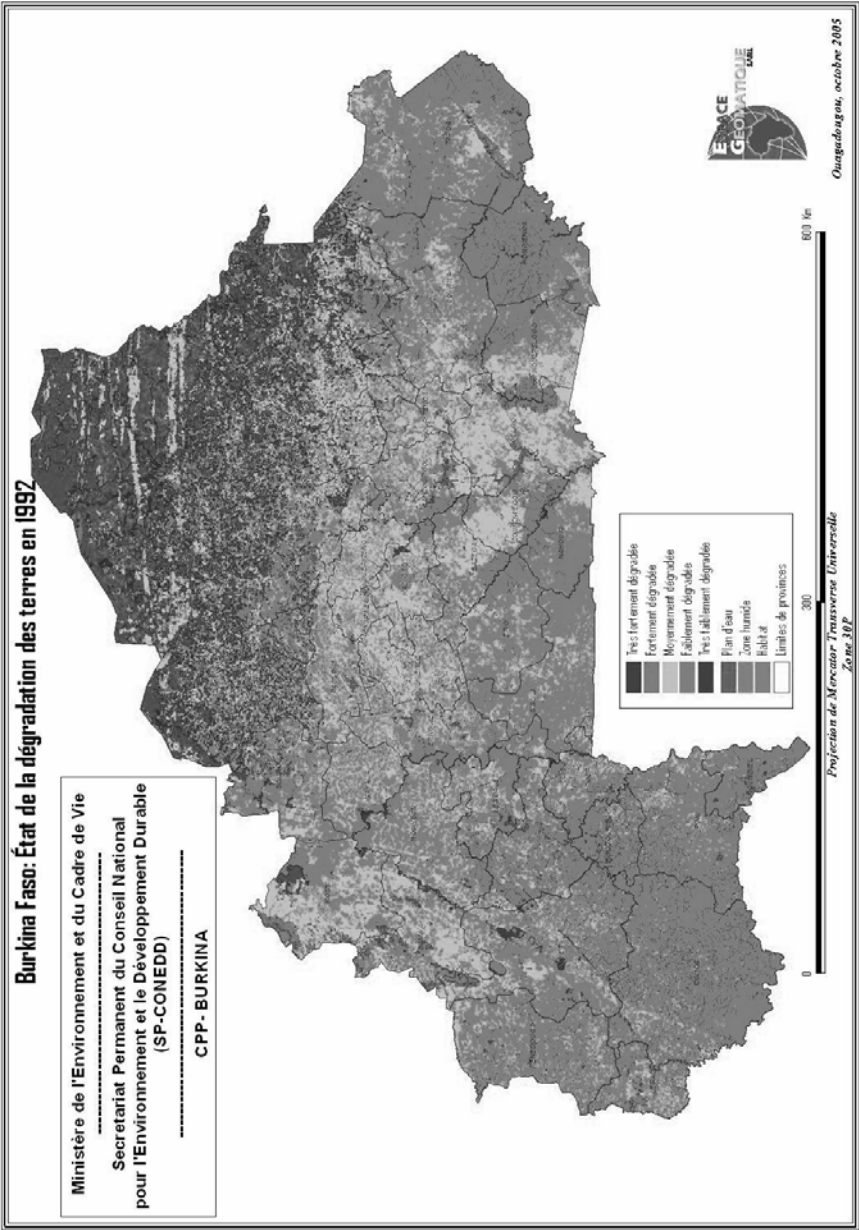
De plus, couplé à une base de données à référence spatiale, cet outil permet de visualiser spatialement les performances du dispositif de suivi-évaluation et de repérer les portions de territoire qui constituent un sujet de préoccupation de par ses résultats, soit pour l'ensemble des composantes combinées, soit pour une composante particulière.

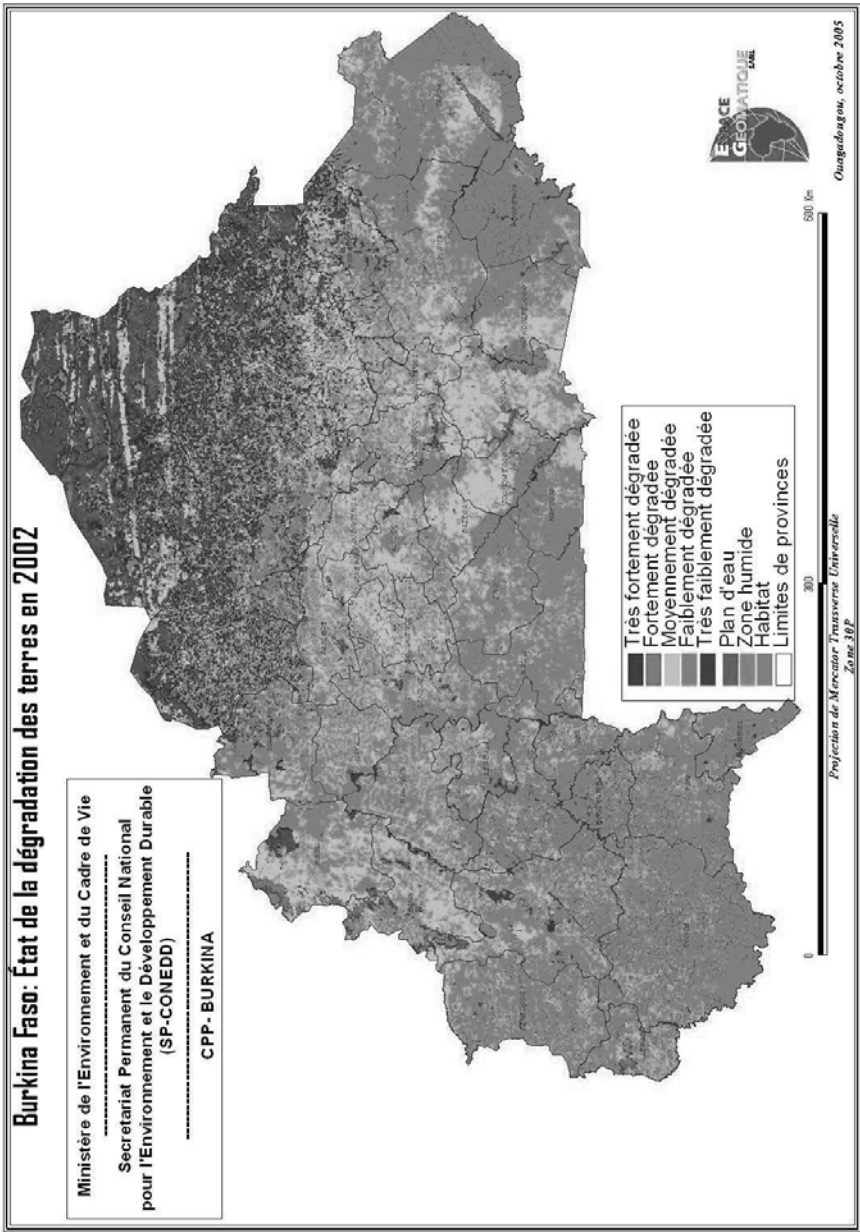
2.5. Système de communication

Ce système fait également partie du dispositif de suivi-évaluation. Il permet de faire circuler les données et de partager les informations issues des diverses analyses opérées. Il comporte une structuration permettant de faire circuler effectivement l'information, des outils de collecte et d'analyse des données, un dispositif de communication de l'information résultant des diverses analyses, avec des formats prédéfinis et une cadence de production de ces informations sous forme de rapports. Il est conseillé à ce niveau d'exploiter, dans le cadre du système de communication à mettre en place, la disponibilité du réseau du Programme national de gestion de l'information sur le milieu (PNGIM) dont la Coordination pourrait exploiter et gérer le patrimoine « Informationnel » du PAN/LCD (y compris la base de données des projets et programmes LCD, la base de connaissance du dispositif de suivi-évaluation pour le compte de tous les partenaires. Ce dispositif est mis en place au Burkina Faso, cependant il manque des moyens techniques et financiers pour son opérationnalisation.

Les contraintes au niveau du suivi-évaluation : Il est très important de suivre et d'évaluer la qualité des sols, les changements d'utilisation de ces sols et les moyens permettant d'obtenir des données et des statistiques de bonne qualité. Sans ces informations, les mécanismes de prise de décision (au niveau central et local) se trouvent affaiblis. Bien que ces mécanismes soient déjà en place, il est encore possible de les améliorer, notamment au niveau du suivi-évaluation participatif.

Annexes





Cas de succès

Valorisation d'acquis en matière de lutte contre la désertification

« La réhabilitation de la capacité productive des terroirs dans la Partie Nord du Plateau Central du Burkina Faso entre 1980 et 2001 »

Résumé

Au début des années 1980 la situation dans la partie nord du Plateau Central), région densément peuplée, était dramatique : des années de sécheresse s'enchaînaient, les disettes se succédaient et l'environnement se dégradait. De l'avis général, la dégradation de l'environnement a continué de s'aggraver pendant les vingt années suivantes. Les indicateurs concernés seraient la dégradation continue du couvert végétal, la baisse des rendements agricoles à cause de l'érosion et de l'épuisement des sols, la baisse de la nappe d'eau phréatique, etc. L'objectif de cette étude est d'identifier et de quantifier aussi bien que possible, les changements dans l'agriculture et dans l'environnement qui ont eu lieu dans la partie nord du Plateau Central de 1980 à 2001.

Face aux crises du début des années 1980 les agriculteurs ont commencé à améliorer leurs techniques traditionnelles de Conservation de l'eau et des Sols (CES), et les investissements privés (agriculteurs) et public (projets) dans la CES ont fortement augmenté depuis le début des années 1980 et surtout depuis 1989. Dans des centaines de villages, 25% à 50% des superficies cultivées ont été aménagées au fil des années. En utilisant une gamme de méthodes de recherche (Méthodes Accélérées de Recherche Participative, enquêtes conventionnelles, images satellites et photos aériennes), une équipe pluridisciplinaire de chercheurs a étudié les impacts des aménagements de CES dans 12 villages, dont 9 avec des aménagements importants et trois villages avec peu de parcelles aménagées dans la partie nord du Plateau Central.

Globalement le constat est encourageant. Les rendements céréaliers ont évolué positivement depuis 1984-88. Dans deux des trois provinces la superficie cultivée est stable, la densité d'arbres et leur diversité sont plus importantes sur les champs aménagés que sur les champs non-aménagés, les effectifs de bétail augmentent et leur gestion évolue de l'extensif vers le semi-intensif. Enfin, selon une enquête d'opinion, la disponibilité en eau dans de nombreux villages s'est améliorée depuis le début des aménagements. Un autre phénomène important est que la croissance de la population des villages d'étude, proche de 0% entre 1975 et 1985, s'est accélérée depuis le début des aménagements autour de 1985 (tableau 16.1). On peut donc raisonnablement penser que les aménagements de CES ont contribué à ralentir l'exode rural. Un des villages qui avait perdu 25% de sa population entre 1975 et 1985 n'a plus vu de départs de familles après la réalisation d'un nombre conséquent d'aménagement en 1985. L'augmentation des rendements céréaliers a amélioré le niveau de sécurité alimentaire de toutes les catégories socio-économiques des exploitations agricoles, a diminué la vulnérabilité en années de sécheresse et a réduit la pauvreté rurale de façon significative.

Les résultats sont impressionnants, mais il est important et urgent de continuer la lutte contre la dégradation des sols et la pauvreté rurale, car il reste beaucoup de terres à aménager et des zones aménagées à mieux valoriser. L'amélioration de la productivité des ressources naturelles par une meilleure gestion des terroirs par les villageois est essentielle, et dans ce cadre l'amélioration de la fertilité des sols nécessite une attention toute particulière, car elle déterminera à long terme la durabilité des acquis.

Lutter contre la désertification en Algérie : « De l'expérience à l'action »

Mohamed Seghir Mellouhi

Ministère de l'Agriculture et du Développement Rural

La Présentation des grands écosystèmes naturels algériens

Au lendemain de son indépendance en 1962, l'Algérie s'est trouvée confrontée à une situation de dégradation écologique très avancée caractérisée par une régression très significative du couvert végétal entraînant une intensification des phénomènes érosifs dans les zones montagneuses et l'apparition de paysages désertifiés dans la steppe.

Cette situation est d'autant plus compliquée par l'existence de particularités géoclimatiques assez importantes et influentes :

- **L'écosystème montagneux**, localisé dans la zone Tellienne.
- **L'écosystème steppique**, compris entre l'isohyète 400mm au Nord et l'isohyète 100 mm au Sud.
- **L'écosystème saharien** : 80% de la superficie totale partagée par de grandes unités morphologiques, les ergs sableux, les hamadas (plateaux caillouteux) et le Hoggar.

Les ressources biologiques sont représentées essentiellement par :

- **Forêt : 4 150 000 ha à dominance de Pin d'Alep.**
- **Steppe : 20 millions d'ha** occupés essentiellement par 3 millions d'ha de nappe alfatière, 4 millions d'ha d'armoise, en plus du sparte, du pistachier et du jujubier au niveau des dayas.
- **Le Sahara** : dans la plupart des cas au stade relique comme le cyprès du tassili, les acacias radiana, et la flore herbacée.

La Problématique de la désertification en Algérie

Sur les **238 millions d'ha** de l'Algérie, **200 millions d'ha** sont occupés par la **zone saharienne** où les infrastructures socio-économiques sont soumises à un ensablement résultant d'un développement souvent incohérent et d'une exploitation anarchique des ressources de ces milieux sensibles.

Sur les 38 millions d'ha du nord du pays, **36 millions d'ha** forment **la steppe et le présaharien**, zone aride et semi-aride très sensible aux processus de désertification, et caractérisée par un surpâturage chronique.

A ceci s'ajoute plus de **12 millions d'ha** en **zones de montagne** qui sont menacés par l'érosion hydrique.

L'Expérience de l'Algérie dans le cadre de la lutte contre la désertification

Aussi, l'Algérie a été amenée à réaliser des programmes de protection et de valorisation de son espace naturel portant sur :

- la reconstitution du patrimoine forestier par les plantations forestières, qui a été consacrée depuis l'indépendance comme tâche d'intérêt nationale se

traduisant par des opérations de reboisements de masse à travers les chantiers populaires (CPR) qui ont permis la plantation de plus de **30 000 ha** suivis des campagnes de volontariat qui ont totalisé plus de **99 000 ha** ;

- les différents plans de développement (1962 – 1970) qui ont pris en charge la réhabilitation de la steppe et le traitement des sols en zones de montagne. La steppe a bénéficié durant les premiers plans de développement de programmes portant, d'une part, sur l'aménagement des parcours et l'organisation de l'élevage ovin, et d'autre part, sur des actions de protection et de reconstitution forestière.

Par ailleurs, la lutte contre l'érosion et la restauration des sols se sont concrétisées par la mise en place des projets d'aménagement intégrés dans les bassins versants et les périmètres d'agriculture de montagne.

Malgré les efforts consentis durant la première décennie qui a suivi l'indépendance, la dégradation des ressources naturelles n'a pu être endiguée et a rendu nécessaire la décision d'entreprendre :

- Le lancement en 1971 du projet **barrage vert** destiné à enrayer le processus de désertification. L'objectif fondamental du barrage vert était de rétablir et maintenir l'équilibre écologique du milieu par une exploitation rationnelle des ressources avec pour finalité la promotion économique et sociale des populations. En matière de plantations toutes confondues, les réalisations ont totalisé plus de **300 000 ha**.
- L'opération **grands travaux** en 1994, qui donnait la priorité à une approche intégrée visant à concilier d'une part la satisfaction des besoins des populations et d'autre part la restauration et l'amélioration du potentiel productif des terres. Les grands travaux ont concerné notamment les actions de protection et d'amélioration des peuplements forestiers disparus, le reboisement des terres à vocation forestière, la mise en valeur des terres pastorales et agricoles, la lutte contre l'ensablement et la fixation des dunes et la mobilisation des ressources en eau superficielles et souterraines. Cette démarche s'inscrivait dans le cadre de la politique nationale d'aménagement du territoire. Les réalisations pour ce programme ont dépassé les **99 000 ha** de plantations.
- La mise en œuvre d'une nouvelle approche, en matière de protection et gestion des ressources naturelles, notamment eau, sols et forêts, consistant à conduire le développement dans le strict respect de l'équilibre des écosystèmes, est lancée en 2000 à travers le Programme National de Développement Agricole (**PNDA**) qui vise un développement durable reposant sur une exploitation rationnelle des ressources naturelles.
- Le Plan National de Reboisement (**PNR**, qui prévoit 1 245 000 ha de plantations sur 20 années) par des plantations fruitières au profit des populations, et la mise en œuvre de programmes d'emploi rural, augurent des politiques nouvelles basées sur la concertation et la participation des communautés locales, avec des effets positifs sur la sauvegarde des équilibres naturels des écosystèmes. La mise en œuvre du Plan National de reboisement a permis la réalisation de **190 000 ha** de plantations toutes confondues depuis son lancement en 2000, soit une moyenne annuelle de plus de 30 000 ha.
- Le Programme National de Développement Agricole et Rural (**PNDAR**) lancé en 2002, notamment dans les zones arides et semi-arides, a encouragé l'introduction de technologie d'irrigation appropriée aux régions sèches d'irrigation (foggara).
- La nouvelle Stratégie de Développement Rural Durable (**SDRD**) lancée en 2004, opte pour un développement rural qui « organise les synergies

économiques et sociales et qui se fonde sur une implication pleine et responsable des autorités au niveau local et des populations concernées dans le cadre de la mise en œuvre d'une politique participative active. Cette approche concerne en priorité les communautés rurales vivant dans des zones éparses ou isolées et s'effectue dans le cadre des Projets de Proximité de Développement Rural qui comportent des actions d'accompagnement des communautés rurales avec un soutien au plan technique, organisationnel, financier et promotionnel.

Soutien pour la mise en œuvre des programmes de lutte contre la désertification

Les ressources financières pour la réalisation des actions de lutte contre la désertification sont, pour une grande part, individualisées dans les différents plans et programmes et prélevées du budget d'équipement de l'Etat. Pour certains projets, une contribution financière est assurée par les organes internationaux de financement.

Les financements ayant des incidences plus ou moins directes sur la lutte contre la désertification et de manière générale sur l'environnement et le développement durable sont mobilisés par les secteurs concernés à travers :

- le **FDRMVT**, qui constitue l'instrument essentiel de financement du Projet de Proximité du Développement Rural (PPDR). Ce fonds finance les investissements réalisés selon un taux d'aide variable en fonction de la nature de l'investissement et facilite l'accès aux crédits qui leurs sont liés ;
- le Fonds National de la Régulation et du Développement Agricole (**FNRDA**), qui finance l'octroi de subventions ciblées, réservées aux seules zones favorables créée en 2000 ;
- le fonds de lutte contre la désertification et le Développement du Pastoralisme et de la steppe, créé en 2002 (**FLDDPS**).

La stratégie nationale de lutte contre la désertification et de développement durable est également soutenue par le programme du gouvernement, issu du programme présidentiel, et est mise en œuvre par le « plan de soutien de la relance économique (**PSRE**) 2001-2004 » ainsi que par le programme de soutien à la croissance économique (**PSCE**) projeté pour la période 2006-2009, les programmes de développement des hauts plateaux (**PDHP**) et le programme de développement des régions du Sud (**PDRS**).

La Mise en œuvre de la Convention des Nations-Unies sur la lutte contre la désertification

L'adoption en juin 1994 de la Convention des Nations-Unies sur la lutte contre la désertification a marqué une étape importante du processus mis en œuvre pour combattre les effets de la sécheresse et de la désertification. L'Algérie a ratifié cette Convention en mai 1996 et s'est engagée ainsi à mettre les moyens disponibles dans un cadre national et une coopération sous-régionale, régionale et internationale. Dans ce cadre, le programme d'action national (PAN-LCD) élaboré et validé en décembre 2003 s'est fixé pour but d'identifier les facteurs qui contribuent à la désertification et les mesures concrètes à prendre pour lutter contre celle-ci et atténuer les effets de sécheresse. Les actions du PAN se réaliseront en cohérence avec la politique nationale d'aménagement du territoire et concerneront la conservation des ressources naturelles (eau, sol et végétation) ainsi que la création des conditions meilleures pour améliorer les revenus des populations locales dans un cadre de développement rural intégré.

Policy Lessons from a Century of Soil Conservation in Iceland

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Introduction

Experiences from 100 years of combating land degradation and desertification in Iceland are used to illustrate impacts of conservation policies, and some of the key elements of successful soil conservation and ecosystem restoration work. The first 80 years can be characterized by top-down approaches dealing with single-issue and localized problems. Although the most threatening erosion fronts and advancing sand dunes were halted, not enough was being attained on a national scale. Policies and approaches have subsequently been changing in order to increase stakeholder involvement and responsibility in the conservation and restoration work. Among the main tools are incentives to increase sustainability of land use; increasing knowledge of problems and solutions; educating and advising; and encouraging wide-ranging participation. Among policy roadblocks that still need to be overcome are outdated conservation legislation, weak land user responsibility, and lack of harmonization within policy and law dealing with the various land use and land health issues. New financial incentives for conservation and restoration of soil and vegetation are emerging, including carbon sequestration as a tool in meeting Iceland's obligations under the Kyoto Protocol.

Desertification in a Humid Environment

The nakedness of many parts of Iceland may be regarded as one of its most striking features. Most of this reflects ecosystem damage, and a large proportion of the deserts may have been created during the last millennium by the interaction between unsustainable land use and natural forces in a sensitive environment. Soil erosion and the degraded state of Icelandic rangelands are the most serious environmental problem in Iceland.

Iceland is located just below the Arctic Circle, on the Mid-Atlantic ridge. It has a land area of 103 000 km² and a human population of 300 000. Despite its name, Iceland has good growing condition. The climate is cold temperate to alpine, with monthly mean temperatures in the south ranging from around -1° to +11°C. Rain is ample for vegetation growth in most parts of the country.

At the time of settlement, around AD 874, up to two-thirds of the country may have been vegetated, and at least 25% of the area was covered with woodlands, mostly birch (*Betula pubescens*) (Aradóttir and Arnalds, 2001). The fertility of the land and the lush vegetation was the foundation for the initial wealth of the Icelanders. The Saga period—the first few centuries of settlement—was a time of prosperity.

Icelandic law from the first centuries of settlement reflect a good understanding of the links between grazing intensity and livestock gain, with a strong disincentive not to overgraze the land. It also had strong property rights, requiring owners to keep their livestock on their own land.

However, the original respect for the land did not last long, and there are several indications that land decline was greatly accelerated by the settlement. The woodlands were cut for fuel and timber, or burned to provide space for agriculture and grazing. Regeneration was hampered by heavy grazing, and the woodlands

receded. With the reduction in woodland cover, sensitive soils lost their shelter. Unsustainable land use, interacting with frequent volcanic eruptions and periodic climatic fluctuations, initiated a process of dramatic ecosystem destruction, which has continued to the present (Arnalds, 2004a).

For the first 1000 years of inhabitation, Iceland was almost entirely a country of self-subsistence, to a large extent founded on hay- and grazing-based livestock production in a harsh environment. Woods and shrubs were extensively cut for fuel. The ecosystems were vulnerable to land use pressures following settlement, interacting with natural forces. Ecological capacity was exceeded and catastrophic soil erosion and desertification has devastated large parts of the country. About half of the vegetative cover may have been lost, implying that about 3 million hectares have become eroded. Only 1% of the area of Iceland is covered by woodlands, compared with at least 25% originally. Much of the remaining vegetation is severely degraded. Biological diversity has also been greatly reduced, land fertility diminished, hydrology altered and microclimates changed.

A national survey of the nature and extent of soil erosion was completed in 1997, revealing that serious soil erosion characterizes about 40% of Iceland (Arnalds *et al.*, 2001). Immense amounts of soil and organic carbon—the foundation of land fertility—have been lost.

Policy Lessons from Early Approaches in Conservation

The severity of land degradation in Iceland prompted in 1907 the establishment of northern Europe's only designated, and possibly the world's oldest, Soil Conservation Service (SCS) (Runolfsson, 1987). The Forestry Service, originally established by the same law as the SCS, had the role of combating the destruction of woodlands in Iceland and overseeing the task of reforestation. A direct translation of the Icelandic name of the SCS, Landgræðsla ríkisins, is the State Healing-the-Land Institute, which reflects much better the actual nature of the institute than the conventional 'soil conservation' version.

The original purpose of the law set by the Icelandic Parliament in 1907 was to prevent further destruction of the remaining woodlands and to halt the severe soil erosion and desertification that was threatening many districts. Among objectives defined in this law were that "protective measures shall be taken to prevent soil erosion and blowing sand wherever practicable. The Government Offices shall be ultimately responsible for forestry and soil erosion matters."

This unique law, however, was flawed by a lack of overall policy support. There were many initial conservation barriers that had to be overcome, such as scarce resources and lack of knowledge. Even worse were long-lasting lack of land user responsibility, lack of belief in the work, and the common fatalistic land-user attitude that severe soil erosion was the 'will of God', and that it was not within human means to halt the destructive forces.

Many areas with rapidly advancing soil erosion, especially encroaching sand dunes, were fenced off for protection from grazing, and seeded with stabilizer plants, such as *Leymus arenarius*. The successes of the first 70 years of soil conservation in Iceland are beyond the comprehension of the current generation, especially considering the limited financial and human resources. However, on a national scale, not enough was being achieved, and overall land health kept declining. In retrospect, the reasons include:

- *Localized soil conservation*, as only the spots of most severe erosion and desertification were being treated;
- *Single-issue conservation*, as the focus was on halting the erosion, not preventive measures on a landscape basis;
- *Lack of land user and public involvement, leading to low conservation awareness*, as the government conducted most of the work with its own personnel and machinery;
- *Insufficient inventories on the state of the natural resources and cause and effect relationships*, leading to futile debates between land users and conservationists on the seriousness of the soil erosion problems and the role of land use in the land degradation process;
- *Governmental subsidies for sheep production, without environmental links*, as a high level of support led to an all-time peak in sheep numbers in 1978. Poor grazing management led to severe overgrazing in many areas. The government was paying at both ends: indirectly for the cause of the land damage, and directly for its reparation; and
- *Weak law on soil conservation*, as the SCS in reality had no actual means to enforce proper protection of sensitive soils and vegetation. Theoretically, maximum numbers of livestock could be decided where needed, but the legal procedure was so complex, and remains so, that this option for preventive measures has been useless.

There are more reasons for the mixed success of the early soil conservation work. In effect, this period was characterized by various sociological barriers to improved conservation, a lack of incentives to care for the land, and disincentives to reduce unsustainable use of the land resources. These lessons from the initiation of the soil conservation work in 1907 up to about 1980 are in many ways similar to experiences from many other countries for this period (Hannam, 2000; Roberts, 1989).

Policy Evolution Since 1990

Approaches to soil conservation and restoring land health in Iceland have been completely revised over the last two decades. This new era has its roots in new strategies published by the Soil Conservation Service in 1991. It was based on the great need to increase conservation awareness and participatory approaches, and to work with the ecosystems in a more holistic manner. New cooperative programmes, like the highly successful *Farmers Heal-the-Land* revegetation programme, were based on this new policy.

The need for a comprehensive framework has become increasingly clear—one based on clear, long-term goals and reflecting a broad range of views and partnerships. Law improvements are lagging, but operational emphasis has been on creating a good blend of incentives and disincentives in order to take greater steps to halt degradation of vegetation and soil, heal the land and reach goals of sustainable land use.

A Parliamentary-approved soil conservation programme provides an operational framework for 2003–2014. This evolving policy is in effect Iceland's National Action Plan. Its main objective is reflected in its heading: to strengthen rural development and improve the health of the land. The main goals are to:

- halt soil erosion and prevent further damage to Icelandic ecosystems. This is a tremendous task, as the massive land degradation has not only led to loss of soil and vegetation, but also to large-scale ecosystem degeneration. This includes massive reductions in organic matter, nutrients, water-holding capacity, seed sources and biodiversity;

- restore lost resources, which also is an immense task. Revegetation of eroded land is helped by the ample rain in most parts of the country; and
- attain sustainable land use. Most of Iceland is accessible for grazing, in both lowland pastures and highland ranges, and grazing is a major determinant of land health.

The main tools to achieve these goals include:

- harmonizing all laws that can affect land use and condition;
- tailoring agricultural policy to conservation concerns;
- integrating a wide range of supporting factors, such as planning, research, extension and education; and
- searching for incentives that also stimulate knowledge, awareness and conservation ethics.

International conventions and agreements also provide important guidelines. Governmental financing for revegetation and forestation programmes was improved substantially. Further financial incentives might become linked to the sequestration of carbon as a tool in meeting Iceland's obligations under the Kyoto Protocol (Arnalds, 2004b).

Policy Lessons from Current Approaches

The greatest strength of Icelandic approaches to caring for the land could be the high level of land user and public participation that has developed in recent years for land improvements, revegetation and forestation. Further policy measures are needed to strengthen this work, coupled with fundamental factors such as funding, knowledge management and land literacy. The main policy challenges relate to land use. Key policy lessons derived from the Icelandic experience are considered below.

Linking agricultural and land use policy to goals of sustainability

Icelandic experience illustrates clearly that ecological sustainability of grazing and other land uses is a significant determinant of land health. In areas of severe land generation and desertification, grazing can have a dramatic effect. In other degraded areas, grazing above certain limits, or even any livestock grazing, can significantly slow vegetation recovery. Sustainable land use is therefore fundamental to conservation of healthy ecosystems, prevention of further desertification, and recovery of degraded land.

A high level of agricultural support without regard to environmental consequences was for a few decades one of the blocks to reaching soil conservation goals in Iceland. A milestone towards sustainability was taken with a new seven-year subsidy agreement in 2000 between sheep farmers and the government. It includes a direct incentive for improved land management, as participants are entitled on an optional basis to a gradual increase in government support if they meet land condition and quality of land use standards (Arnalds and Barkarson, 2003). Starting in 2004, participating sheep farmers must apply to the SCS for verification of the quality of their land, based on factors such as vegetation cover and soil erosion. Farmers not meeting standards have to submit improvement plans for approval, with measures such as revegetation, improving grazing management, or even preventing livestock access to degraded areas.

This new link between governmental support and environmental quality has also become a very positive incentive. The process of applying for verification based on land quality has been rather long, but has led to an increase in land literacy, which in

turn has been a stimulus. Farmer-led initiatives in restoring land and improving management are increasing as a result.

Developing knowledge about problems and solutions

Increasing the knowledge base is one of the main foundations for any successful soil conservation programme. This includes assessments and monitoring of the natural resources. As an example, there was a wide disagreement on the extent and seriousness of soil erosion in Iceland, especially between land users and conservation-oriented groups. A milestone in bridging this gap was the first national survey of soil erosion in Iceland, published in 1997 [in Icelandic; for the English version, see Arnalds et al., 2001], which indicated that about 40% of the land area was affected by serious soil erosion. The combination of increased research and better use of experiential and local knowledge has also greatly improved technologies available for management and revegetation.

Capacity building through advice, education and encouragement

Knowledge is fundamental when building up attitudes, awareness, skills and conservation ethics, which in turn may govern long-term success in protecting and improving natural resources. Strong tools for knowledge management and capacity-building are therefore among the foundations for successful conservation work. The soil conservation and forestry sectors in Iceland therefore work with land users, schools, the public and other groups on advice and education. However, there is a great need to harmonize policy and strengthen cooperation between ministries, institutions and others that can influence education, capacity-building and advice. Among future objectives is also to ensure that all government-funded services to agriculture incorporate due respect for the goal of sustainability.

Farm and land use planning

Planning, that can be divided into top-down planning and participatory planning, with a wide range in between, can be a powerful tool in conservation. Icelandic authorities have so far made little use of top-down planning for the purposes of conserving and improving soil and vegetation. This could be done through land use restrictions, based, for instance, on land use capability classification, linked to vegetation cover and slope steepness. However, participatory planning approaches may be more efficient in the long run, educating and assisting the land users to make their own property plans. Such planning has been emerging over the last few years in Iceland, based on Australian experience (Brouwer *et al.*, 1999) under the programme name *Better farms*. Among the many benefits from this promising approach are its use as an educational tool and the fact that people tend to have more belief in their own work than plans 'handed to them by government'.

Participation in stewardship

Restoration of degraded land and the quest for sustainability are unattainable without a commitment to good management by the agricultural community. Increased participation, with a local-leadership emphasis, has therefore been one of the main elements in the development of new soil conservation strategies in Iceland over the past two decades. This direct involvement has proved to be a very powerful tool in extending revegetation of denuded land, improving sustainability of land use, and developing conservation awareness.

To be effective in the long term, incentives for combating land degradation must be oriented towards the problems as perceived by the land users. If well thought out, direct incentives can be very effective. With the limited financial resources of

Icelandic farmers, governmental assistance may be regarded as essential to both the revegetation work and improved land management for reaching sustainability goals. As a step in reaching the long-term goal of making the land users the true custodians of the land, the SCS now has two such main programmes:

- *Farmers Heal the Land.* Within this cooperative programme, farmers receive about 85% of fertilizer cost for revegetation of denuded land and grass seed as needed. They conduct all the work with their own machinery, and this, coupled with their 15% contribution to the cost of fertilizer, amounts to about 50% of project cost. Cost sharing is considered important, as it helps to create a feeling of ownership in the results. The bottom-up nature of the project has facilitated communication. The farmers are proud of their reclamation work, and enjoy being seen as a part of solution to the degradation problems. Local experimentation and decision is encouraged, and the programme is kept simple, based on the fact that mutual trust often works much more efficiently than bureaucratic paperwork.
- *Land improvement incentives programme.* This programme is directed at large projects that are beyond the means of individual land users, and may involve wide cooperation at the community level. Recipients are landcare groups and district authorities, and projects include revegetation and improved grazing management on communal grazing lands.

The SCS also emphasizes working with rural and urban authorities concerning grazing management and revegetation issues. A wide range of clubs and associations, together with individual volunteers, have become active in various elements of the conservation work. Working with such groups can be important in bridging the divide between rural and urban communities. The rapidly increasing prominence of forestry in Iceland, which has a large role in conservation and land improvement, also has a strong farmer and public participation focus.

Conclusions

The experience gained in Iceland is illustrative of failures and successes in conservation work in many parts of the world. With its 1100 years of land degradation and 100 years of mitigation work, Iceland provides unusually vivid examples, not only of the long-term consequences of unsustainable land use, but also possible means to halt destructive forces and restore lost resources.

The scale of ecosystem disturbance in Iceland, where, over large areas, barren deserts have replaced vegetation and thick soils, despite ample precipitation, demonstrates the global nature of land degradation and desertification. As in most parts of the world, the management of livestock grazing and other land uses is a key determinant of rangeland health. Clear guidelines for conservation of the natural resources must be set within effective environmental policy and enabling legislation.

Increased knowledge and locally-led community involvement, based on a high degree of land literacy, is one of the foundations of the Icelandic 2003–2014 soil conservation programme. Involvement at all stages of the conservation work has proved a very powerful incentive, with wide ranging effects at all levels, from grassroots to Parliament.

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Evolutionary Process of Mainstreaming Desertification Policy: A Namibian Case Study

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Introduction

Namibia is the driest country in sub-Saharan Africa with 22% of the land surface arid, 70% semi-arid and 8% dry sub-humid. Consequently, rainfall is highly variable and unpredictable and much of the landscape, particularly in the semi-arid areas with high population density, is susceptible to degradation. A national land degradation risk assessment indicated that 4% of the land is at high risk, 67% at medium risk and the remainder of the land is classified as low or very low risk of land degradation (Klintonberg and Seely 2004). Nevertheless, many policy-makers have high expectations of the potential of Namibia's environment to provide food security and improved livelihoods for its growing population. This contradiction between the arid environment and the expectations of the majority of the population and their decision makers is at the base of efforts to combat desertification in Namibia. There has been a strong push from some quarters towards alternative land use options that do not rely on conventional agricultural practices and that are more suited for the characteristics of the land such as game ranching, community-based tourism and wildlife conservancies.

Policy Overview

The policy landscape in Namibia, despite the contradiction between expectations and aridity, represents a relatively progressive framework for combating desertification (Dewdney 1996, DRFN 2006). The Namibian Constitution of 1990, with visionary Article 95 (I), affirms that "the State shall actively promote and maintain the welfare of the people by adopting ... policies aimed at maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future." Vision 2030 confirms that Namibia's goals for 2030 include, *inter alia*, .. "a healthy productive land" .. "rivers [that] run permanently and clear" and "farms and natural ecosystems [that] are productive, efficient, diverse, stable and sustainable – socially, economically and ecologically", all essential for combating desertification.

As one of several relevant policy elements at the sectoral level, the National Agriculture Policy (RoN 1995a) has as an overall goal "to increase and sustain levels of agricultural productivity, real farm incomes and national and household food security within the context of Namibia's fragile ecosystem". Specific objectives include several challenging statements, e.g.: "achieve growth rates and stability in farm incomes, agricultural productivity and production levels higher than the population growth rate" and "promote sustainable utilisation of the nation's land and other natural resources". Government's main role will be to create a favourable macro-economic policy environment and to provide agricultural support services and facilities conducive to increasing and sustaining agricultural productivity, real farm income and food security. Moreover, these services will be designed to redress the structural imbalances and dualism inherent in the sector "by redirecting and strengthening essential services and facilities to the communal areas, where their socio-economic impact is likely to be greatest".

Effective drought preparedness planning and responsive drought management are considered to be key factors in reducing the risk of production failure in Namibia's highly variable climatic conditions. Agricultural extension will play a co-ordinating role in ensuring that farmers have access to support services and programmes for improved farming and marketing. The main focus of extension services will be on small- and medium-scale farmers, with emphasis on supporting female headed households, retrenched farm labourers and youth engaged in agricultural production as a means of livelihood and gainful employment.

Government will also consider practical ways to integrate and co-ordinate rural and regional development programmes aimed at addressing such problems as rural poverty, food insecurity and unequal distribution of incomes. Close co-operation with NGOs and the private sector will be pursued.

The Namibian Drought Policy and Strategy (RoN, 1997) recognises that droughts give rise to regular and significant shocks for rural livelihoods and increase vulnerability. Prior to this policy, government had borne full responsibility of risk management and financed and delivered substantial drought relief programmes. A number of these relief measures, e.g. fodder subsidies, were found to encourage unsustainable farming practices such as overstocking and farming on marginal land which, in turn, led to land degradation. In general, government fostered an expectation that in cases of drought, the state would come to the rescue. The new approach to droughts, based on the policy and strategy, focuses on developing an efficient, equitable and sustainable approach to drought management. This implies shifting the responsibility for drought management from government to farmers. Farmers will assume greater responsibility for drought management by developing ways of reducing vulnerability to drought in the longer term. This involves managing their agricultural operations in an economically and environmentally responsible manner and taking low rainfall and resultant income variation into account. Moreover, the policy recommends that farmers be encouraged to reduce their livestock by marketing it, rather than receiving fodder subsidies.

The objectives of the Drought Policy include, *inter alia*, to: a) encourage and support farmers to adopt self-reliant approaches to drought risk; b) minimise the degradation of the natural resource base during droughts; and c) enable rural inhabitants and the agricultural sector to recover quickly following drought.

Emergency relief water supply programmes should be based on identification of needs by community-based Water Point Committees and Regional Water Committees. Emergency schemes should be planned and designed pro-actively to facilitate immediate implementation as needed while complementing long-term development goals. Sustainable rangeland management practices need to be developed, which requires that land tenure policies give users more secure and exclusive rights to land and resources. Diversification of income sources will be an important means to mitigate the negative impact of drought. However, "in the long run, the alleviation of poverty is the most effective way of ensuring that food insecurity does not result from drought".

The National Land Policy (RoN, 1998a) is focused on the poor. More specifically, the policy will ensure equity in access to land and secure land tenure, and will consider special programmes to help the poor acquire and develop land. Several issues have a bearing on desertification, e.g. the directives for a) clear policy and administrative structures for land allocation and management in rural areas and b) removal of uncertainties about legitimate access and rights to land in communal areas.

The National Resettlement Policy (RoN, 2001) defines its programme within the wider undertaking of government to uplift living standards of all Namibians. The primary

objective of the National Resettlement Policy is to resettle eligible people in an institutionally, sociologically, economically and environmentally sustainable manner and in such a way that they become self-supporting. More specific aims of resettlement include: a) to redress past imbalances in the distribution of natural resources, particularly land and b) to alleviate human and livestock pressures in communal areas.

The National Water Policy (NWP) (RoN, 2000) was formulated and approved to address inequalities in access to water. In line with other government policies, the NWP puts emphasis on a reduction of government involvement in the actual operation and delivery of services, placing more responsibilities on community management of water supplies. The policy is built on the assumption that privatisation of water service “can introduce efficiency and effectiveness, reduce wastage and extend use of valuable public funds”, reflecting the Dublin Principles of sustainability, social equity and environmental integrity (GWP, 2003). Cost recovery and economic efficiency are accorded high importance.

Decentralised water management structures have been established in all regions. At the apex of this framework are Basin Management Committees which will be responsible to manage a water basin within an integrated management plan. At the local level, Water Associations and Water Point Committees will be responsible for the day-to-day management of water points. WPCs are recognised in law and have the authority to control access to water points and organise payment for water. Payment for water services will be gradually introduced up to a point where local water users will be completely responsible for the operation and maintenance of water points.

The NWP tries to balance the imperatives of improved equity with sustainable water management, economically and environmentally. It states that “all Namibians have the right of access to sufficient safe water for a healthy and productive life”, while, at the same time, recognising the scarcity and economic value of the resource. Decentralisation of water management and development as well as integrated planning which needs to harmonise human and environmental requirements are some of the fundamental principles of the NWP.

The Poverty Reduction Strategy for Namibia (PRS) (RoN, 1998b) was approved in 1998. The PRS identified six structural problems that make poverty reduction difficult including: a) a highly-skewed distribution of income, b) a weak agricultural resource base, characterised by limited and highly variable annual rainfall as well as sandy soils with low fertility and c) a high population growth rate and the resulting pressure this puts on scarce resources such as water. Despite obvious limitations, the PRS recommends that the livestock sector be further developed and crop productivity and value be increased. New ways of using water more efficiently are considered important. The complementary National Poverty Reduction Action Programme 2001-2005 (2002) builds on international best practices and includes ensuring policy harmonization.

The Wildlife Management, Utilisation and Tourism in Communal Areas Policy (RoN, 1995b) provides for user rights over wildlife and other natural resources on communal lands to a legally-constituted body known as a conservancy. A conservancy consists of a group of commercial farms or areas of communal land on which neighbouring land owners or members have pooled resources to conserve and use wildlife sustainably. Members practice normal farming activities and operations in combination with wildlife use on a sustainable basis. The main objective is to promote greater sustainable use through co-operation and improved management. Conservancies are operated and managed by members through a Conservancy Committee.

Conservancies seek to increase local responsibility and ownership over wildlife. Rural residents benefit financially from wildlife and tourism through a range of activities including harvesting quotas, trophy hunting, selling live game and tourism concessions. Conservancies provide new economic opportunities which can help in times of drought.

At the initiation of Namibia's Programme to Combat Desertification (Napcod), (Napcod, 1997; Napcod, 1999), Namibia's Policy to Combat Desertification (RoN, 1994) was prepared but never approved. Napcod accepted the UNCCD definition of desertification as "land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities". Its guiding principles included, *inter alia*, recognition that combating desertification involves long-term, integrated strategies and that it must address poverty alleviation, contribute to informed decision making and involve broad-based participation.

As part of the Napcod programme, an analysis of policy factors and desertification was compiled (Dewdney 1996). This focused on immediate policy factors, e.g. land and natural resource management, water, agriculture and forestry. It also analysed what were termed 'underlying policy factors' of poverty, population and economic policies. The analysis concluded by pointing out that in some key natural resource sectors sustainable use is being targeted, e.g. water and wildlife, although in other sectors, e.g. land and agriculture, environmental considerations are subordinated to social, political and economic considerations.

A recent policy contributing indirectly to combating desertification is entitled 'Government of the Republic of Namibia, Civic Organisations, Partnership Policy' (RoN, 2005). Its objectives include, *inter alia*, "to bring the Government closer to the people and create partnership opportunities that benefit the Government, COs and civil society." The policy is also expected to establish a greater sense of local identity, community and ownership leading to more inclusive, equitable and socially sustainable development, all necessary elements in combating desertification.

Combating Desertification within the Evolving Policy Milieu

Two streams of policy issues, covered in the introductory overview, have direct relevance for combating desertification. One stream addresses enhanced use of the environment and natural resources through a variety of stated intentions and recommendations. The other, less obviously directed at combating desertification but equally if not more important, is that which addresses broad participation, devolution of responsibilities and community empowerment. Taking advantage of the second set of elements embedded in a number of policies, several programmes have been developed that contribute, directly or indirectly, to addressing desertification. These included: Community Based Natural Resource Management, based on the establishment of representative conservancies focused on wildlife and tourism and spear-headed by the Ministry of Environment and Tourism, and the Community Based Management of rural water supply, the broader Basin Management approach nationally and internationally, the Farming Systems Research and Extension programme and Community Forestry under the Ministry of Agriculture, Water and Forestry. In many instances, the focus on participation and community involvement has resulted in far greater involvement by NGOs in policy implementation while government institutions remain focused on the sectoral content of the policy framework. The Napcod programme, with government and NGO representation, took advantage of the enabling environment provided by the latter policies and two tools evolved. The Forums for Integrated Resource Management (FIRMs), supported by Local Level Monitoring, use the focus on community participation and empowerment to address improved management of natural resources and hence adaptations to

withstand climate change including natural climate variability and anticipated droughts.

Basin management

In Namibia, river basin management was recently identified as a valuable approach to enhance management and functioning of a water basin (RoN, 2000). The basin management approach within Namibia is: an iterative process; transparent to all; open to voluntary participation; information-rich; based on shared vision and understanding; enhances capacity of all stakeholders; focuses on sustainable development; encompasses integrated water resource management (IWRM); encompasses integrated, multi-sectoral approaches; and reflects the Constitution, Vision 2030 and all relevant Namibian policy and legislative instruments. One of the main purposes of basin management is to bring a wide range of interested communities together to improve understanding, management and decision making with respect to shared water resources.

In Namibia, the establishment of a Basin Management Committee (BMC) has so far involved three phases: a 'start-up phase' in which basin area, stakeholders and issues are identified and preliminary meetings and information dissemination take place. During the 'forum phase' a Forum of Stakeholders is established, a shared information base is initiated and stakeholder capacity needs are identified and plans made to address these needs. During the 'basin management committee phase' the idea of a basin management committee is introduced and discussed, and a committee is established that begins activities, elaborates a constitution and vision and obtains the Minister's confirmation. After establishment, the BMC and the Forum identify and facilitate or implement activities that support integrated land and water management in the basin. In this way, basin communities are better prepared to address ongoing climate variability and environmental change. Overall, basin management has been recognised in Namibia as a useful approach, although challenges to its implementation range from appropriate representation to sustainability and are receiving ongoing attention. Moreover, international donors have also recognized the importance of participatory water management and have contributed to many of the initiatives since independence.

On the local level, Water Point Committees under the Community Based Management programme which grew out of the Water and Sanitation Sector Policy (RoN 1993), have been established throughout Namibia. They are supported by a new directorate of Rural Water Supply which focuses on facilitating community based management. At least 4000 Water Point Committees oversee use, management and maintenance of community boreholes and contribute to cost recovery. They have the largely unrealized potential of undertaking local level monitoring and contributing to basin management on a larger scale. In terms of numbers of people involved, this has been one of the most successful community participation programmes to evolve.

Currently within Namibia, and as a direct result of the National Water Policy White Paper (2000), two river basin management committees are in place and starting to contribute to basin management while in another three basins the potential is being analysed or the first steps of establishment are being taken. Two active groundwater aquifer management committees predate the policy and helped to steer its formulation. They both support the Department of Water Affairs in management and water allocation from these aquifers. A Basin Management Support Unit has been mooted but not yet established to enhance basin management.

Namibia is a member of several transboundary river basin organizations (RBOs) under the Southern African Development Community (SADC) protocol on shared basins. Until recently, these RBOs have received greater attention, nationally and

from international donors, than basins lying entirely within the country. Namibia participates in Orasecom (the Orange-Senqu River basin committee that is augmented by two, two-country water commissions – Lesotho and South Africa, Namibia and South Africa), Okacom (encompassing the Okavango River in Angola, Namibia and Botswana), Zamcom (the Zambezi river organization that is not yet ratified but is operational through Zacpro) and the Permanent Joint Technical Commission on the Kunene River (Angola and Namibia). These and other evolving or non-functional RBOs, most of which predate the current policy, were a factor ensuring that transboundary RBOs were included in the policy formulation.

Forum for Integrated Resource Management (FIRM)

The FIRM is an approach giving rural farmers living on communally managed farmlands a tool allowing them to be in charge of their own development (Kruger et al., 2003). In the centre is a Community Based Organisation (CBO) of rural farmers or a water point committee taking the lead in organising, planning and monitoring their own activities and development actions while coordinating the interventions of their service providers. Service providers include traditional authorities, government or private extension services, non-governmental organizations (NGOs), other CBOs and short or long-term projects or programmes. Several hundred firms, most supported directly by an Agricultural Development Centre (ADC) and its extension personnel, have been or are being established and are operating at different levels of effectiveness. The ADCs themselves are a new institution established since independence to support more effective and efficient communal farming.

The key element of the FIRM approach is the collaborative planning, implementation and monitoring process led by the CBO representing the community involved (Kambatuku 2003a). This usually takes the form of an annual or semi-annual meeting to which all CBO members and associated service providers are invited. During this facilitated meeting, the vision, goals and objectives of the community are reviewed and either reaffirmed or revised. Results obtained from formal or informal monitoring of the previous year's plans and activities are thoroughly discussed and lessons learnt are extracted. This analysis serves as the basis for the next step of the annual meeting, operational planning for the coming year. During this process, the various service providers commit themselves, within their mandate, to providing specific support to the community based on the community's own agreed-upon objectives. This approach ensures that services provided by mandated service providers and project partners contribute to agreed-upon needs and wishes of the CBO and the greater community. It also minimizes the amount of time needed by communities to meet with their service providers and it further ensures ownership by communities of the interventions that take place in their areas.

Local Level Monitoring (LLM)

Agriculture is still the most important source of support and income for most Namibians living in communal areas in the form of livestock farming and dryland crop production. However, Namibia is an extremely dry country experiencing highly variable and irregular rainfall. Most of the country is arid to semi-arid and not suitable for large-scale agricultural activities. Many farming communities in Namibia survive in ecologically marginal areas that are highly susceptible to drought and degradation. This high variability and generic dryness of the climate in Namibia puts pressure on the local farmers, forcing them to make management decisions that can be the difference between life and death, many times based on limited information and knowledge about the present state of the environment. By continuously monitoring and observing the condition of the rangeland, farmers would be better equipped to detect any patterns or trends in the state of the environment and in agricultural activities (Reed and Dougill, 2002). There are several techniques developed to

monitor the state of rangelands, however, these techniques are normally developed by scientists or other specialists and local farmers often find these methods both complex and time consuming. Furthermore, these techniques often require special skills and experience to provide useable information, skills that few of the local farmers in Namibia possess.

Local level monitoring involving local community members was first developed for monitoring of wildlife in the Grootberg conservancy in north-western Namibia (Stuart-Hill et al., 2004). This approach was adopted and further developed by Namibia's Programme to Combat Desertification (Napcod) into a tool that can provide local farmers with relevant information to support their decision making (Kambatuku, 2003b).

At the centre of the local level monitoring system developed by Napcod is a set of environmental indicators identified by the local farmers based on their information needs. Most frequently, livestock condition is selected as an indicator that integrates rangeland condition. Rainfall and fodder availability are other preferred indicators. Each farmer is then equipped with a field guide, in which he enters his observations for each of the indicators used. With livestock, for example, the observations are based on a comparison of a number of animals with photographs illustrating a range of poor to excellent conditions. The frequency of observation differs between different indicators, ranging from observations made on a daily basis to once a year. The recording of observations in the field guide is an important part of the system. Most farmers make decisions based on one or several environmental (or social) indicators. However, observations are seldom recorded and only kept in the head of the individual farmer. Information like this is usually lost, as the memories fade and get mixed up between years. This is a common phenomena often resulting in statements such as 'the grasses were much higher in the past' or 'it used to rain much more when I was young.' By recording these observations the farmer gets a better understanding of how variable environmental conditions, e.g. amount and seasonality of rainfall, influence the state of the environment and agricultural production. Secondly, by recording each observation in the field guide, a historical record is created, which allows the farmer to compare conditions over the years and also to compare with fellow farmers who are also recording their observations.

The FIRM and LLM approaches, working together, have led to a number of local improvements ranging from better organized and used quarantine and auction processes to community-developed plans and implementation of improved range management. No figures, beyond specific events or localities, are available overall.

Discussion

This brief overview illustrates the comprehensive policy framework available to support combating desertification in Namibia. However, by definition most policies have a sectoral bias, with little overall integration of policies and programmes. In some instances there is actual conflict between policies and legislation of different sectors. What is lacking is an overall policy framework integrating sectoral policies with respect to combating desertification and addressing environmental variability and change. It is noteworthy in this regard that to date no rural development policy exists, although attempts have been made, and a desertification policy was formulated but never approved. Similarly, and in another vein, no overall policy has been formulated on participation, devolution of responsibilities or community empowerment although this is included in most sectoral policies and has been addressed in the recent partnership policy (RoN 2005).

On the other hand, the various policies are not always fully understood, or interpreted taking into account Namibia's variable climate and the potential productivity from its

arid environment. Conflicting statements promoting issues such as sustainable development (today a catch-all phrase), while at the same time achieving increased productivity or “achiev[ing] growth rates and stability in farm incomes, agricultural productivity and production levels higher than the population growth rate” are of concern. Interpretation often focuses on increased productivity using traditional farming methods, to support the growing population and contribute to poverty alleviation, while ignoring climate variability and prevailing aridity. Evolving expectations and changing lifestyles of the population are also largely ignored.

The Basin Management and FIRM approaches and LLM are firmly based on the evolving policy framework elements promoting broad participation, devolution of responsibility and community empowerment. While these policy directives in themselves are not fully understood or implemented at any of the relevant levels, ranging from high-level policy-makers through traditional authorities to farmers on the ground, they do provide the platform for introduction and gradual development of necessary interactions, communication and cooperation required to combat desertification. Moreover, the FIRM and LLM also address the policy directives focusing on improved natural resource management which by themselves, however, would not have the impact on desertification if they were not embedded in participation and community empowerment.

It is noticeable that in many sectoral policies the role of the state has changed in the past fifteen years in Namibia. Instead of implementing development programmes and providing subsidies, the State intends to play more of a facilitating role, with regional and local authorities, communities, NGOs and the private sector assuming increasing responsibility for service provision. It is in this gap that Napcod, and programmes using the FIRM and LLM tools refined in Napcod, have addressed the issues contributing to desertification frequently in parallel with initiatives focusing on wildlife and tourism.

Several other implications of this shift in policy related to service provision through community empowerment, devolution of responsibility and participation are implicit. One of these implications is that communities will have to pay for some basic services such as the provision of water and veterinary medicines. How this will impact the poor and marginal sectors of society, or the environment in which they live, needs to be carefully monitored, in order to prevent or mitigate potential negative effects. Nevertheless, the overall recent policy focus on community empowerment, devolution of responsibility and participation provide the framework for and make a major contribution towards a people-centred approach to combating desertification.

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Combating Desertification in Argentina: From Research to Action

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1. Introduction

In Argentina, the process to combat desertification starts before the implementation of the UNCCD, and this is a struggle not solely directed against desertification, but relates more fundamentally to the widespread perception of Argentina's environmental wealth. This perception is dominated by the "humid pampa", where wealth is generated by agricultural and range development of the humid areas of the country ("a good (wheat) harvest will help us out of the crisis, and we will all be saved..."). There is a general lack of recognition, both of the existence of drylands, and particularly of their importance to the socioeconomic development of the country.

Scientists were among the first to seriously consider desertification in drylands. 30 years ago when we started working at the recently created Argentine Institute for Arid Land Research and Development (IADIZA) for the 1975 Conference in Nairobi, no one seemed to be aware of the fact that 70% of the country was comprised of drylands, and that such drylands contributed 50% of the agricultural production and 47% of the livestock production, and that these areas were affected by desertification processes (Figure 1).

With promotion and development policies being historically focused on the production centres in the humid pampa, the other regions were always peripheral, playing the role of providers of inputs and labour, in a perfect application of the well known model of concentration of capital and power: central territories-subordinate territories. Ever since the colonial period, the design of communication and transport networks in our country has been centripetal, with its centre at the capital city, Buenos Aires, in order to facilitate the concentration of wealth and communication with foreign countries mostly through the port of Buenos Aires. The best territorial expression of this policy is the macrocephaly of the federal capital (16 603 341 million people, out of a total of 36 260 130 inhabitants, National Population Census 2001). The magnitude of population of the capital is fed by intensive internal migrations caused by increasing desertification and poverty in the interior of the country. This in turn, through a vicious circle, generates more desertification and poverty, because of the lack of active population in the desertified areas.

This situation changes in a relative manner with the consolidation of regional economies, given that each region and even the provinces themselves, in their own way, repeat this scheme in the relationship between productive areas and desert, as is clearly observed in the case of Mendoza, in the central western part of the country, where 95% of the population (1 527 237 inhabitants) and natural resources, basically soils and water are concentrated in productive oases under irrigation. The rest of the territory contains only the remaining 5% of the population (80 381 inhabitants), constituting, in the most literal sense of the word, an uninhabited desert (with less than half an inhabitant per km²). This surrounding area is desertified by the use of its resources for building the richness of the oases. The clearest example of this is the degradation of the mesquite woodland. In the lowlands, between a depth of 5 and 15m, the water table feeds the dry open mesquite woodland (*Prosopis spp.*), which deserves particular attention because of its importance to the population. To the present day, it has practically disappeared. Studies we have conducted on environmental history show the decline of the woodland in the desert. It was cut down

and used to build the viticulture and wine growing oasis. In a 35-year period, from 1901 to 1935, during the railroad expansion, there were 992 748 Tm of forestry products that were cut down, a total of 198 550 deforested hectares (Abraham & Prieto, 1991, 1999). This wood from the desert has been used in the oases as vineyard poles and props. Such studies are important when policies of development are defined. When there are decisions and policies taken with regards to oases, the destiny of the outlying space is decided too. So it is time to accept the challenge of planning with a systemic criterion, favouring the oases-desert relationship, in a complementary process, not in a competitive one.

The policy regarding natural resources is inscribed in our national constitution, where, in a federal state (23 provinces), every province is the owner and sovereign of its natural resources, among them water, which, in the case of irrigated lands, is inherent to the land. This legal framework resulted in very dissimilar situations, depending on the political-institutional maturity of each province but, in general terms, all were marked by very serious desertification processes. This was because of the repeated abuse of dryland resources that served as a basis for the concentration of wealth in the central territories, and forming what in some studies we call “invisible spaces”, that is non-irrigated dry areas whose people are not considered citizens (Montaña et al. 2004).

This is the situation that we identified as the baseline when we started the process for the design and launch of the NAP, in 1995.

Since then, many things have changed, although not with the speed or the depth that the urgency and seriousness of the processes require; but nevertheless with encouraging results. The modification of the national constitution ensures the incorporation of the environmental dimension in the normative framework, promoting the creation of “minimal budget laws” relative to resources as an attempt to put a stop to the “environmental paradises” generated in the provinces with deficient legislation in this respect.

2. Desertification in Argentina: A Country that Turns its Back on the Desert

Argentina occupies an area of over 270 million hectares. Arid and semi-arid regions comprise 75% of the national territory. The arid region is the largest one (51.50% of the total area). Drylands in Argentina are located in the northeast, central western and southern parts of the territory. This reality ranks Argentina as the country with the ninth largest percentage of its territory comprised of drylands, and as one of the 14 countries where these occupy over a million square kilometres. In Latin America, it is the country with the highest proportion of drylands and the highest proportion of population living in drylands.

At present, 60 million hectares show moderate to severe erosion processes, and desertification advances in these regions at a rate of 650,000 ha/year. These lands are inhabited by about nine and a half million people (30% of the total population). The popular image of the country, held even by its own inhabitants and especially by the decision makers, is that it is the country of “La Pampa Húmeda”. This image is distorted. The reality is that three-quarters of the country is made up of drylands (Figure1), and thus face the risk of desertification. Argentina may be defined overall as an arid country.

Dregne et Chou (1992) included Argentina as Category 2 according to the EDI (Estimated Drylands Index). The calculation of the EDI for Argentina is as follows:

$2\,737\,000\text{ km}^2$ (total area) / $1\,926\,260\text{ km}^2$ (estimated total dry lands area) = 70.4%.

Category 2 includes countries with EDI between 75% and 50% (Table 1).

Table 1. Land use and desertification estimates for drylands in Argentina (in 1000 ha).

	Irrigated Land	Rain-fed cropland	Rangeland
Total area	1680	12068	178878
Slight desertification	1150	10868	N/A
Moderate	350	1130	N/A
Severe	150	65	N/A
Very severe	30	5	N/A
Total moderate and more	530	1200	N/A
% desertified	31	10	N/A
Total dry lands: 1 926 260			

Source: Dregne and Chou, 1992.

Drylands in Argentina include several regions with different climate conditions, hydrology, geomorphology, plant cover, fauna and land uses. These regions also differ in the type and combination of desertification processes: recurrent droughts, wind and water erosion, overgrazing and diminishing plant cover, deforestation, loss of soil fertility, salinization and water logging, and loss of biodiversity. Diversity in the social structure and the dynamic social relationships is also marked, but in general, all the regions share poverty, emigration, unstable land tenure, deficiencies in productivity and marketing and scarce diversity in agricultural production. Argentine drylands are under a process of desertification. The consequences of this process are loss of productivity and deteriorating living conditions; the average income is lower and structural poverty is higher than national levels in these areas (Abraham y Roig, 1994).

The arid regions have only 12% of the total surface water resources (2 600 m³/sec), which along with the available ground water, have allowed for the important productive activities developed in the 1.5 million ha covered by the existing “oases”. Nearly 40% of this area shows desertification problems brought about by salinization and water-logging. Over the last 75 years the natural forests have been depleted by 66%. Extraction of timber, firewood and charcoal, overgrazing, and clearing for crops and livestock rearing are responsible for this large-scale felling of trees. Out of the 106 million ha of native forests existing in 1914, only 36 million were left by 1966, that is, 33% of the original resources. The rate of deforestation is estimated to be approximately 850 000 ha/year, a rate that will lead us to the total loss of this valuable resource by the year 2036. As for biodiversity, 40% of the animal and plant species of the marginal regions are endangered. Also, mining and industries, especially the exploration and exploitation of oil deposits, contribute to desertification.

Currently, the occurrence of soil erosion is not as worrying as the “human erosion” brought about by desertification processes. In many of the provinces of this region the average income per person is lower than the national average, and the percentage of households with unsatisfied basic needs double the national average. Land tenure is a factor that contributes to worsening deterioration processes. There are very large estates, as well as very small ones; arguments over deeds lead to a growing degradation of the soil, water, and vegetation, reducing or even destroying their productivity, plunging the people into poverty or forcing them to migrate. Serious problems such as absenteeism, low primary productivity, marketing difficulties, and

scarce productive alternatives exert a tremendous pressure on desertification processes.

These processes bring the problem of marginalization to the periphery of urban areas. In Argentina the urban population reaches 83%. One of the major desertification problems in our country is the one generated by the chaotic and anarchic expansion of the cities over fragile lands, and desertification on the outskirts of urban areas results from the social pressure exerted by marginal groups and migrant people from the rural areas.

3. A Wide Spectrum of Desertification Processes, Whose Causes and Consequences May Serve as an Example of What is Happening all over Latin America and the Caribbean

As already explained, there are severe problems of desertification in the country, and they affect productive bases and society in practically all the eco-regions involved, with specific socioeconomic, natural and political implications that tend to worsen their effects by spreading degradation. Among them we could cite the effects of natural catastrophes: sustained and recurrent droughts, earthquakes, hurricanes, and destructive volcanic eruptions, floods and landslides, sandstorms, pronounced climate oscillations in the semi-arid and dry sub-humid zones with strong influences on the displacement of agricultural and husbandry related regions; the "El Niño" and "La Niña" phenomena that influence coastal and interior areas, glacier retraction with consequences on water supplies and water logging, mainly in piedmont settlements of the great Andean range and their area of influence.

In addition to these natural risks – critical for drylands – there is also human pressure on the environment as a consequence of the social, economical and political situations affecting the agro-ecological regions and provoking some of the major desertification problems: massive deforestation, from the dry Chaco forests to the xeric "Monte" woods and the cold forest of the south end, in Patagonia; accelerated loss of biodiversity; overgrazing and loss of productivity of savannahs, grasslands and shrubs; accelerated rural-urban migration, abandonment of productive lands and increase in the rural, urban and suburban levels of poverty; salinization / alkalinization and cave-in of the water table in irrigated cultivated lands; critical effects on the quality and quantity of surface and underground water resources; degradation and destruction of soils; extraction of non-renewable resources without previous planning (mining, petroleum); an increasing loss of values and traditional knowledge; undesirable changes in the use of land, worsening quality of life for rural and urban populations (violence, new survival strategies related to the urban explosion of outlying areas); accelerated urbanization carried out without proper planning; underdevelopment of scientific and technological processes guided to control and revert the problems of desertification; damage and infrastructure loss (reservoir filling, port dredging, destruction of roads, railways and bridges), among others. We cannot fail to mention the tremendous effect that the foreign debt of the country, because of its relation with desertification and poverty, has had and continues to have on breaking the processes of growth and local development and therefore working against the development of the national capacities to combat desertification.

4. Policy overview for combating desertification

In 1994, Argentina sanctioned the new text of the National Constitution, which emphasizes conservation of the environment and social development in a sustainable way, also asserting environmental rights of a general character for all the inhabitants of the country and the coming generations. In its article 41, it declares that: *"The right to a healthy environment assumes that productive activities can satisfy the current needs without compromising those of future generations"*. It establishes the

“obligation to repair the environmental damage caused”, where the degraded environment will have to be recovered to the condition prior to the occurrence of the event. It also determines that the authorities *“will provide for the protection and rational use of natural resources”*, and empowers the Nation to dictate minimal budgets for environmental protection. In this framework, in 1996, Argentina adheres to the UNCCD, trusting that this new international normative tool will turn into a valid instrument to combat the severe desertification processes the country is undergoing. In 1996 the UNCCD was ratified by the National Congress by Law 24701. The present Secretary of the Environment and Sustainable Development (SAyDS), belonging to the Ministry of Development, is the application authority in environmental issues and, consequently, the enforcer of Law 24701, regulated by SAyDS Resolution N° 250/03.

This is completed with the forming of political structures, such as the Federal Council of the Environment (COFEMA), which serves to improve the decision making process, on a national and federal scale in relation to Sustainable Development, as well as progress in several sectors and provincial regulations on specific environmental issues.

4.1. Other international treaties

Argentina keeps working actively in the design of a National Strategy for Sustainable Development (ENDS), in compliance with the commitment to Agenda 21.

Moreover, our country is a signatory of the international Conventions on Biodiversity and Climate Change, and has designed national strategies on biodiversity conservation, management of wild fauna and flora, and environmental education. In 1994, a National RAMSAR Committee was created to coordinate and advise on the application of the Convention to the Wetlands in Argentina. Of the seven RAMSAR sites appointed, five are located in arid areas.

5. Land Tenure and Land Use Policies

The problem of land tenure in drylands lies in factors of population expulsion and desertification. Most desert inhabitants have no acquired rights over the land through property titles, not even through renting agreements. They are thus “illegal occupants”, subject to expulsion, despite having lived there for generations. There is the possibility of claiming the lands on the basis of the twenty-year right, with witnesses, but lawyers are very expensive and the area must be marked out, which is a serious setback to people who live in poverty. In some provinces there are programmes, such as the “Arraigo”, whereby the State is seeing to these situations and trying to alleviate them, but the slowness of the response is contradictory to the urgencies of the people, who are swiftly displaced by new land uses, especially cultivation of monocultures. In Santiago del Estero, where the agricultural boundary expands at an alarming rate, totally eliminating the original cover of timber forests, a single company purchased 50,000 hectares of land, where 200 families lived. The company fenced the area and the people were compelled to abandon their lands, which were immediately turned to mechanized soy production. The whole estate is currently looked after by only 5 workers and the families have become part of the poor who migrated to the outskirts of urban centres.

The problem of land tenure and inequity of opportunities is one of the most serious roadblocks to the implementation of desertification control policies, not only because it enhances speculation, poverty, migration and non-sustainable land uses, but also due to the nonexistent access to credits by the original inhabitants, and even to the application of local development projects where donors or investors demand clarity in land tenure before investing or approving any proposal. This is one of the greatest

challenges for the implementation of the UNCCD in the country, and in Latin America and the Caribbean.

The other one is the lack of regulation regarding land uses. Discussions have just begun on the definition of a national law on land use that regulates the different activities. In most States this law is blocked in the Congress by the high interests involved, mostly related to real estate, that threaten its implementation. Without a law on land use, proposals for land management, however sustainable they might be, are merely good intentions.

6. Stakeholder Analysis: Mainstreaming in Partnerships

The CCD is a legal tool that forces governments to include the populations of drylands, their organisations, and the NGOs as active partners in the national planning process and in the implementation of activities associated with natural resource management in drylands. The CCD's success will depend on the roles played by each partner, and on the partners' capacity to respond to the requirements of the Convention.

So far the CCD has not been able to increase and strengthen its partnerships because, at the national level, it is only related to the governments through the Focal Points, with the risk that these may bring about bureaucracy, partiality, and unequal distribution of resources and opportunities to participate. The goal of the CCD is the strengthening of final users, by conferring power of decision on the local population. Currently, this goal usually only remains a wish because between the CCD and the population of drylands there is a "cushion" (that disperses initiatives and resources) formed by some planning and executive sectors (at the national, provincial, and municipal levels) that is precisely the only sector able to change the situation of local populations. The problem is that these sectors primarily respond to election interests ... and there are very few electors in the desert. There is only one thing able to exert pressure on an indifferent official: public opinion and this is where women could play a decisive role. Political will and the allocation of adequate resources are essential elements of successful translation of the concepts of "gender mainstreaming-desertification" into practice. And this largely depends on the will of politicians and officials and on their open-mindedness regarding the issue of women and desertification.

7. Experiences and Institutional Capacity in the Scientific and Technological Sector, Previous to the Establishment of the UNCCD

In Argentina, given the relevance of the agrarian sector in its economy, there is growing awareness of the importance of preserving the natural resources as a factor of production and socioeconomic development.

Previous to the establishment of the UNCCD, the development of science and technology institutions related to dryland issues gave the country initial advantages in institutional capacity and the existence of well-formed human resources. These facilitated the process of establishment of the NAP in the different regions. In this sense, the activity in centres for research and development of the scientific-technological system, both nationally and provincially, has allowed the achievement of a high degree of knowledge about the different ecological systems in the country and their problems, developing appropriate intervention tools to combat desertification.

The National Institute of Agrarian Technology (INTA) was established in 1956 as an autonomous agency of the Secretary of Agriculture, Cattle, Fishing and Food (SAGPyA), aimed at *"promoting and invigorating integral development and agrarian*

expansion". In this framework, the preservation and retrieval of natural resources has been a permanent objective, which has translated into nation-wide programmes and projects. The creation in 1972 of the Argentine Institute for Research on Arid Lands (IADIZA), dependent on the National Council for Scientific and Technological Research (CONICET), the National University of Cuyo and the Government of Mendoza, is one more milestone in the development of research directed to identify, get to know and improve the altered ecosystems of dry areas and achieve a sustainable use of their natural resources. The Centre for Renewable Natural Resources of the Semi-arid Zone (CERZOS) was created in 1980, dependent on the National University of the South and on CONICET, with the major goal of studying and investigating productivity in the semi-arid and arid areas of the country. In Puerto Madryn, Chubut Province, dependent on CONICET, is the National Patagonian Centre (CENPAT), established in 1970 by Law 18705, directed to the study and assessment of the natural resources in the region, systems of economic planning, production and education.

In 1982, the Law for Soil Conservation Promotion N° 22428 was sanctioned and implemented, and applied by the SAGPYA in the period 1983/1989. This law allowed incorporating 2 800 000 hectares under conservationist management, and another 2 500 000 hectares as protected areas, and 95% of the total corresponds to projects carried out on drylands. The law was implemented through direct subsidies to agrarian producers grouped in consortiums to develop conservation practices in their estates, with a public investment of \$US 14 million. All of these actions, besides those developed by the Secretary of Sustainable Development and Environment Policy, have added to the full integration of Argentina to the CCD, and have given impetus to the actions that enabled the launch of the NAP.

8. The National Action Programme (NAP)

In 1995 Argentina began the process of formulating the National Action Programme (NAP), and a short while after signing the Convention, Argentina presented its NAP (1997), the result of nearly 60 workshops around the country, in which more than 2 000 people participated (Figure 2). That work allowed for the dissemination of UNCCD's goals, and encouraged the joint participation of researchers, government officers, NGOs and representatives of the local communities in the diagnosis of local situations of desertification. This national programme was coordinated by the UNCCD National Focal Point (Dirección Nacional de Suelos, SRNyDS), the present SAYDS, funded by FAO, UNEP, and UNSO/UNDP and actively supported by GTZ and the GM in the early times of implementation.

The NAP was established in 1997, within the framework of the national strategy for sustainable development, in response to the objectives of the UNCCD. The strategies for formulating the NAP are based on integrated and participatory planning, decentralization achieved through the country's regionalization, and consensus among all parties involved. The Programme is based on local proposals that will contribute to the formulation of regional policies which, in turn, will serve as the basis for national policies. For this purpose, the key elements are: regionalizing; regional facilitators; partnership building; participatory "top-down" methodology; and gender-sensitive approach. The elaboration of the NAP culminated with the elaboration of the National Action Programme to Combat Desertification, which became the framework for national and local activities to combat desertification. This document considers six strategic areas:

1. Provincial, Inter-provincial and Regional Action Programmes
2. National Information Network for the Combat of Desertification and for Drought Mitigation
3. Education, Capacity Building and Public Awareness

4. Strengthening of the Institutional and Legal Framework
5. Strengthening of the Economic Financial Framework
6. Insertion of the National Programme in the Regional and International Order

The Programme to Combat Desertification in Argentina has not established a budget of its own; it has rather constituted a mechanism to optimize financial resources from the most diverse sources through consensus on and establishment of expenditure and investment priorities in the framework of the NAP's Temporary Executive Committee. This situation ensures a basis of technical and institutional capacities, distributed across the dry area, where incremental financial resources, allocated by national or international programmes and projects would result in a very high cost-effectiveness ratio. International cooperation on activities to combat desertification in Argentina has been significant, and has triggered national and provincial strategies. The technical and financial support of FAO, UNEP, UNSO UNDP and the Government of Spain, enabled the elaboration and consolidation of the NAP; the launching of the Sub-regional Programmes of the Great Chaco and Puna, and the deepening of the gender thematic. The support provided by the Government of Germany, through GTZ, has been continuous and is one of the most highly developed cooperation programmes.

One of the aims of the NAP is to overcome some of the research obstacles in combating desertification, namely the fragmentation of studies among disciplines, the lack of integration of social and environmental dimensions in one single framework, and the deficiencies in basic information. Then determining the status and trend of the process based on benchmarks and indicators is a priority so as to collaborate in the formulation of public policies oriented toward the sustainable development of arid regions.

9. Towards a National Coordination Body: The Starting Point of a Way Towards Decentralization

Continuing with the implementation phase of the National Action Programme to Combat Desertification (NAP), in March of 2004 the National Advisory Committee (CAN) was created (by SAyDS Resolution N° 302/04), with the goal of suggesting measures and actions deemed pertinent to increase the efficiency of policies for the prevention and control of desertification. The CAN can in practice evolve toward a national Coordination Body, as it is headed by the Secretary of the Environment, and among its members are high-level representatives of the main sectors involved in efforts to combat desertification¹. The CAN is of vital importance to the development of institutional coordination, and enables its members to channel their actions to a high political level.

10. Participation: RIOD, a Discourse in Action. Experiences from Nongovernmental Organizations

In Argentina the contributions made by the RIOD, a nongovernmental network organization concerned with desertification, that has played an active role in the combat against desertification, ought to be highlighted. Its role has largely increased and consolidated over recent years. Numerous nongovernmental organisations (NGOs) and community organisations carry out their activities in desertified areas that are oriented toward raising awareness, building capacities in the use of sustainable

¹ Among them, Secretaría de Agricultura, Ganadería, Pesca y Alimentos; Secretaría de Ciencia, Técnica e Innovación Productiva; Instituto Nacional de Tecnología Agropecuaria; Consejo Nacional de Investigaciones Científicas y Técnicas; Red de ONG's de Lucha contra la Desertificación; RIOD; Movimiento Nacional Campesino e Indígenas; Consejo Federal de Medio Ambiente; Federación Agraria Argentina; Confederaciones Rurales Argentina; Asociación de Productores del NOA; Ministerio de Relaciones Exteriores, Comercio Internacional y Culto; Secretaría de Políticas Sociales.

technologies, forestation, rehabilitation of degraded areas, and toward the incorporation of new alternatives for agro-silvo-pastoral production, mostly directed to peasants and small producers. These activities are financed by resources from international cooperation institutions, by subsidies from national or provincial agencies and/or entrepreneurs' donations, and by financial resources contributed by the NGOs themselves. The organizational level reached by RIOD Argentina is outstanding; it groups over 80 institutions with active participation in building capacities among producers, transfer of technology, social promotion and organisation, and other activities related to the sustainable development of dry lands. The network also organises meetings and workshops of national scope for the training of its members.

It is worthwhile to note, in the Argentine case, the early initiative of NGOs, GOs and decision-makers to work in partnership on the search for participatory desertification indicators. In 2002 the Civil Association "Los Algarrobos", national Focal Point of the RIOD, in cooperation with IADIZA, implemented the first activities for NGOs in the use of desertification indicators. By complementing the approaches on indicators developed in Argentina, especially the practical approach on the selection of indicators for decision making and the vision of horizontal cooperation "from bottom to top", capacity building activities for adoption of indicators by NGOs in the country and in the region were organized. The aim of the work was to sensitize NGOs to the adoption of this tool. Results have been most encouraging, as the nongovernmental sector shows a high capacity to immediately adopt these tools and, moreover, to cooperate in obtaining and monitoring indicators of status and impact. Also, these kinds of experiences were transferred to other South American NGOs, like that organized in Loma Plata, Paraguay by "Desde el Chaco" Foundation. Argentina's experience in benchmarks and indicators was shared with participants from the Paraguayan Chaco region, and the foundations for starting work in the region with desertification indicators were consolidated.

11. National Strategies for Monitoring and Evaluation

11.1. Argentine experience linked to obtaining and evaluating desertification indicators: efforts to address the integrated assessment of desertification as a complex process

Argentina is one of the countries that has most progressed in relation to the recommendations of the UNCCD's Science and Technical Committee, since work on the development of indicators at local and regional levels had already begun before the implementation of the Convention. Very early on, the country incorporated the need to work with Benchmarks and Indicators (B&I). By 1987, results on this thematic issue had already been generated (Roig, 1989, Roig et al. 1991, Abraham, 1987, Del Valle et al., 1998).

Once the NAP was developed, activities continued. Thus in 1997, the Argentinean Group for Obtaining and Assessing Desertification Indicators was formed, summoned by the National Focal Point. Between 1997 and 2001, representatives of the major governmental and scientific-academic institutions engaged in the desertification issue in Argentina participated in this process.

A characteristic that distinguishes this country is that this initiative emerged not only at the national level, but also with the goal to build capacities and generate a network for the management of knowledge about desertification in LAC, as attested by the successive courses and projects of groups of countries conducted on the issue by IADIZA and other institutions. Amongst these we can mention the Latin American courses financed by UNEP and FAO, and carried out by IADIZA, FAO, the Postgraduate College at Saltillo, Mexico and the University of Chile; the projects on

B&I by ECLAC and GTZ, in 2002, the MEDRAP (Programme of Regional Action for the countries of the Northern Basin of the Mediterranean, European Union, UNCCD), that allowed for a fluent exchange of experts, from Europe and LAC, on all issues related to combating desertification and regional planning; and, more recently, the AIDCCD (Active Interchanging of Experiences in all the Annexes of the UNCCD). These initiatives contributed to raising generalized awareness in the countries listed in Annex II of the need to accomplish a better management of the knowledge about desertification, based on B&I and with the goal of establishing early Warning Systems.

It must be highlighted that a great part of the results obtained in the country on the B&I issue have been spread and transferred through numerous publications in journals and books, as well as through meeting proceedings and processes of building capacities of different users, from technicians and academicians to decision makers, NGOs and local people. The "Argentine Sustainable Development of Arid and Semiarid Lands" Project, carried out through an INTA – SRNyDS and GTZ agreement has devoted a special chapter to the development of Impact Indicators using a participatory methodology and enabling the final users (doers, technicians, and inhabitants) to obtain and evaluate indicators. At the same time, decision-support systems for combating desertification have been developed by GTZ and INTA, especially for Patagonia and San Luis.

11.2. Early Drought Warning System

In 1998 the NFP formed the Argentinean Group for the creation of a Drought Early Warning System, composed of scientists from diverse institutions, such as the National Meteorological Service (SMN), National Institute for Agrarian Technology (INTA), National Institute for Water and Environment (INAA), provincial governments, national universities and NGOs, for the design of an Early Alert System for Drought, following the directions of the UNCCD. Palmer's monthly drought index (PDI) is used for the detection, follow-up and assessment of drought. Moreover, the Pilot Project on early alert for drought is under way in the Semiarid Pampa, the provinces of La Pampa and San Luis, where the probability of drought occurrence is once every three years.

11.3. Existence of databases

The country has an important number of databases. In most cases, they are only available at the sites where the information is generated, and this makes their access difficult. On the other hand, potential users (the public in general, universities, research groups, etc.) are not always aware of their existence, which makes it difficult to consult them. Although information is abundant, there is disparity in its disaggregation. The organisations that produce databases find difficulties in collecting primary data and in continuing these activities. Implementation of a coordinated system of consultation and updating information is lacking as well. Even though there are good databases and natural resource diagnosis, these have not been accompanied by a proper evaluation of social and economic effects. This is a tendency that has been redressed somewhat over the last years, but an unbalanced situation persists between the volume of physical-biological information compared to socio-economic information. There is no evaluation of physical losses due to the degradation of natural resources, decrease of productive potential, or recovery costs. Nonetheless, and in spite of their scarce diffusion, there have been methods and technologies generated in Argentina and validated at local and regional levels.

12. Helping to Consolidate a Regional Image: The Role of Argentina in LAC

In its formulation, the NAP prioritizes the insertion of Argentina in the Regional (RAP) and Sub-regional (SAP) order, aiming at completing and reinforcing the respective NAPs of the countries involved. The NAP contemplates the inclusion of agreed joint programmes for the sustainable management of natural resources, scientific and technical cooperation and strengthening of institutions. In this context, it must be pointed out that Argentina, together with Bolivia and Paraguay, is carrying out the Sub-regional Programme for the Sustainable Development of the Great American Chaco. Moreover, good progress is being made towards the accomplishment of the Programme for the American Puna, along with Chile, Peru and Ecuador.

Argentina also participates in the Program to Combat Desertification in South America (IICA – BID) together with Bolivia, Peru, Chile, Brazil and Ecuador. The NFP contributed the set of indicators that have been agreed upon by the experts at national and local levels. Likewise, Argentina took part in the project “Assessment of desertification indicators and of the socioeconomic impact of soil degradation” (ECLAC), together with Chile and Brazil. Argentina has made the UNCCD a proposal for a Technical Network Program (TNP) in order to articulate all B&I efforts in the region.

Another international project now underway is the Argentina Pilot Country - LADA Project “Evaluation of Land Degradation in Arid Zones”. It started in 2003, and one of its goals is to achieve a national strategy for monitoring and evaluation. For this purpose, a national committee has been formed to be in charge of transferring the results obtained from case studies at the national level.

13. Local level monitoring (LLM): A Participatory approach: A Case Study within the case

After more than twenty years of continuing work on research and its transfer in relation to the development of drylands in Mendoza, in 2003 the LaDyOT/IADIZA began to develop and implement the project “Strategies for local development and control of desertification and poverty in indigenous local communities of the Argentinean Monte desert” through a partnership with the Municipality of the town of Lavalle, and the indigenous Huarpe Community “Paula Guaquinchay” of La Asunción, counting on the financial support of the Argentine-German Technical Cooperation Agency (GTZ), the Federal Investment Council (CFI) and other institutions such as the IDB, LADA -FAO, and the National Secretary of Science and Technology.

This work has as its main goals: to develop a rural/local/sustainable development model that combines the best options found among all participants to combat desertification and takes the challenge of incorporating deserts to economic and production circuits, after the motto “living with the desert” rather than combating it; to show that the cooperation of scientists, NGOs and GOs, local governments and communities is possible within a research-action proposal, based on the acknowledgement of the potential existing in the desert, surpassing both compensation- and assistance-based approaches. It is framed within a rural territorial development concept, with the purpose of integrating a desert rural territory to dynamic territories in a competitive and sustainable way.

Among the main causes of desertification in Mendoza drylands, we wish to highlight the absence of policies for developing the desert, in contrast to the diversity of policies and promotion activities directed towards the oases. For this reason, after nearly thirty years of studying the desert, we decided to pass from research to action, with a proposal for local development and control of desertification and poverty based on the endogenous resources of the territory. We started a process of intervention

based on the intensive use of the territory's endogenous resources that proposes: to generate more sustainable development strategies in rural indigenous communities of the Mendoza desert; to improve the status of the ecosystem through an integral management of natural and cultural resources; to promote improvement of the socioeconomic conditions of the inhabitants of drylands. Among the objectives, we can highlight those to have had an effect on current production practices by incorporating conservation concepts and experiences in: herd management, preservation and validation of natural and cultural heritage, animal and human health, social organization, irrigation efficiency, waste recycling, use of water resources and non-conventional energies, production of organic manure, tourist and cultural services, and fundamentally, obtaining healthy food products.

The work methodology has been published on several occasions, and is based on the design of a participatory procedure where, starting from the identification and prioritization of problems and objectives, we obtain and evaluate desertification indicators, and on the grounds of the shared knowledge of the system, and of the desertification processes affecting it, all actors together design the impact hypothesis and the intervention actions. The intervention strategy is based on an attempt to optimize the local production by incorporating techniques allowing the capitalization of knowledge and traditional practices, with the goal of generating a high impact on the diversification and quality of production, and reducing the factors of pressure on the territory, mitigating and slowing down the desertification processes. The context of action is the Lavalle desert (10 197 km²), with a population of 3 213 inhabitants, where the dispersed population does not exceed 0,33 inhab/km². This is the desert where some of the Argentine aridity poles are located (mean annual rainfall is 80mm at "El Retamo" locality). The main economical activity is a subsistence production system based on goat breeding for meat and manure. One of the main causes of desertification in the region was the devastation of the native *Prosopis* woodland.

The current production system is characterized by a high territoriality and individualism, low profitability, and negative impact on the ecosystem productivity. Only goat meat is produced, with only a 30% survival rate of kid goats, due to the winter parturition. Leather is not used, milk is not produced, and actually the goats are only a device to produce manure, which is the most sought-after product, and this leads to overstocking, overgrazing and the worsening of sanitary conditions. The use of goat livestock at the household level entails: an excessive number of goats, extensive grazing techniques, desertified lands, serious problems in land tenure and property, problems in herd sanitation (brucellosis, tuberculosis), and scarce drinking water contaminated with arsenic. Therefore, the greatest challenge was to generate a demand for products from these marginal areas by other more dynamic markets, always taking sustainability into account, since this relative integration to more dynamic economic circuits must be produced not by hindering the values and testimonies of the local identity but based on such values and testimonies.

Thus, we together designed a system based on partnership building and association of small producers, where each provides the number of parous goats one can, and where they are housed at the UPYS (Pilot Unit of Production and Services). This is a sort of "hotel for goats", designed to keep them most of the year in order to produce milk, milk byproducts, kid goats, sanitation, food supplements, information, basic and applied research and eco-tourist products. It has been carried out on the basis of alliances and the financial support of a foreign Cooperation Agency: GTZ, who were the first to believe in us, and after them, of our National Science and Technology Council, to design and monitor the System. Recently we have established a fruitful cooperation with Italian research/development institutions (NRD and Istituto Spallanzani) financed by the Government of Italy, with the support of the GM, to transfer this experience to the entire Lavalle desert.

The outputs we expect to achieve are: a desert-adapted production system for healthy food (pastures, composting and vermiculture); a laboratory for primary sanitary control of goat herds; a reforestation nursery; an Observatory of processes to measure desertification and land recovery; and an interpretation center for education, transfer and tourism. The acting hypothesis is to achieve the compatible regeneration of the ecosystem and diversification of productive activities. This will make the following goals possible: generation of employment and increased income; productive transformation of domestic units; supply of infrastructure and services; improving human and animal sanitation; capacity building and technical assistance; and promoting participation and gender equity. The design of the process of the Experimental Unit for Production and Services (UPyS) has been started in the framework of the NAP for Argentina.

14. Discussion. Lessons learnt... and Still to be Learned

The process of formulation and implementation of the Argentinean NAP is a good example of partnership building that has summoned and articulated diverse partners, but is yet to be consolidated. A flexible programme was designed among all partners, with proposals generated through a consultation and participation process. These methodologies generate expectations, so it is necessary to guarantee the continuity of the actions, which requires definition of the lines of action and investment of genuine resources.

There is a sufficient regulatory framework, but it is necessary to urgently implement essential laws such as the laws of land use and land management at the national and provincial levels.

A great effort has been made to get benchmarks and indicators of desertification at local and national levels; however it is necessary to increase the dynamics of permanent assessment and improvement of ongoing projects, as well as the implementation of the Integrated System of Monitoring and Evaluation. Indicators for monitoring the impacts of the NAP and the follow-up by the UNCCD remain to be defined. The work on B&I was the result of a successful alliance between governmental and nongovernmental organizations. In practice, this translated into a very early awareness in Argentina and in LAC of the close relationship that should exist among scientific and technical sectors, political decision-makers and all other actors of the civil society. Furthermore, the fact that the civil society was especially taken into account over the process has determined an early incorporation of participatory methodologies, in the frame of B&I.

The process of formation of the National Coordination Body has started. There is still the need to put the organisation structure into effect, effectively linking institutions and local people to decision-making sectors at different levels, and to guarantee the autonomy of sub-national, provincial and local programmes. Although institutional articulation has been achieved, sectoral contributions to combat desertification must still be increased in order to achieve sufficient financing for a greater number of research and development projects, especially at the local level. Mechanisms for monitoring the progress and impact of these projects must also be generated.

We need to pursue topics such as the legal framework, non-conventional energies, land tenure policies, and drought prevention, among others. We are still far from accomplishing gender equity.

Considering the control of desertification in Argentina we must still improve:

- A thorough knowledge of the territory's status and capacities;
- Clarification of the land tenure situation;

- An updated and agile normative framework to protect those who have less;
- A series of proposals and actions tending to a sustainable local development, aside from regulations for large undertakings, mostly those in open competition for incompatible land uses (urban versus agricultural uses, etc.);
- An institutional articulation including strong partnership bonds among all actors: research, action, decision-makers and local inhabitants;
- Gender equity and awareness in all actions;
- A budget in accordance to the needs and activities put forth, and not solely dependent on donors, but primarily on genuine national, provincial and municipal funds likely to be sustained;
- A law of land use and land management that accompanies the proposals for the control of desertification, at the national and provincial level;
- An integrated system for monitoring and assessment of desertification processes, their impacts and responses.;
- Local development actions that are effective, and capable of generating strategies that may bring substantial improvement to income, production diversification and incorporation of marginal economies to the market, catalysed by support from the State and encouraging the participation of the private sector.

Towards more efficient policies for combatting desertification

One strategy for policies to be more efficient is that they respond to the interest of a greater number of citizens. For such interest to arise, the citizens ought to be sensitized to the problem. To be gain awareness, such citizens must be undergoing or at least know about the problem. To raise awareness of the problem we must invest in building and disseminating knowledge. This implies changing some of the policies for science and technology in the country. The perception, in the interior of the country, of the role played by the Science and Technology System in this process must change. A science “on paper” but far from reality cannot contribute to the resolution of problems. Likewise, a science where more and more partial and specialized views are prioritized cannot apprehend the complexity of desertification processes, which are complex processes that require an integrated approach. The evaluation of scientists in this system cannot be based only on the number of papers they publish in international journals indexed in the Science Quotation Index. Actions directed towards knowledge transfer; local development, capacity building and formation of local human resources should be taken into consideration, something that does not happen in the present day.

Attention should be paid to the scientific-technological sector, because in many cases it is excluded, or excludes itself, from decision-making processes. The CCD has reinforced the role of NGOs, and has created a Science and Technology Committee, but has not facilitated the participation of genuine representatives of the scientific and technological sector. This sector should be trained and capable and should make a great effort, along with government officials, to ensure the transfer of knowledge to the local people in places affected by desertification, and to generate and sustain knowledge and technologies.

A self-criticism we all need to make within the UNCCD concerns the lack of attention given so far to generating knowledge on the status and trends of desertification, and to strategies to apply such knowledge in assessment and monitoring systems, particularly in early warning systems for decision-making. From the very beginning, the generation of knowledge was not invited to the decision table or to the debates, the political sector was indeed invited, and so was the civil society, indirectly through the NGOs. The scientific and technological sector, one of the actors that generates

knowledge, was always indirectly present, at best through ad-hoc groups or by invitation by the Cooperation Agencies. In practice, this has widened the gap between knowledge generation and problem solving. Scientists and technicians have felt excluded from the process and stakeholders do not receive the necessary knowledge to face the seriousness of the problem, stand up to the politicians and demand policies and actions to combat desertification.

To achieve support for developing and financing efforts to combat desertification, we must learn the culture of assessing and monitoring impacts and responses from the initial condition to the desirable one. If the projects are not associated with an assessment and monitoring system, we will never know their real impact.

In short:

Perhaps the only lesson worth being learned is knowing how to link special keywords that demand a certain order of priority:

*planning before investments
research before actions
dignity before people
equity before development*

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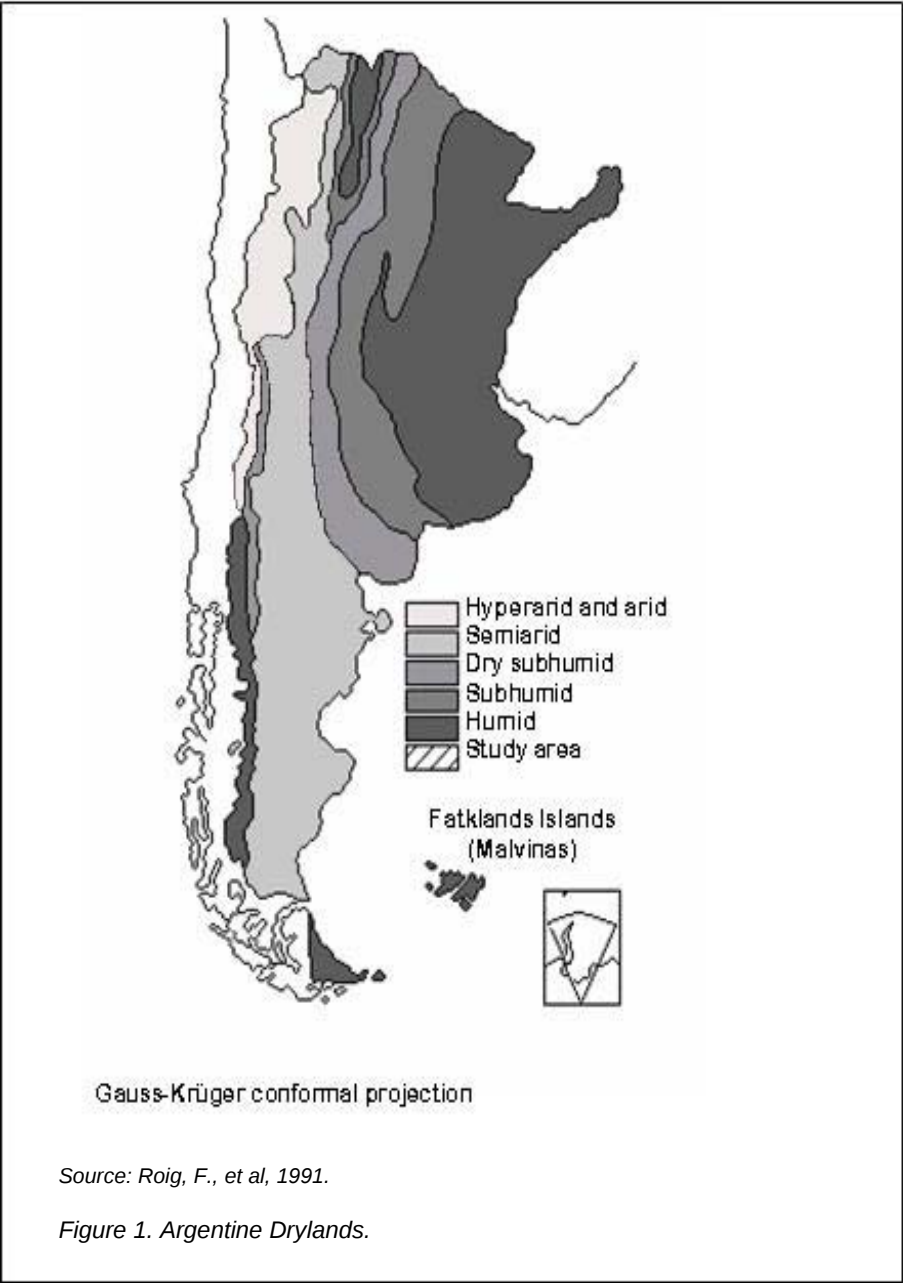
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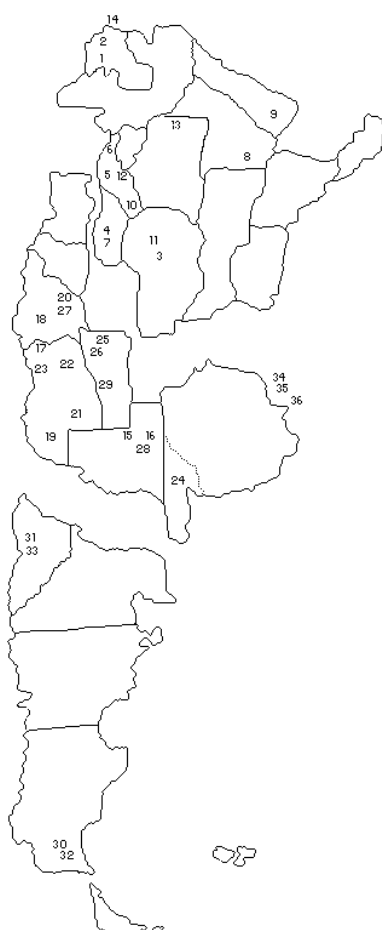
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Figure List:

Figure 1: Argentine drylands

Figure 2: Building our NAP: regional activities





Source: NAP, 1996.

Figure 2. Building the National Action Programme, 1996.

NUMBER OF PARTICIPANTS PER REGION AND WORKSHOP

CENTRAL NORTHERN REGION

1. J.P. Abra Pampa-Jujuy	20
2. J.P. La Quiaca-Jujuy	15
3. J.P. Córdoba	30
4. J.P. Chilecito	10
5. J.P. Belén-Catamarca	50
6. J.P. Sta. María-Catamarca	40
7. J.P. La Rioja	20
8. J.P. Resistencia-Chaco	30
9. J.P. Formosa	40
10. J.P. catamarca	30
11. J.P. Vaquerías-Córdoba	24
12. Taller Valles áridos-Belén	80
13. Taller Chaco-Quimilí	40
14. Taller Puna-La Quiaca	50

CENTRAL WESTERN REGION (624.000 km²)

15. J.P. La Pampa	7
16. La Pampa-San Luis	17
17. J.P. Lavalle-Mendoza	140
18. J.P. San Juan-La Rioja	15
19. J.P. Malargüe-Mendoza	120
20. J.P. Valle Fértil-San Juan	29
21. J.P. Gral. alvear-Mendoza	80
22. J.S. docentes y Alumnos Mendoza	550
24. J.P. Bahía Blanca-Bs.As.	10
25. Mendoza	100
26. T. Nacional Oasis-Mza.	55
27. San Juan-La Rioja-Catamarca	67
28. La Pampa y Sur Bs.As.	53
29. T. San Luis	66

PATAGONIC REGION

30. J.P. Río Gallegos-Santa Cruz	15
31. J.P. Chos-Malal-Neuquén	18
32. T. Río Gallegos-Sta. Cruz	25
33. T. Chos-Malal-Neuquén	40

NATIONAL

34. J.P. NAP	15
35. 1° Meeting of the National NAP Executive Committee	40
36. Meeting for the creation of NGOs Network-Bs.As	50

Central Northern Region : 579 people
 Central Western Region: 1.446 people
 Patagonic Region: 98 people
 National: 105 people

Total of participants: 2.228

China: The Role of Policies in Combating Desertification

Xiaoxia Jia

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Introduction

China is one of the countries in the world suffering from severe desertification with a vast area, wide distribution and various symptoms. The area prone to desertification is 3.317 million km², accounting for 34.6% of the total territory. According to the findings of the National Desertification and Sandification Monitoring, by the end of 2004, the total area of desertified land is 2.6362 million km², taking up 27.46% of the total land mass. The proportion of land prone to desertification is 79.48% of the total, which is higher than the world's average of 69%. The land in China the process of desertification is mostly distributed throughout 498 counties in 18 provinces, including Xinjiang, Inner Mongolia, Tibet, Qinghai, Gansu, Hebei, Ningxia, Shaanxi, Shanxi, etc. Put as such, the area of desertified land as a result of wind erosion totals 1.839 million km², taking up 19.16% and 69.77% of the total land territory and desertified land, respectively, and it is distributed in 13 provinces in northwest, north and northeast China. It thus forms a sandified zone, which is 4,500 km long east-to-west and 600 km wide north-to-south, and stretches from the Tarim Basin in the west to the Songnen Plain in the east. The area of desertified land as a result of water erosion totals 259,300 km², distributed mostly in the Loess Plateau in the upper and middle reaches of the Yellow River.

For a long time, it has been well recognized that the main causes of desertification are the interaction of climatic factors and irrational human practices in drylands, which are grouped into "five unwise activities" including deforestation, overgrazing, over-cultivation and abuse of water resources. But thanks to the studies of the past 20 years, it has been more and more well accepted that the root causes of desertification are relevant to population pressure and inappropriate human practices, including local and remote practices, which cause global climate change and increases in extreme weather occurrences, particularly drought epidemics and low rainfall efficiencies. To tackle this problem requires both technical and policy methods at local and international levels.

1. Overview of Policy Development in China

Review of the policy development in the history of combating desertification

China's history of desertification prevention and control can be traced back to the early 1950s when, far earlier than the birth of UNCCD, the efforts were mainly driven by the internal needs of the country to improve deteriorated ecological environments and protect agricultural production. The history can be divided into two periods: pre-UNCCD, which includes three phases, and post-UNCCD, also known as the present period, which reflects the process of changing, development and improvement of the policy system.

Pre-UNCCD - International Agreement

First phase: 1950s-1960s. Small-scale, local efforts.

In the early 1950s, instead of the pressure from international communities, but driven by the needs to improve the quality of the eco-environment of those areas suffering from wind and sand disasters, West Hebei Afforestation Bureau and North Shaanxi

Afforestation Bureau were successively established. At almost the same period of time, the government passed the resolution on the establishment of the protective forest shelterbelt in the western part of northwest China. During the next 5 years, great achievements were made in desertification control in northern China. Integrated desert scientific investigation was carried out and some experimental observatory stations were established to explore the mechanism of deserts and study the countermeasures to desertification. Local organized activities fighting desertification were raised in Shaanxi, Gansu, Xinjiang and the western part of Inner Mongolia, under the guidance that “man must be the winner in the battle with nature”.

Second phase: Policies on tree plantation and re-greening territory

In the late 1970s, the government of China launched a series of ecological improvement programs, known as the “three-north forest shelter belt programme (the Green Great Wall)”, which symbolized the transition of China’s desertification combating policies from local, small-scale initiatives to widespread, organized, nationwide programs. In the early 1980s, the central government passed the resolution on compulsory tree planting, in accordance with which it is compulsory for each Chinese citizen (males 11-60 years old and females 11-55 years old) to plant 3-5 trees annually. Everybody is responsible for making a contribution to greening the motherland and combating land desertification.

Third phase: Integrated approaches and sustainable development

In the early 1990s, along with the introduction of the sustainable development theory and the outcome of relevant scientific research concerning drylands, it was widely recognized that combating desertification is an integrated and systematic programme, of which the essence is harmonizing the relationship between humans and drylands in an effort to maintain sustainable development through adjusting human activities to the natural carrying capacity. The Government has determined ‘sustainable development’ as the state’s major development strategy. China harmonizes the developmental strategies between economy, society, resources, environment and population. To further curb the expansion of land desertification, the government held a national conference on desertification and planning of legislation for desertification control. With the state council’s approval of the National Programme on Combating Desertification, some policies were issued by the central government, such as taxation exemption policies, to encourage stakeholders’ participation in desertification prevention and control, just as China’s desertification combating entered into the combination phase of policy and technical measures. For implementing the commitment to the International Summit on Environmental Protection and Sustainable Development, China formulated its Agenda 21-white Paper on China’s Population, Environment and Development in the 21st Century, in which desertification was included in Chapter 9.

After ratification of the United Nation’s Convention to Combat Desertification

After ratification of the United Nation’s Convention to Combat Desertification (UNCCD), China accelerated its pace on combating desertification. In 1994, the National Coordination Body was formally named as the National Committee for the Implementation of the UNCCD. Responding to the call of the Convention, the government took the initiative of establishing a national desertification monitoring system and carried out the first round of a desertification monitoring survey in 1994. In 1996, the government completed its first National Action Program based on the State Master Plan to Combat Desertification adopted by the state council.

Since then, a policy system to harmonize relations between man and land, and to promote sustainable land management has been gradually established, which includes agricultural, forest and rangeland land use policies, governmental financial support policies, taxation policies, environmental services policies, environmental impact assessment policies and natural disaster early warning policies, preparatory and mitigation policies, and so on.

2. The Present Policy System

Legislation Structure

Since the establishment of the People's Republic of China, laws and regulations related to dryland management and ecological improvement have been formulated and gradually improved. A system composed of general and specific laws has initially been set up. The National Constitution clearly defines that all of the land belongs to the state and its collectives. At present, China has promulgated about 20 laws relating to environmental protection and a series of environmental regulations and standards, and the local by-law system has been continuously enhanced. The legal guarantee system combined with environmental protection laws, other relevant laws and regulations promulgated by the State and local governments have been primarily formed.

The Law of Water and Soil Conservation came into effect on June 29, 1999, which has exerted a remarkable effect on controlling water and soil loss, protecting water and soil resources, and improving the eco-environment. According to the law, many local governments have the mandate to incorporate water and soil conservation into the high agenda of the government, and a system of reporting to the same level of congress and a system of checking responsibility for government leaders has been set up.

In accordance with the law on compulsory tree planting, each Chinese citizen (males 11-60 years old, females 11-55 years old) has the duty to plant 3-5 trees annually. Everybody is responsible for making a contribution to greening the motherland and combating land desertification.

The other laws, such as the Environmental Protection Law, the Land Administration Law, the Water Law, the Grassland Law, the Renewable Energy Law, and the Rural Land Contracting Law, in parallel with the Law on Combating Desertification, are also very important in promoting the efforts of combating desertification.

The Law on Combating Desertification

The 23rd Meeting of the ninth Standing Committee of the National People's Congress passed the Law on Combating Desertification on 31 August 2001, and the law came into effect in January 2002. It is formulated on the basis of systematic analysis and review of the relevant laws, regulations and policies. It states that China's desertification combating has been on the legal track, and introduces a new phase of preventing and controlling desertification by law. The law sets out the basic guidelines, responsibilities and obligations, management system, main system, guarantee measures and the legal responsibility of violating the law.

The Law made breakthroughs in the following aspects:

Firstly, the Law defined that the legislative objective is prevention and control of desertification to protect ecological security and facilitate sustainable socio-economic development. It is the first time that controlling desertification is given the important position of safeguarding ecological security. That prevention and conservation have

been given a primary role in desertification control reflects the fact that the resilience of ecosystems has been well accepted and applied in anti-desertification initiatives in China.

Secondly, the obligation and rights of the people who deteriorate land or control desertification have been clearly defined. Any entities or juridical persons using land resources have the duty to prevent and control desertification; any individuals or entities who degrade the land is obliged to recover the degradation; any individuals or entities who reverse the process of desertification would receive benefits.

In addition, policies encouraging the participation of all stakeholders have been elaborated in the form of laws, and are divided into two categories from which individuals and entities invested in combating desertification for the purpose of public welfare can rent the state-owned land for 70 years. For the profitable investment in degraded land rehabilitation, the government will give concessive loan and taxation exemptions and reductions to a limited extent during a certain period of time.

The most outstanding feature of the Law is the identification of government responsibility. The Law clearly defines the responsibility of governments in programming at various levels, and the role and functions of line departments in implementation. Furthermore, through an official governmental responsibility system, the Law prescribes that the governors who do not take action for desertification control in their official term will be punished.

The Law clearly defines management system and jurisdiction of relevant governmental agencies. The Forestry Administrative Department of the State Council shall be responsible for organizing, coordinating and guiding prevention and control of sand throughout the country. Forestry departments are responsible for establishing and operating monitoring systems, and reporting on the desertification process.

The legislative law structure forms the basis for regulating human practices and defines the obligation and duty of all relevant stakeholders.

National Programmes and general principles for implementation

The Government of China has determined 'sustainable development' as the state's major national development strategy and has defined environmental protection as the basic national policy. China harmonizes the developmental strategies of economy, society, resources, environment and population. As part of the major efforts to protect the environment and to realize sustainable development, combating desertification has been incorporated into the State Economic and Social Development Plan. China has developed a number of important documents such as 'China's Agenda 21', 'China's Environment Protection Agenda 21', 'China's Agenda 21-Forestry Action Plan', 'China's National Action Programme to Implement the United Nations Convention to Combat Desertification (NAP)', 'China's Eco-environment Promotion Plan', 'China's National Master Plan for Combating Sandification (2005-2010)', etc. In China, economic development and environmental protection is stressed in integrated forms of synchronous planning, synchronous implementation and synchronous development.

The 'China National Action Programme to Implement the United Nations Convention to Combat Desertification' (NAP) is the key document for the implementation of UNCCD, which covers:

- Ecological forestry improvement;
- Grassland protection and improvement;
- Inland river integrated management;

- Conservation and ecological agriculture;
- Poverty alleviation; and
- Restructuring of rural energy.

The National Programme defined the guidelines for the establishment of a guarantee system that includes:

- Attention from the government;
- Training and education;
- Science and technology support dissemination;
- Monitoring and assessment; and
- Legislative and policy systems.

The general principles for the implementation of NAP have been identified as follows:

First, the most basic principle that should be followed is that combating desertification must be coordinated with developing the local economy and poverty alleviation. Desertification control is not only an environmental improvement initiative but also a local survival and development issue. Only through improvement of local livelihood would desertification eventually be tackled. Secondly, for the designing and practicing of interventions in anti-desertification, human-facilitated ecological rehabilitation must be combined with an ecosystem's self-repair function. At the same time, special measures must be combined with integrated and comprehensive measures. Thirdly, partnership arrangement is the core for resource mobilization, in that direct financial input from the government must be combined with policy incentives for resource mobilization from all stakeholders. Furthermore, the tradition of hard work must be combined with scientific innovation. Without updating traditional knowledge and the application of appropriate advanced technology, effectiveness and efficiency can not be improved. Moreover, legal measures should be combined with ecological ethics. The interventions should focus on the control of controllable sandified lands. Short-term approaches should be combined with long-term approaches to maintain a sustainable development.

In 2005, the State Council ratified the National Master Plan on Combating Sandification (2005-2010), which stated that by 2010, 13 million ha of sandified land will be harnessed, with 3.72 million ha enclosed. It is estimated that the trend of expansion of sandification will be effectively contained. In 2005, the State Council's Resolution on Further Accelerating Combating Sandification was issued.

Government financial support policies

Combating desertification has been incorporated into the national economic and social development plan financed by the government. For implementation of the national program and strategies, the Chinese government has established a stable and predictable central government financial support mechanism for ecological improvement to provide public ecological goods and services by means of direct financial support, transferring revenue from beneficiary to benefits creation areas and, subsidies to land users for the creation of public ecological goods.

Government direct input system

Through implementing key national projects for ecological improvement, the government directly invests in combating desertification. The funds for the implementation of the National Action Plan for combating desertification will be collected from various channels, including financial appropriation from the government, local fund collection, and job-offering opportunities for poverty relief

covering the combating desertification and comprehensive development of desertified land with special project funds for comprehensive agricultural development, and funds for poverty alleviation and disaster relief. In addition to the financing from the central government, the state demands that all provinces (autonomous regions and municipalities) should provide respective counterpart funding for the projects. As for the project investment, the Chinese government adopts the policy that the funds from the central government should primarily be invested in the national ecological programs, in contrast to its secondary investment in the local ecological programs; the funds for public welfare should be employed freely while the funds not for public welfare should be employed with pay; the regions with good financial status should provide more funds than those with poorer financial status, and, provincial funds for the comprehensive agricultural development projects should cover at least 70% of the total counterpart funds, otherwise the funds allocated to the local governments by the central government for the next year will be reduced.

Transferring Revenue: Forest Ecological Benefits Compensation System

In 2004, the Ministry of Finance and State Forestry Administration jointly started up a compensatory fund for forest ecological benefits. The goal of this special fund is to provide some subsidies to the managers of the key forests of public welfare for their expenditures in afforestation, tendering, protection and management. The scope of the compensatory fund covers the forestry lands designated by the State Forestry Administration, such as the afforested land within the key forestry lands of public welfare, as well as the thin-stocked woodland, shrub-land and shrubby land in the areas suffering from serious problems of land desertification, water erosion and soil loss. In 2004, the Central Government allocated RMB 2000 million for the first phase to compensate for the forest ecological benefits over 26 666 700 ha of the key forests of public welfare throughout China.

Subsidies for land use change of degraded farmland and rangeland

Subsidies for the conversion of degraded farmland to forest

The government provides gain and cash subsidies to farmers who convert degraded farmland to forest. In the Yangtse River valley and southern region of China, the government pays 2250kg/ha of the farmers' grain annually. In the Yellow River valley and the northern region of China, the grain subsidy is 1500kg/ha. In addition to grain, the government pays farmers cash subsidies of 200Yuan/ha. The subsidy duration is based on 8 years for farmers planting trees for ecological purposes, and 5 years for those planting economic forests. In addition to the subsidy mentioned above, farmers can also be provided with subsidies to purchase seedling, and labor payments for tree planting for 450 yuan/ha. The government maintains that grain and cash encourages farmers' participation in the programme of converting degraded farmland to forest and grass.

Subsidies for converting degraded rangelands to grasslands

In most of the pastoral areas, the system of contracted responsibility for grasslands has been practiced. On the basis of public ownership, grasslands have been divided to each household under contracted responsibility, and raising household livestock is supported with socialized services. In the program of restricting free-grazing for vegetation rehabilitation, the Government has contributed lots of financial input to help herdsmen construct grassland fences, and has made lots of efforts to push forward the activities of a free-grazing ban, seasonal grazing and rotational grazing, so that the production and livelihood patterns of the farming herdsmen have been improved. For seriously degraded grasslands, the Government has implemented programs of vegetation enrichment, and grass seeds are subsidized at 150 RMB/ha. The farming herdsmen who carry out the free-grazing ban and seasonal grazing are

subsidized with feed grains to ensure their normal situation of production and livelihood is not impacted. At the Tibetan Plateau, the feed grain subsidies for an all-year free-grazing ban and seasonal grazing amount to 41.25 and 10.35 kg/ha per year, respectively, and the duration of subsidies is calculated on the basis of 10 years. For other areas, the feed grain subsidies for an all-year free-grazing ban and seasonal grazing amount to 82.5 and 20.625 kg/ha per year, respectively, and the duration of subsidies is calculated on the basis of 5 years.

Auctions of the “four barrens” (barren hills, barren gullies, barren sand-lands and barren waste lands) have been pushed forward. The policy of “One who plants trees is the one who will manage them and benefit from them” has been carried out. Lots of marginal farmland of serious sandification has been converted for tree planting and grass growing. The Government has provided financial subsidy for the construction of ecological forests.

Preferential taxation support policy

The Notification jointly issued by the Ministry of Finance, the State Taxation Administration and the Customs Bureau on “Taxation Favorable Policies on Western Region Development”, Document Code: Finance & Taxation 2001, No. 202, was issued in 2001. It maintained that special local produce from ecological environmental protection practices and farmland converted into forests and grassland in the western region should be exempt from the Taxation of Special Local Produce in the subsequent 10 years from the first year of earning income. The People's Republic of China's Law on Taxation for foreign-investment enterprises and foreign enterprises provides that the license fees to be gathered from foreign enterprises transferring technology to Chinese territory can be exempted from taxation in advance, once ratified.

Preferential loan support policy

Interest-exempt loans for combating desertification were issued in the early 1990s by the Ministry of Finance and the People's Bank of China, which have been credited by the bank of agricultural development for more than 10 years. The public go-ahead in the follow-up of industry development and agricultural products-based processing has been greatly motivated. The People's Bank of China gives its positive support in light of its credit principles to the key shelterbelt system construction, afforestation and regeneration of forest resources, integrated development of mountain areas, sand dune fixation and combating desertification.

Other administrative regulations and policies

In addition to the role of relevant laws in the restriction of inappropriate human activities, some incentive policies have been formulated by government administrative agencies to encourage all stakeholders' participation. For instance, the Decision of the government on Forestry Development issued in 2004, and the Decision of the State Council on accelerating the pace of combating desertification issued in 2005.

Direction and priorities of China's eco-environmental improvement during the period of the 11th Five-Year Plan of China's National Economic and Social Development (2006-2010)

The 11th Five-Year Plan states the requirements for protecting and rehabilitating nature and ecosystems, provides guidance, and identifies the priority for combating desertification in China over the next five years in the following aspects:

- The priority of ecological conservation and improvement should be transferred from aftermath-control to pre-damage conservation, from man-made efforts to natural rehabilitation, and should reverse the deterioration of the ecosystem by targeting the source of the deterioration.
- Establishing key ecological function zones in the natural forest protection areas and important water source conservation areas, so as to promote the natural rehabilitation process.
- Improving the legal system, making clear divisions of the responsibilities, and enhancing the supervision and management of the nature reserves.
- Establishing an ecological compensation mechanism in accordance with the principle of “those who explore the resources should protect them, those who benefit should receive compensations”.

3. Situation Description

The result of the third desertification monitoring shows that desertification in China has been primarily harnessed and that remarkable achievements have been made in the course of combating desertification. However, there are still challenges facing China's desertification combating.

Firstly, the desertified land is in a large area and the task of desertification combating is very arduous. China has a total of 263.6 million ha of desertified land, with a wide distribution and complicated types.

Secondly, the man-made vegetations of the past decades are still unstable, and they are still fragile and vulnerable to long-lasting drought epidemics induced by climate changes and variation and regenerating desertification processes.

Thirdly, the poverty that causes the expansion of desertification is still prominent. The desertified land areas are mostly located in poverty-stricken areas where ecology is very fragile, natural conditions adverse, economic basis poor and the local people's livelihood difficult. The government, at various levels, has faced great pressure in developing a regional economy and getting rid of poverty, resulting in a prominent problem of poverty due to the expansion of desertified land areas.

Fourthly, human factors, the “Five Abusing Activities”, which cause desertification will still subsist for a long time because of low incomes in rural areas, and the rural economic structure being heavily dependent on primary land production.

In addition, the overall trend of global warming may bring a more complex dryland climatic pattern, increasing the vulnerability of drylands. Adaptation to unexpected climatic variation and anti-desertification efforts require international partnerships and policy support as well.

4. Policy Analysis

During the past decades of anti-desertification processes, policy measures have played important roles in regulating the relation between man and land/nature, which can be elaborated into three functions, including restrictive - regulating inappropriate land management behaviors; incentive - encouraging sustainable alternative livelihood of local people; and guarantee functions - providing services and support.

Most laws take on the restrictive role. The law of combating desertification, executed in 2001, identifies the responsibilities of the government for degradation control at various levels. In that way, all government at various levels have paid more attention to combating desertification. In addition to those legislative laws, some administrative regulations are more direct and quick to respond to urgent issues compared to the

legislative laws. For instance, restrictions against harvesting natural medicinal herbs in fragile dry areas; prohibition of open grazing in degraded grasslands; and prohibition of fuel-wood collection in degraded drylands. Inland river water allocation policies combined with correct water exchange facilitates water saving in cropping and initially releases the stress of water shortages in the lower reaches of arid areas. But the common problem in implementing those laws is the lack of coordination. Some laws are difficult to implement because of the lack of detail of operational regulation. Lack of awareness of the laws and bylaws at the local level, low capacity of teams executing laws, and short follow-through of long-term monitoring and supervision mechanisms are the main barriers for urgent improvement.

The role of incentive policies have been the most functional policies in the last ten years, including taxation exemption policies on agricultural and forestry products in desertified areas, concessive loans for desertification rehabilitation activities, and subsidies for readjusting grazing and farming structures. The innovation of the incentive policies provides tremendous impetus for farmers' participation in combating desertification, for instance through providing grain and cash subsidies directly to individual farmers. The programme of converting degraded farmland to forest land has become the programme with the highest number of farmer participation. The national forest ecological benefits compensation system creates modules of governments purchasing ecological services. But all those policies are facing the same issue of sustainability and adjustment based on changing circumstances. For instance, the present hot topic is what the consequences would be, "reverting to cropping or loss of income", when the 8th year's subsidies are concluded.

The role of guarantee policies also could not be fully performed. The policies regarding land tenure of cropping land, grazing land and forest property rights are all in the process of optimization and perfection and are challenged by the needs of reform. Some experts are arguing about the best way for development of the animal husbandry and advantages and disadvantages of nomadic grazing and intense animal feeding and related rangeland contract policies. A reform pilot of the collective forest property right is also ongoing, and the way of joint management by shareholders who own the forest property is under further testing. Agricultural extension and services policies are also facing reform and transition from a single role in the government to a government-lead system with the participation of the private sector and farmers associations. The ongoing reforms will bring a more active role to the policies in the forthcoming years.

The assessment of the efficiency and effectiveness of national programmes and relevant policies suggests that the innovative policies have effectively promoted the recovery of the degraded vegetation. However, although the process of desertification expansion had been initially reversed in 1999-2004, the human-induced land degradation still exists parallel to the overall reversal. Rural poverty, lack of alternative livelihood, surplus rural labor and high dependancy on land resources are all challenging the fragile aid ecosystem and raise new questions for revising and further developing relevant policies.

5. Recommendations

To realize its objectives, China continuously needs to follow the principle of harmonizing environmental protection and development, harmonizing incremental benefits and local benefits, and insisting on scientific outlook in combating desertification.

In order to do this, firstly, it needs to improve the sustainability of recovered dryland ecosystems through maintaining, optimizing and improving the ecological function of the existing vegetation and improving desertification monitoring and early warning

systems, and by carrying out follow-up monitoring on the key programs.

At the same time, it also must improve the sustainability of the enthusiasm of the affected local people through gradually perfecting the incentive policy system to encourage the development of alternative livelihoods, including the eco-tourism processing industry in order to add to the value of local products.

Furthermore, China must mobilize more resources from the whole society of affected and non-affected areas through innovative policies complementary to the present financial direct investment mechanism.

Last but not least, China must to enforce the “responsibility system” to improve project management.

To maintain the existing achievement in combating desertification in China, far more needs to be considered regarding policy aspects in land tenure, forest property rights and reform of the rangeland contracting system, and the marketing of ecological benefits in order to bring more benefits directly to rural communities.

SESSION 3, PART II:
STRATEGIES FOR
MONITORING AND
EVALUATION

Expérience marocaine en matière de suivi-évaluation du Programme d'Action National de lutte contre la désertification : acquis du projet SMAP/CE/OSS

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Introduction

Le Programme d'Action National de lutte contre la désertification (PAN), adopté au Maroc depuis juin 2001 dans le cadre de la mise en œuvre de la Convention des Nations Unies sur la lutte contre la désertification, constitue une nouvelle approche d'orientation de la politique en la matière. En effet, le PAN constitue un cadre de mise en cohérence des programmes sectoriels de lutte contre la désertification pour une meilleure efficacité dans la protection des ressources naturelles. Le PAN devra permettre de constituer un nouveau contexte favorisant la concertation et l'implication de la population et des différents partenaires dans l'élaboration et la mise en œuvre des actions de lutte.

Par ailleurs, le PAN intègre une autre dimension liée à la culture, dite « résultat », dans l'identification et l'exécution des programmes de lutte. En effet, le PAN prévoit la mise en place d'un système de suivi-évaluation, destiné à servir d'outil d'aide à la décision et d'orientation de la politique, des programmes et actions de lutte, pour une optimisation de l'utilisation des ressources naturelles et des ressources financières allouées à la protection de ces ressources et à l'atténuation de la pauvreté. Ainsi, il a été décidé de mettre en place un système de suivi-évaluation de la mise en œuvre du PAN (dynamique de la désertification et impacts des programmes de lutte engagés). Cet instrument est destiné notamment à l'Organe National de Coordination (ONC) et aux décideurs concernés à tous les niveaux.

A cet effet, les gouvernements du Maroc et de Tunisie, ainsi que le Secrétariat de l'UMA, assistés par l'OSS, ont pu bénéficier d'une coopération avec l'UE pour appuyer la mise en place du système de suivi-évaluation, à travers le projet SMAP/CE. Ce projet vise le renforcement des capacités nationales en matière de collecte et d'analyse de données de surveillance des zones sensibles à la désertification et des paramètres pertinents de suivi des impacts des projets de lutte ainsi que l'échange d'informations et d'expériences utiles dans ces domaines.

Pour ce faire, le Maroc a engagé par le biais du projet SMAP/CE, une étude qui avait pour but essentiel d'établir un diagnostic sur la base de la documentation disponible pour dresser : i) l'inventaire des principaux programmes et projets liés directement ou indirectement à la problématique de lutte contre la désertification selon les secteurs d'intervention (irrigation, parcours, forêts, développement agricole et rural. etc...) et ii) l'inventaire des institutions concernées par la production, le traitement et/ou la diffusion de l'information en rapport avec les objectifs du PAN. Ce dernier volet a concerné également les attributions et les domaines d'intérêt de ces structures en la matière ainsi que leurs capacités humaines et matérielles en relation avec la thématique. Ce diagnostic s'est attaché en particulier aux dispositifs existants en matière de recueil, de traitement et de diffusion de l'information sur la lutte contre la désertification au Maroc.

Par ailleurs, il a été passé en revue les bases de données cartographiques et des SIG existants au Maroc et qui peuvent être utilisés dans le cadre des systèmes de circulation de l'information sur la désertification et de suivi-évaluation du PAN.

Enfin, une analyse critique de ces systèmes d'information et de suivi a été faite afin de porter un jugement sur leur capacité à répondre aux objectifs fixés dans le cadre du PAN, en vue d'une éventuelle utilisation de leurs produits dans le cadre du système de suivi-évaluation des impacts des programmes de lutte contre la désertification.

Il ressort de ce diagnostic que le Maroc dispose d'expériences et de programmes touchant divers aspects de la lutte contre la désertification et d'approches de suivi-évaluation de ces programmes. Ces expériences et programmes se présentent comme des atouts considérables dont il a été tiré profit pour la mise en place progressive du système de suivi-évaluation du PAN.

En ce qui concerne le Système de Circulation de l'Information sur la Désertification (SCID), le travail qui a été fait a permis de collecter de riches informations qui ont été mises à contribution au profit de ce système.

Les objectifs spécifiques du système sont définis à travers les rôles qui lui sont assignés en tant que :

- moyen d'encadrement et de pilotage de la mise en œuvre du PAN ;
- outil d'aide à la décision pour la réussite du PAN : tableau de bord pour les décideurs.

1. Démarche de mise en place du système actuel

La démarche préconisée pour la mise en place du dispositif est déterminée tant par la nécessité de réaliser les objectifs convenus que par l'importance qui s'attache à sa reconnaissance au niveau institutionnel, comme un outil essentiel de pilotage du PAN.

Pour atteindre ces objectifs retenus en terme notamment d'orientation et dynamisation de la mise en œuvre du PAN, de renforcement de la coordination au niveau national, de dynamisation et encouragement de la coopération internationale et de moyen approprié de préparation des comptes rendus périodiques aux COPs, il y a lieu en particulier de:

- s'assurer de la pertinence du système et de la reconnaissance de son utilité pour le pilotage de la mise en œuvre du PAN ;
- faire du dispositif à mettre en place l'outil privilégié de préparation des rapports du Maroc aux Conférences des Parties (COP) et autres rapports d'évaluation ;
- faire déboucher le projet sur la mise en place d'un dispositif national d'observation à moyen et long terme, fondé sur la délimitation d'espaces territoriaux homogènes.

Un élément important de la démarche de mise en place du système de suivi-évaluation du PAN Maroc est représenté par la création et l'opérationnalisation d'un réseau des partenaires. C'est dans ce sens qu'un groupe d'acteurs et partenaires impliqués et mobilisés pour la mise en œuvre du dispositif de suivi-évaluation du PAN est mis en place depuis la deuxième année du projet. Le réseau est constitué d'une quinzaine de personnes représentant les principales institutions et organisations concernées par la mise en œuvre du PAN

Aussi pour donner au dispositif la place requise dans le processus de mise en œuvre du PAN/LCD et pour s'assurer de son ancrage institutionnel et garantir sa pérennité au delà même de la période du projet, une large concertation a été menée avec les principaux acteurs intervenant dans la mise en œuvre du PAN. En particulier, le

programme de travail et les activités du projet ont été élaborés et régulièrement revus et améliorés avec l'ensemble des partenaires concernés.

Les principales institutions, parties prenantes, intervenant dans la conduite des activités du suivi-évaluation, relèvent :

- des Départements de l'Agriculture, de l'Environnement, de l'Eau ... ;
- des Hauts Commissariats aux Eaux et Forêts et à la Lutte contre la Désertification, et au Plan ;
- des Etablissements scientifiques et de Recherche (IAV Hassan II, INRA, ENFI, CRTS...) ;
- du Réseau des ONGs, RIOD ;
- du partenaire au développement pour la mise en œuvre du PAN ; RFA/GTZ.

Il a été jugé, par ailleurs, opportun et profitable après la réalisation des inventaires de données et l'instruction des fiches descriptives des indicateurs et à la vue de la richesse du fonds informationnel national en la matière, de procéder à l'analyse des informations disponibles en situation de départ et de fournir à l'ONC et aux décideurs les premières évaluations possibles. Il s'agit d'un premier rapport d'évaluation qui a été élaboré en 2004, à destination des décideurs et de l'Organe National de Coordination (ONC). Ce rapport a permis de faire un diagnostic des principales problématiques liées à la désertification au niveau national et de proposer en terme de suivi-évaluation, sous forme de fiches actions, dix thématiques jugées d'une grande importance pour la mise en œuvre du PAN.

2. Montage d'ensemble du dispositif de suivi-évaluation du PAN

La construction du dispositif de suivi-évaluation est guidée par les objectifs arrêtés par la Convention et les préoccupations majeures exprimées dans le PAN-Maroc. La conception du dispositif se présente à la fois comme une reformulation des objectifs et sous-objectifs de la UNCCD, en les adaptant au contexte marocain, d'une part, et comme une définition des thématiques essentielles et des espaces affectés par la désertification sur lesquels le système de suivi-évaluation est fondé, d'autre part. A titre illustratif et pour l'objectif de la UNCCD relatif à la Gestion des Ressources Naturelles, les thématiques et espaces retenus au Maroc sont : les ressources hydriques, la forêt et le couvert végétal, les parcours, l'agriculture pluviale, l'agriculture irriguée, et les oasis.

L'architecture générale du dispositif national de suivi-évaluation élaboré intègre, au plan conceptuel, les trois niveaux de planification et d'élaboration des décisions, à savoir les niveaux national, régional (subnational) et local, et identifie les institutions, les acteurs, les problématiques et les types d'indicateurs pour chacun de ces trois niveaux. Cependant, au plan pratique, il a été nécessaire d'adopter le principe de construction progressive du dispositif, selon une démarche participative impliquant l'ensemble des acteurs pour s'assurer de son opérationnalisation et des conditions d'appropriation du dispositif par ces acteurs, sachant que sa mise en place exige une série de dispositions et de conditions préalables.

Ainsi, le dispositif de suivi-évaluation a préconisé au niveau de chacun des trois niveaux précités les mêmes types de composantes, à savoir : une organisation des partenaires en instances et structures aux fonctions bien définies et des mécanismes de circulation de l'information et de pilotage du PAN.

C'est le niveau national qui a bénéficié de l'essentiel des investigations conduites par l'ONC, avec l'appui du projet, pour aboutir aux résultats concrets relatifs à l'identification et à la mise en œuvre des outils de suivi-évaluation spécifiques à ce

niveau d'analyse. Le niveau régional n'a été abordé que récemment au niveau d'une région pilote.

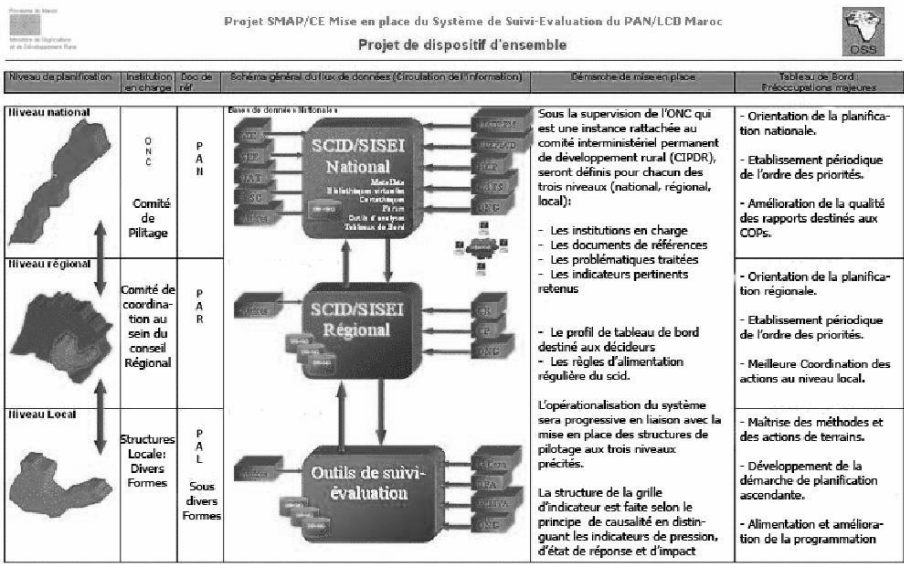


Schéma de montage d'ensemble

3. Les Principaux Acquis du projet au niveau national :

3.1. Un Réseau de partenaires impliqués dans la production et l'utilisation des données et indicateurs

Pour la mise en œuvre du dispositif de suivi-évaluation du PAN/LCD, un réseau de partenaires a été constitué ; il est composé d'une quinzaine de membres représentant les principales institutions et organisations concernées de près par la gestion des ressources naturelles et du développement rural. C'est cette instance technique qui a établi la liste des indicateurs, le projet de rénovation du SCID et la charte informationnelle. Pour l'examen des dossiers relatifs aux thématiques de désertification, cette instance est structurée en groupes spécialisés. Les cinq groupes mis en place sont :

- Groupe thématique de lutte contre la pauvreté,
- Groupe thématique des ressources en eau,
- Groupe thématique des forêts et couvert végétal,
- Groupe thématique des parcours,
- Groupe thématique des agricultures pluviale, irriguée et des oasis.

La composition des groupes se présente comme suit :

- Groupe thématique : Lutte contre la pauvreté
 - o Haut Commissariat au Plan ; Direction de la Statistique,
 - o Secrétariat d'Etat à l'Environnement ; Observatoire National de l'Environnement du Maroc,
 - o Ministère de l'agriculture et du développement rural ; DPAE,
 - o Observatoire du Sahara et du Sahel ; projet SMPA/CE.

- Groupe thématique : Ressources en Eau
 - o Secrétariat d'Etat à l'Eau ; Direction de la Recherche et de la Planification,
 - o Secrétariat d'Etat à l'Environnement ; Observatoire National de l'Environnement du Maroc,
 - o Haut Commissariat aux Eaux et Forêts et à la Lutte contre la Désertification ; Direction du Développement Forestier,
 - o Observatoire du Sahara et du Sahel ; projet SMPA/CE.
- Groupe thématique : Forêt et couvert végétal
 - o Haut Commissariat aux Eaux et Forêts et à la Lutte contre la Désertification (Direction du Développement Forestier) : Monsieur Mohamed Ghanam.
 - o Haut Commissariat aux Eaux et Forêts et à la Lutte contre la Désertification ; DREF,
 - o Centre Royal de Télédétection Spatiale,
 - o Observatoire du Sahara et du Sahel ; projet SMPA/CE.
- Groupe thématique : Parcours
 - o Ministère de l'Agriculture et du Développement Rural ; Direction de l'Elevage,
 - o Haut Commissariat aux Eaux et Forêts et à la Lutte contre la Désertification ; Direction du Développement Forestier,
 - o Centre Royal de Télédétection Spatiale,
 - o Observatoire du Sahara et du Sahel ; projet SMPA/CE.
- Groupe thématique : Agriculture pluviale, irriguée et oasis
 - o Ministère de l'Agriculture et du Développement Rural ; Directions : DPV, DAF, DPAE, DDGI,
 - o Secrétariat d'Etat à l'Environnement ; Observatoire National de l'Environnement du Maroc,
 - o Centre Royal de Télédétection Spatiale .

Les réunions des groupes thématiques sont animées par un chef de groupe (représentant l'institution la plus concernée). Au cours de l'année 2005, ces réunions ont été focalisées sur l'actualisation et la mise à jour des indicateurs, ainsi que l'alimentation du site internet www.scid.ma en informations sur la lutte contre la désertification.

Trois formes d'appui aux groupes thématiques constitués ont été apportées par le projet :

- la fourniture d'équipements informatiques nécessaires, et l'assistance à la mise en œuvre desdits équipements ;
- la dynamisation du travail des groupes thématiques, en terme d'alimentation en données des sites leur revenant et d'actualisation des données sur les indicateurs ;
- la formation ciblée des différents intervenants au niveau de leur institution, par des déplacements du responsable de la communication et système d'information.

3.2. Une Liste d'indicateurs exploitée pour le pilotage du PAN

De par les clauses et articles pertinents de la convention CCD, les indicateurs du dispositif de suivi-évaluation doivent permettre de :

- évaluer le degré de désertification et suivre son évolution ;
- suivre et analyser le processus de mise en place du PAN-Maroc ;
- évaluer les impacts du PAN sur la lutte contre la désertification.

La conception de la grille d'indicateurs a été par conséquent guidée par : (i) les objectifs essentiels de la CCD ; (ii) le guide de préparation des rapports nationaux aux COP ; (iii) les objectifs spécifiques du PAN/LCD et les thématiques préconisées pour sa mise en œuvre ; et (iv) les exigences du dispositif pression-état-réponse et impact.

Une première liste d'indicateurs a été établie en juillet 2003, puis soumise à l'examen des institutions partenaires. Elle a, par conséquent, fait l'objet de modifications et d'améliorations.

La liste définitive, présentée ci-après, a été établie à l'issue de l'atelier de restitution des 14 et 15 janvier 2004, ayant regroupé une vingtaine de partenaires représentant les différentes institutions impliquées dans le suivi du projet, relevant notamment des départements de l'Agriculture et du Développement Rural, de l'Environnement et de l'Eau, et des Hauts Commissariats aux Eaux et Forêts et à la Lutte contre la Désertification et au Plan.

La sélection des indicateurs retenus a été faite sur la base des propositions des institutions concernées et des données descriptives et des historiques disponibles. Ainsi, à chaque indicateur retenu, a été associée une fiche descriptive et de présentation.

La liste des indicateurs retenus est donnée ci-après, par thème :

Lutte contre la pauvreté

- Taux de croissance de la population ;
- Part de la population rurale dans la population totale ;
- PIB par habitant ;
- Taux d'analphabétisme ;
- Part de la population active occupée exerçant dans le secteur de l'agriculture, forêt et pêche, dans la population active occupée rurale ;
- Taux brut de scolarisation dans le primaire ;
- Taux de ménages ruraux raccordés au réseau d'eau potable ;
- Taux de ménages ruraux ayant accès à l'électricité ;
- Taux de pauvreté ;
- Taux de chômage rural.

- Volume d'eau disponible par habitant ;
- Taux de remplissage des barrages (septembre) ;
- Indice de qualité générale d'eau ;
- Taux d'envasement des barrages.

Espaces forestiers

- Superficie de la forêt ;
- Superficie reboisée ;
- Superficie régénérée ;
- Superficie forestière délimitée et homologuée ;
- Superficie traitée contre l'érosion hydrique ;
- Superficie des dunes fixées ;
- Superficie des aires protégées aménagées ;
- Superficie incendiée ;
- Superficie défrichée ;
- Superficie de la forêt dégradée.

Ressources en eau

- Volume d'eau de surface mobilisé ;
- Volume des eaux souterraines mobilisé ;
- Taux de mobilisation des ressources en eau ;

Parcours

- Evolution des effectifs des petits ruminants ;

- Nombre de points d'eau d'abreuvement du cheptel ;
- Part de la superficie des parcours aménagés.

Terres d'agriculture pluviale

- Part de la superficie annuelle des céréales dans la SAU ;
- Part de la superficie annuelle de la jachère dans la SAU ;
- Part de la superficie annuelle travaillée avec cover-crop par rapport à la superficie totale mécanisée ;
- Superficies des principales cultures (assolement) ;
- Superficie totale des plantations arboricoles ;
- Superficie plantée annuellement dans le cadre du Plan National Oléicole (PNO) ;
- Productions annuelles des principales cultures ;
- Superficies annuelles des cultures irriguées ;
- Part des superficies des cultures irriguées fortement consommatrices en eau ;

- Quantités annuelles des engrais et pesticides utilisées ;
- Rendements et productions des principales cultures en irrigué.

Terres d'agriculture irriguée

- Volume d'eau consommée par l'irrigation ;
- Superficie des terres agricoles irriguées ;
- Superficies aménagées ;
- Taux de recouvrement des redevances d'eau.

Oasis

- Nombre de plants distribués dans le cadre du plan national de restructuration et de réhabilitation de la palmeraie.

Indicateurs globaux

- Indice de végétation (NDVI) ;
- Température de surface (TS).

3.3. Un Système de circulation de l'information sur la désertification fonctionnel et accessible sur internet

L'un des résultats importants du projet est représenté par la plate-forme d'échange mise en place par le projet (www.scid.ma). Le site du SCID est devenu, de plus en plus, un espace de documentation, d'information et de partage des données pour les partenaires du projet, mais aussi une source d'information pour plusieurs autres acteurs, intéressés par la protection des ressources naturelles.

Outre le suivi des indicateurs, le site fournit une large gamme de données et informations :

- Au niveau international : Convention dans les langues (anglais, français et arabe), diverses notes sur les thématiques liées à la Convention, les Conférences des Parties...
- Au niveau national : Document principal du PAN et synthèses en anglais, français et arabe, rapports nationaux aux COPs, etc.
- Le suivi-évaluation du PAN : architecture, données essentielles, etc.
- Les indicateurs et leur actualisation par thématique.

Après les étapes d'initiation, de développement et d'alimentation en données et informations, la 3e année du projet a été consacrée à l'opérationnalisation du site et à son utilisation, notamment lors de l'élaboration du 3e rapport national : le projet et les

données du site SCID ont été d'un grand intérêt dans l'élaboration du rapport national et du profil national recommandé pour le CRIC 3 et la COP 7.

Tel que conçu, le Système de Circulation de l'Information sur la Désertification (SCID) deviendra un portail ou une passerelle donnant accès à une information sociale, économique et environnementale complète en relation avec la problématique de la désertification, comprenant des données brutes, des renseignements interprétés, des indicateurs, des rapports, des normes et d'autres documents. Le but ultime du SCID est d'offrir une information environnementale utile et intégrée qui aidera à la prise de décision relative à la lutte contre la désertification. Le SCID est élaboré suivant une approche par étape, qui met l'accent sur l'établissement de partenariats et sur la progressivité dans la construction de l'architecture de base du système. En rassemblant les données, l'information et les connaissances, et en les mettant au service des partenaires, le SCID soutiendra l'élaboration des politiques, l'évaluation environnementale, les indicateurs et les rapports sur l'environnement, les acteurs publics, les entreprises et les collectivités locales.

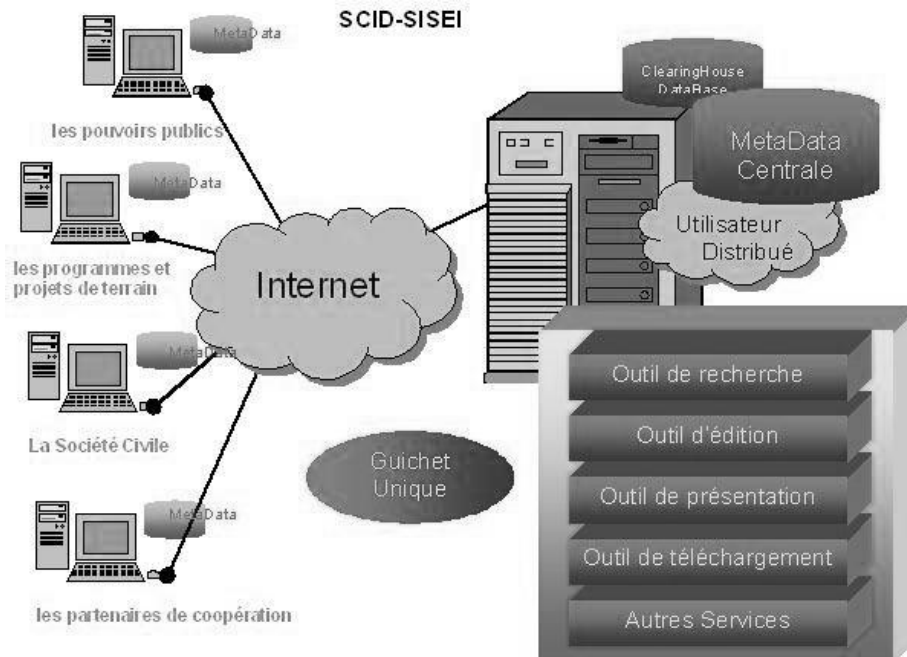


Schéma d'échange et de circulation de l'information sur la désertification

3.4. Amorce d'établissement de tableaux de bord

Deux démarches ont été tentées pour présenter aux décideurs et à l'ONC des indications tant textuelles que graphiques, leur permettant de prendre connaissance de la situation en matière de lutte contre la désertification en vue de prendre les mesures correctives nécessaires par, notamment, un pilotage, plus efficient, de la mise en œuvre de la CCD et du PAN LCD :

- La première concerne un essai d'élaboration d'une esquisse de tableau de bord à travers la définition et la documentation de dix thématiques majeures, associées à la mise en œuvre de la CCD et du PAN/LCD ;
- La seconde consiste en un exercice d'amorce de l'élaboration d'un tableau de bord à travers un essai de définition et caractérisation du profil de

développement durable des projets ayant trait à la lutte contre la désertification.

Les représentations ci-après donnent une illustration de la situation de mise en œuvre de la CCD et du PAN/LCD, à partir des résultats obtenus à partir de la mise en œuvre de ces deux approches.

a) Identification et analyse des thématiques de suivi du PAN :

Les dix thématiques sélectionnés, et pour lesquelles des fiches de synthèse sont élaborées, sont les suivantes :

- Situation socioéconomique en milieu rural ;
- Démographie et pression sur les ressources ;
- Ressources en eau ;
- Forêt ;
- Pastoralisme et parcours ;
- Agriculture pluviale ;
- Agriculture irriguée ;
- Oasis ;
- Amélioration de l'organisation institutionnelle ; et
- Amélioration de la connaissance du phénomène de la désertification.

Les éléments de caractérisation de chacune des thématiques ci-dessus sont les suivants :

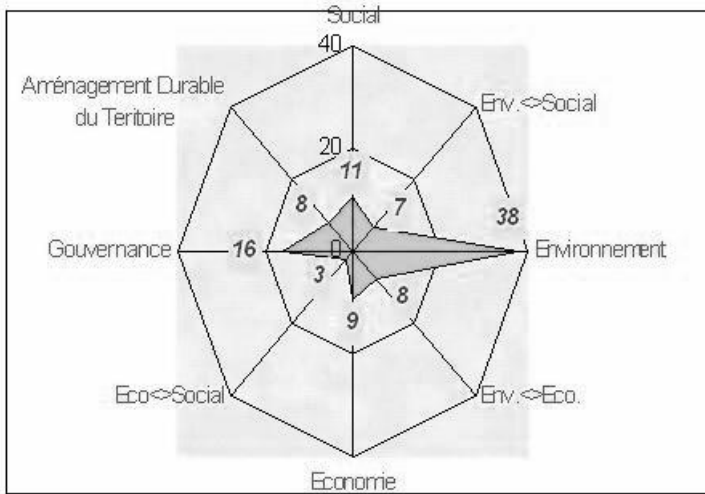
- Problématique ;
- Principaux indicateurs sélectionnés ;
- Illustrations graphiques ;
- Appréciations globales des tendances ; et
- Domaines et axes de redressement.

b) Profil de développement durable des projets de lutte contre la désertification

L'utilisation des bases de données disponibles, notamment celles reconstituées par l'ONEM (Edition 2003), à travers le recensement et l'analyse d'environ un millier de projets de développement durable a permis d'identifier 74 réalisations en matière de lutte contre la désertification, comme elle a permis de présenter, suivant une vision synoptique, formant une plate-forme de tableau de bord pour les décideurs, un profil de développement durable dans ce domaine.

L'exercice est inspiré de la démarche initiée au niveau européen, et particulièrement au niveau national français, pour la caractérisation des réalisations de développement durable au sein des collectivités locales, prenant en considération l'aspect de la gouvernance, au même titre que les aspects de développement économique, social et environnemental, dans une perspective éco-systémique. La démarche a été adaptée au niveau national pour caractériser le profil de développement durable et approcher l'élaboration d'un tableau de bord, sous forme graphique, pour les décideurs et planificateurs au niveau national.

Comme le montre le profil ci-après, l'analyse fait ressortir une prédominance de la vision sectorielle, et particulièrement environnementale, dans la lutte contre la désertification au niveau national. La vision intégrée, impliquant simultanément les dimensions sociale, économique et territoriale (en termes de gestion de l'espace) dans le cadre d'une vision globale dans la planification des projets, reste limitée.



Profil des projets de développement durable adapté aux projets de LCD

4. Les Acquis au niveau sub-national

Pour la décentralisation du dispositif national, une tentative de mise en place d'observatoires sub-nationaux par grande thématique est initiée sur la base de six ensembles territoriaux qui paraissent recevoir le consensus des partenaires. Il s'agit :

- de la région du nord, pour l'aspect érosion hydrique ;
- de la région anti-atlas, en ce qui concerne les écosystèmes forestiers ;
- de la région de l'oriental, pour le système pastoral ;
- des espaces d'agriculture pluviale, avec la province de Setta comme zone pilote ;
- des espaces d'agriculture irriguée, représentés par le périmètre de Tadla ; et
- des espaces oasisien, représentés par la réserve de biosphère des oasis du sud Maroc, notamment le Tafilalet.

Le choix de la région de l'oriental pour le démarrage de cette décentralisation a été dicté par les éléments suivants :

- l'état avancé du processus de désertification dans la région ;
- la diversité des projets de lutte contre la désertification, menés dans la région ;
- le dynamisme de la société civile et de la communauté scientifique dans le domaine de lutte contre la désertification au niveau de cette région.

Les indicateurs thématiques identifiés au niveau national seront testés au niveau de cette région en y introduisant d'autres indicateurs spécifiques relatifs au parcours.

Une application est développée pour pouvoir renseigner régulièrement aussi bien les indicateurs pertinents que les fiches projets, y compris les indicateurs de leurs impacts sur le processus et sur la population et leur environnement.

5. Les Préoccupations au terme du projet

La pérennisation du dispositif de suivi-évaluation et sa continuation après la fin du projet est une préoccupation permanente des acteurs depuis la mise en place du projet. La démarche préconisée et une grande partie des actions du projet ont été déterminées en rapport notamment avec les exigences de pérennisation du dispositif et de son approbation par les institutions et acteurs concernés.

Parmi les évolutions importantes convenues pour une plus grande opérationnalité du dispositif et son adaptation aux contextes tant institutionnel que technique, figure notamment la nécessité de son articulation sur des expériences concrètes à des niveaux territoriaux et son ouverture sur les autres conventions de développement durable.

Plus concrètement, les préoccupations au terme du projet sont :

- la consolidation des acquis déjà obtenus ;
- la poursuite de la décentralisation du dispositif en lui donnant des prolongements à des niveaux territoriaux ;
- l'ouverture du SCID sur les autres conventions dans le cadre, notamment du SISEI ;
- la pérennisation du système au delà même de la période du projet ; et
- la mise en place d'observatoires de suivi-évaluation à des échelons territoriaux.

Pour le volet décentralisation du dispositif, six ensembles territoriaux sont proposés, en rapport avec les thématiques majeures retenues, et l'existence de projets concrets de terrain illustratifs pourront interagir positivement avec le dispositif national de suivi-évaluation du PAN/LCD.

6. Les Perspectives d'avenir : vers un dispositif, plus global, d'observation et de suivi environnemental (le programme DOSE)

Le dispositif est envisagé comme cadre fédérateur, mais aussi comme moyen de capitalisation et de valorisation des autres initiatives en cours (projet SMAP/CE, ROSELT, LIFE, Pays Tiers, ... etc.), et se présente comme étape importante dans le processus d'observation, surveillance et suivi-évaluation en rapport avec les PAN et les conventions de RIO.

L'importance du projet tient d'abord à :

- la diversité et la richesse des expériences en cours, menées notamment en coopération avec l'OSS, qu'il s'agit de dynamiser et de valoriser pour en tirer le plus grand profit ;
- les difficultés rencontrées à développer des complémentarités et à dégager des substantielles subnationales, entre les initiatives et projets conduits par différentes institutions ;
- l'importance qui s'attache actuellement à la mise en synergie des activités liées aux Conventions de Rio.

L'importance et la pertinence du projet sont également perçues à travers ses éléments structurants, en l'occurrence, les trois composantes ciblées et leur complémentarité dans le cadre d'un montage harmonieux et cohérent. Les composantes sont :

- la surveillance environnementale à long et moyen termes ;
- l'alerte précoce environnementale, et ;
- l'accompagnement de la mise en œuvre de suivi-évaluation des PAN et du PASR.

Conclusion

La mise en place d'un dispositif national de suivi-évaluation du PAN/LCD et de ses impacts est une œuvre de longue haleine, impliquant l'ensemble des acteurs en la matière à tous les niveaux de prise de décision. Elle commence d'abord par une phase conceptuelle consensuelle adaptée aux conditions actuelles du pays : il s'agit alors de coller à la réalité des institutions, à leur mode de fonctionnement, aux moyens et capacités disponibles, mais également aux intérêts et stratégies des populations rurales directement concernées par la LCD, pour aboutir à un dispositif de suivi-évaluation pratique répondant aux diverses attentes.

Grâce à une forte mobilisation et responsabilisation des représentants des producteurs et utilisateurs des données et informations sur la GRN et la LCD, aux niveaux national et sub-national, il est possible de concevoir un schéma directeur de montage d'un dispositif national de suivi-évaluation réaliste, évolutif et doté de la souplesse nécessaire pour rallier progressivement de nouveaux acteurs de la LCD à tous les niveaux. Ce schéma directeur comporte alors trois sous-systèmes intégrés de suivi-évaluation de la LCD relatifs à trois niveaux de planification et de prise de décision par rapport à la priorisation des projets/programme de développement où la lutte contre la désertification est considérée comme un des leviers de la durabilité du progrès social : les niveaux local, subnational et national.

Chaque sous-système est doté des attributs devant lui, permettant de fonctionner et de répondre d'une façon autonome aux besoins des décideurs, à savoir :

- une organisation des partenaires/opérateurs en une instance de planification, de décision et de suivi-évaluation ;
- un document de référence reconnu comme base d'élaboration des projets de développement et de LCD ;
- un tableau de problématisation de la désertification spécifique au territoire considéré ;
- un dispositif de collecte d'informations pour l'élaboration d'une base de données et le calcul des indicateurs appropriés au niveau considéré ;
- une grille d'indicateurs et un tableau de bord appropriés.

Un mécanisme d'intégration verticale des informations des trois sous-systèmes, assurant à l'ensemble du dispositif une cohérence globale de la planification et du suivi-évaluation, est nécessaire. Il consiste d'un système de circulation de l'information et des données entre tous les partenaires, en application d'une charte informationnelle négociée et ratifiée par tous les partenaires du dispositif.

South Africa: The Implementation of Land Degradation Assessment and Rehabilitation Programmes - an Agricultural Perspective

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Introduction

South Africa is a hot and dry country. The country's average annual rainfall is less than 500mm, compared with the world average of 860mm. Nearly a quarter of the country has an average annual rainfall of less than 200mm. Only 35% of South Africa receives more than 500mm rain per annum, which is normally considered to be the minimum required for rain-fed cropping. Because South Africa's rainfall is low and erratic, and much water is lost due to evaporation from the soil surface, the country has very limited water resources. Over 80% of South Africa is dominated by very shallow soils. These include the country's main wheat producing areas in the Western Cape. A combination of two factors, namely hard rock parent material and low and inefficient rainfall, is mainly responsible for the predominance of shallow soils in the country. Large areas of South Africa are dominated by deep aeolian (wind-blown) sandy soils. These include major parts of the areas where about 75% of the country's maize is produced, viz. the Free State and Northwest provinces. These sandy soils are inherently much less fertile than the deep, finer textured American and European soils that are of wind-blown origin. South Africa has only 13% arable land. This means that 87% of South Africa is only suitable for natural forests, nature reserves and/or extensive livestock farming (including game farming) on natural rangeland. By far, the biggest proportion of this area is used for the latter. Water erosion has been described as South Africa's biggest environmental problem. It is estimated that South Africa has lost 25% of its topsoil during the 20th century due to water erosion. In some areas soil loss rates have dropped sharply because virtually all erodible material has been removed.

Policy and Programme Overview

State Departments dealing with the natural resources, each with its own agenda and priorities, include: the Department of Agriculture (DoA), with its nine Provincial Departments of Agriculture (PDsA); the Department of Environmental Affairs and Tourism (DEAT); the Department of Water Affairs and Forestry (DWAF); the Department of Land Affairs (DLA); and, the Department of Science and Technology (DST), under which all Research Councils resorts. DoA through its directorates of Land Use and Soil Management, Water Use and Irrigation Development and Agricultural Engineering Services, is responsible for the conservation of all agricultural and rural land in South Africa. In carrying out its mandate, the DoA liaises with the Provincial Departments of Agriculture (PDsA), regional and international institutions, other national and provincial government departments, semi-state organizations, NGOs, private sector organizations and land users.

In 1984 the Department of Agriculture promulgated the Conservation of Agricultural Resources Act (CARA – No. 48 of 1984). The main objective of this Act is to provide for the conservation of the natural agricultural resources by the maintenance of the production potential of land through the combating and prevention of erosion, protection of natural vegetation and the combating of weeds and invader plants. The National Environmental Management Act (NEMA – No. 107 of 1998) provides the legal framework for implementing the state's constitutional obligations with regard to

environmental management. NEMA can be regarded as the most important piece of general environmental legislation. It provides a framework for environmental law reform and covers the following areas: land use planning and development, natural and cultural resources use and conservation, pollution control and waste management.

Initiated in 1998 by DoA in South Africa, the National LandCare Programme (NLP) focuses on the development and implementation of integrated approaches to natural resource management in South Africa, which are efficient, sustainable, equitable, and consistent with the principles of ecologically sustainable development. More than ZAR100 million has been invested in rural development projects, incentives and awareness campaigns since its inception. In addition, DoA has created more than 8 000 jobs through NLP, which has been implemented cooperatively with the PDsA. LandCare is a community-based and government-supported approach to sustainable land management, primarily a resource for poor and disadvantaged communities.

Land Degradation Assessment – Past and Present

First National Land Degradation Assessment in South Africa (1997)

The Department of Environmental Affairs and Tourism (DEAT) contracted the National Botanical Institute (NBI) and the Programme for Land and Agrarian Studies (PLAAS) to report on the status of land degradation in South Africa in 1997. The primary aim of the project was to assess the extent, rate and causes of land degradation in South Africa through research and participatory workshops and to develop a series of consensus maps of land degradation based on the perceptions of people with knowledge of the region. The workshops were held largely with agricultural extension officers and resource conservation technicians, and 453 people participated in the 34 workshops held between June 1997 and February 1998. Hoffman and co-workers (2001) adopted the same assessment approach in all workshops. This approach was similar to that used in the Global Map of Human-Induced Soil Degradation (GLASOD) (Oldeman *et al.*, 1991), but they modified the method considerably to suit the project's own needs and circumstances. Generally, they followed the procedure as laid out in Liniger & Van Lynden (1998), for the assessment of land use practices and soil degradation only. This methodology has emerged from several iterations of a WOCAT Task Force (World Overview of Conservation Approaches and Technologies), and has been shown to be robust enough to be used under a wide range of circumstances. The final report comprises, primarily, the literature review of the scientific and socio-economic debates around the desertification problem in South Africa. It also, however, incorporates the results of the 34 workshops and presents consensus maps of soil and vegetation degradation where appropriate (Figure 1).



Source: Hoffman et al, 2001

Figure 1. The relative extent of soil degradation (top), vegetation degradation (middle) and a combined index of soil and vegetation degradation (bottom) in South Africa as perceived by agricultural extension officers and resource conservation technicians.

NOAA (AVHRR) and LandsatTM applications

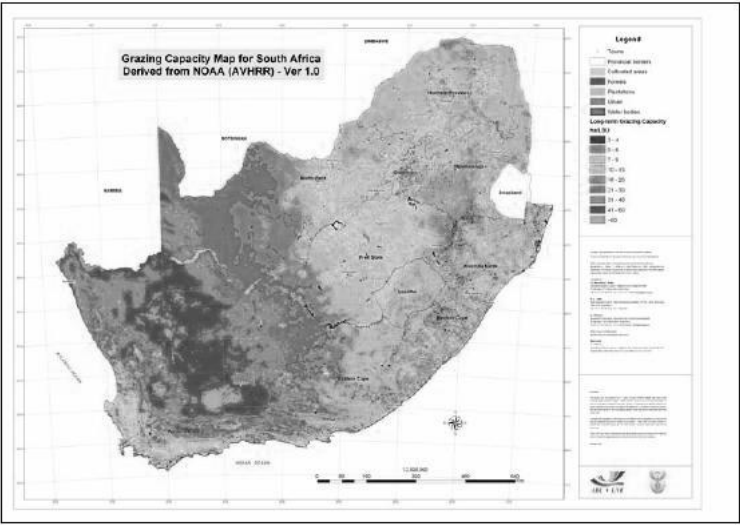
The Agricultural Research Council (ARC), in 1984, was charged with the national responsibility for developing an agricultural remote sensing center of expertise. This center had to evaluate different remote sensing systems and techniques, using satellite and aerial photography, to map and monitor soils and vegetation. It also had to develop remote sensing techniques to determine and monitor the extent, condition and severity of climatic phenomena like drought, the occurrence of plant disease/insect pests and soil related problems like erosion and water-logging.

In 1995, the South African standardized land-cover database venture of the ARC and Council for Science and Industrial Research (CSIR) was initiated to provide baseline

information on land cover for South Africa, Lesotho and Swaziland. A series of 1:250 000 scale precision-corrected satellite images were produced. This database enabled various government departments to undertake a much needed natural resource monitoring and auditing projects. The National Land Cover database was updated in 2000 with the aid of Landsat 7 satellite data.

The Department of Agriculture with support from ARC initiated the development of a NOAA advanced very high resolution radiometer (AVHRR) image database, comprising monthly composite cloud-free images, in the early 1980s. Utilized initially for drought relief assessment, the NOAA data also proved useful in the development of soil loss prediction and grazing capacity maps for South Africa. A project to investigate the use of Landsat™ satellite data in erosion assessment was initiated in the 1990s. Through this research a Bare Soil Index was developed to identify degraded rangeland areas. Landsat™ imagery was also used to map land cover, vegetation habitats, overgrazed as well as bush encroached areas. Barnard *et al.* (1998) reported that although there is no single source of information on the current status of vegetation degradation, numerous localized accounts reach the same alarming conclusion that natural vegetation is being increasingly degraded. This, obviously, has serious consequences for annual and long-term grazing planning and monitoring. In an attempt to bridge this gap, a grazing capacity map (Figure 2) was compiled in 2004 from NOAA-AVHRR satellite data. A vegetation index based on NOAA data was transformed into grazing capacity values by means of regression analysis. Global tree density data derived from MODIS satellite data and National Land Cover (2000) data was integrated into the map. Verification of the map indicated that this map could be the answer to monitoring grazing capacity and to determine an annual norm for carrying capacity (Morgenthal *et al.*, 2004).

Wessels *et al* (2004) completed a study for DoA during which NOAA (AVHRR) data was evaluated as a tool in land degradation assessment. Normalized Difference Vegetation Index data (NDVI, 1 km², 1985–2003) and modeled net primary production (NPP, 8 km², 1981–2000) data were used to estimate vegetation production in South Africa. The linear relationships of rainfall with NPP and NDVI were calculated for every pixel.



Source: Morgenthal *et al.*, 2004

Figure 2. Grazing capacity map for South Africa.

It was found that vegetation production generally had a strong relationship with rainfall over most of South Africa. Therefore, human-induced land degradation can only be detected if its impacts on vegetation production can be distinguished from the effects of rainfall. Two methods were tested Rain-Use Efficiency (RUE) and Residual Trends (RESTREND). Degraded areas mapped by the National Land Cover in north-eastern South Africa had reduced RUE; however, annual RUE had a very strong negative correlation with rainfall and varied greatly between years. Therefore, RUE was not a reliable indicator of degradation. The RESTREND method did however show more promising results at a national scale, and more specifically, in the Limpopo Province, where negative trends were often associated with degraded areas in communal lands. Both positive and negative residual trends can, however, result from natural ecological processes, e.g. the carryover effects of rainfall in previous years. It was concluded that the RESTREND method can only identify potential problem areas at a national or regional scale, while the cause of negative trends has to be determined by local investigations.

Natural Agricultural Resource Monitoring

During 2005, DoA embarked on the development of a National Fixed Site Monitoring System (NFSMS) for South Africa aimed at providing reliable quantitative information regarding the status of the natural agricultural resources at a national level.

The programme has the following objectives:

- Monitor trends regarding the status of the natural agricultural resources at specific sites.
- Provide information suitable for the calibration and verification of products resulting from satellite data processing or model outputs.

The NFSMS will eventually form part of a Natural Agricultural Resource Monitoring System (various scales of application) that will include the utilisation of various other datasets including satellite data, field observations and products derived from prediction models. The placement and number of monitoring sites are two of the main issues that can influence the successful implementation and maintenance of the system. A total of 2000 sites were selected by means of random sampling within a 500m buffer around major roads in South Africa. As indicated, the stratification was based on accessibility, land capability and land-cover. Land-cover classes were grouped into 3 main categories, namely, cultivated, rangeland and irrigated. Non agricultural land was excluded from the stratification process. Table 1 contains the issues/resources and indicators to be monitored at various frequencies. Information on soil indicators, species composition and tree density would be collected on a 5 year basis while biomass information would be collected annually.

Table 1. Issues/resources and indicators to be monitored.

Issue/Resource	Indicators	Frequency (years)
Vegetation	Biomass	1
	Specie composition	5
	Tree density	5
Soil	Water Erosion	5
	Organic carbon	5
	Soil fertility	5
	pH (acidification)	5
	Salinity	5

The location of fixed sites in South Africa is presented in Figure 3. It is obvious that there is a higher concentration of sites in the higher production potential areas. All sites are currently being evaluated to determine their suitability to be included as permanent monitoring sites.

The field surveys at the fixed sites will commence in 2007. One of the main logistical issues that still needs attention is arranging access to the sites with landowners. This can be a very time consuming and is currently being addressed through dedicated awareness campaigns.

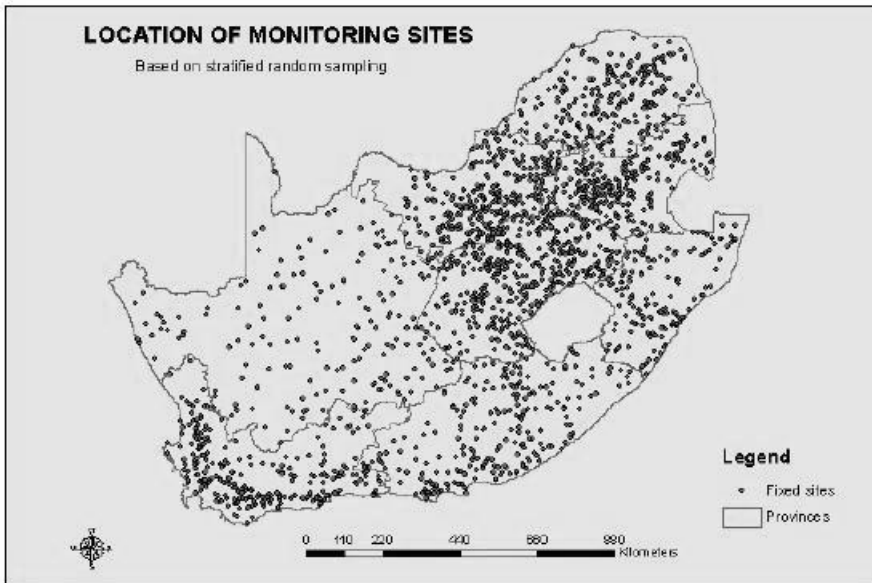


Figure 3. Location of the 2000 monitoring sites.

A Soil Protection Strategy for South Africa

During August 2005 the Minister of Agriculture requested the development of a “Soil Protection Strategy for South Africa”. One of the main reasons for this request was the approximation that three million hectares of moderate to high potential agricultural land have a moderate to high erosion risk in South Africa. As a first step in the development of the strategy priority areas for the implementation of integrated soil rehabilitation programmes were identified by means of a GIS model based on Land Capability and Predicted Soil Erosion data. The rationale followed in this approach was based on the principle that high potential soil in South Africa should be protected at all cost. Predicted high to very high erosion on moderate to high potential agricultural land is presented in Figure 4. From the map it is evident that the Eastern Cape, KwaZulu-Natal and Limpopo provinces are the most affected by soil erosion on high potential agricultural land. It was calculated that more than 850 000 hectares of moderate to high potential agricultural land in these three provinces are subjected to serious erosion.

The strategy further recommended the establishment of a National Advisory Board (NAB) on Soil Protection supported by three thematic (erosion, decline in organic matter/nutrient depletion and soil contamination) and two horizontal (monitoring and research) technical working groups. The main role of the NAB would be to coordinate all activities of the working groups and to formulate recommendations to the Minister

around the development of the final policy on soil protection. First, recommendations from the initial strategy will be implemented in three selected study areas in the above-mentioned provinces. These include integrated land use planning, mapping the extent of land degradation and the implementation of rehabilitation measures.

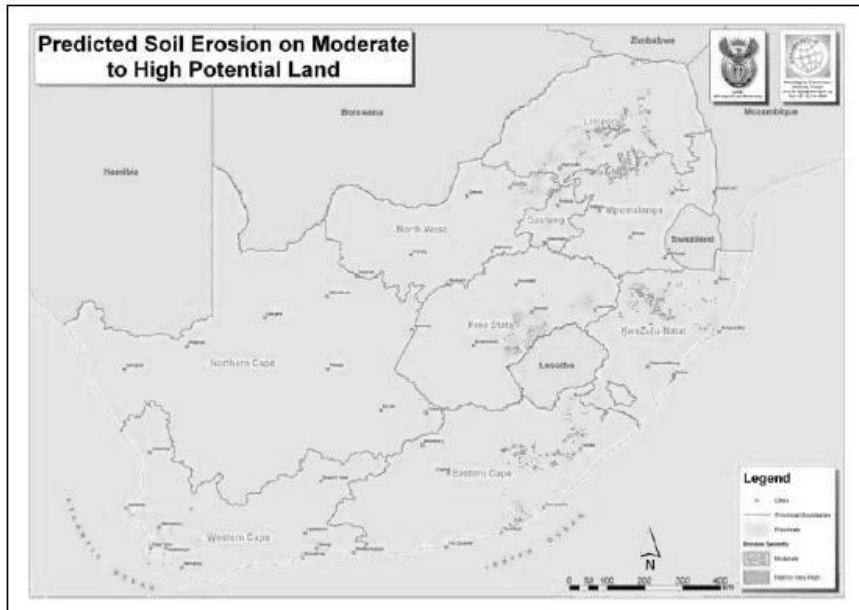


Figure 4. Serious erosion on moderate to high potential agricultural land in South Africa.

Projects in the Eastern Cape commenced during June 2006 through the Eastern Cape Department of Agriculture. During November 2006 the thematic and horizontal working groups were established and commenced with first meetings under the leadership of the Agricultural Research Council. The land degradation assessment in the three study areas will be linked to the global Land Degradation Assessment in Drylands Programme (LADA) launched during the 3rd meeting of the GEF Assembly during August 2006 in Cape Town. South Africa is one of the six pilot countries to assist with the development and testing of land assessment methodologies. The LADA programme in South Africa will commence after the first coordinators' meeting scheduled for December 2006. The first phase of LADA in South Africa will include the development of the LADA approach (land degradation assessment guidelines, network and information system) and the carrying out of local assessments in hot and bright spots.

Summary

This paper gives a brief overview of the major role players, policies, programmes and projects that are focused towards combating desertification in South Africa. NEMA provides the legal framework for implementing the state's constitutional obligations with regard to environmental management. The investment in rehabilitation programmes, research and geo-informatics focused at natural resource management/assessment also shows the government's commitment towards the integrated management of land degradation. The DoA is also actively involved in various international programmes (WOCAT and LADA) in an effort to contribute towards methodology development and the collection and dissemination of

information related to the assessment of desertification and the impacts thereof in drylands.

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Problématique de la salinité et de l'excès d'eau dans les zones agricoles au Sahara algérien - Contraintes et actions d'amélioration - (cas des régions du Nord-Est du Sahara)

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Agence de Bassin Hydrographique Sahara

Introduction

Les contraintes qui ont gravement accentué le phénomène de la dégradation des écosystèmes sahariens et notamment au Sahara septentrional sont, principalement, l'excès d'eau et de sels dans les sols agricoles. En effet, le constat est, à présent, évident et inquiétant : l'eau et le sol, ressources naturelles, dont la relative rareté et la fragilité sont reconnues, subissent, dans de nombreuses situations, un réel appauvrissement de leur potentiel, et ce à cause d'une gestion peu rationnelle. Les pratiques d'exploitation non-conservatives et non-contrôlées (surexploitation, pollution) aggravées par des risques naturels aussi fréquents que sévères (fortes températures, évaporation, érosion éolienne, holomorphie et hydromorphie) créent des situations difficiles à maîtriser, et conduisent dans certains cas à l'irréversibilité au plan de la conservation des ressources.

De fait, une utilisation incontrôlée des ressources en eau non-renouvelables entraîne souvent une remontée critique des nappes phréatiques salées avec des conséquences dommageables pour la préservation du cadre de vie et de l'environnement, et la durabilité du potentiel productif agricole, lequel constitue un facteur de stabilisation des populations et une des premières sources de leurs revenus.

La forte teneur en sels des eaux a engendré, très souvent, une chute des rendements des cultures et parfois la stérilisation des sols par la destruction de leur structure. Une mise en valeur hydro-agricole non-maîtrisée, aggravée par des conditions climatiques extrêmes, entraîne fatalement une salinisation des terres, d'autant plus accentuée par le fait que les sols cultivés présentent souvent des caractères d'hydromorphie. A cet égard, la gestion rationnelle des ressources en eau et en sols et la maîtrise des techniques hydro agricoles dans ce vaste territoire, fragile et complexe, d'une superficie de plus de deux millions de km², sont aujourd'hui une nécessité en vue d'assurer un développement harmonieux et durable et ce, dans l'optique d'une agriculture moderne et performante.

Cependant, la recherche et l'expérimentation hydro-agricole dans ces régions restent insuffisantes, alors que le besoin en études et investigations sur des stations spécialisées est indispensable, notamment au niveau des grandes zones agricoles. L'absence ou le peu d'intérêt accordé à ces activités scientifiques et techniques ont contribué à la méconnaissance des divers phénomènes engendrés par la mauvaise gestion des ressources en eau et en sols.

La présente communication est articulée autour de la présentation :

- des ressources en eau et en sols au Sahara ;
- des travaux d'amélioration réalisés dans les régions du nord-est du Sahara ;
- de quelques expériences soit réussies, soit mal conduites dans ces régions ;
- de thèmes de recherche – développement à initier dans le cadre de la coopération internationale.

Ces différentes questions seront étayées par des cartes, graphiques, tableaux et photographies.

1. Présentation du milieu saharien

Le Sahara algérien couvre une superficie de plus de deux millions de kilomètres carrés et s'étend de l'Atlas saharien et des Aurès jusqu'aux frontières avec le Mali, le Niger et la Libye, sur une distance du nord au sud de plus de deux milles kilomètres. Ce vaste territoire couvre neuf Wilayas en totalité et huit partiellement, regroupant 286 communes pour une population évaluée à quatre millions et demi d'habitants. La grande majorité de cette population est concentrée dans les chefs lieux des Wilayas, dont certaines dépassent les 150 000 habitants. Le Sahara est constitué d'un socle précambrien, sur lequel repose une grande formation sédimentaire avec de grandes étendues de regs, ergs et chotts et de massifs (Hoggar), constituant plusieurs unités géomorphologiques.

Du point de vue climatique, le Sahara est l'un des déserts les plus chauds et les plus arides du globe. Il se caractérise par des précipitations très peu abondantes et irrégulières, entre 120mm au nord et 12mm au sud, des températures élevées pouvant dépasser les 45°C, avec des amplitudes thermiques significatives, et par une faible humidité relative de l'air.

Les vents sont relativement fréquents et leur vitesse est importante d'avril à juillet, ce qui provoque pendant cette période le sirocco et/ou des vents de sable, responsables de la formation et des déplacements des dunes. L'évaporation mesurée sur le bac Colorado varie entre 2 500mm dans les régions de l'Atlas saharien et plus de 4 500mm au grand sud (Adrar). Toutes ces conditions rendent impossible toute pratique de cultures sans irrigation. L'agriculture au Sahara a été, tout le temps, dominée par le mode d'exploitation oasien associé à la phoëniculture, qui couvre une superficie de plus de soixante mille hectares (60 000 ha) pour un nombre de palmiers dattier de plus de huit millions (8 millions), concentrés dans les régions du nord-est du Sahara (Biskra, El Oued, Ouargla....), ce qui place l'Algérie au cinquième rang mondial pour la production de dattes.

1.1. Ressources en eau

Au Sahara, les ressources en eau sont surtout constituées par les eaux souterraines, en dehors des régions situées dans l'Atlas saharien, le Hoggar et le Tassili, où les précipitations génèrent des écoulements intermittents dans des oueds et des chotts (Zibans et Saoura) et une alimentation des nappes phréatiques captées par des barrages d'inféro-flux (Laghouat et Tamanrasset).

Les ressources en eau souterraines, notamment dans le Sahara septentrional, sont contenues dans deux grands aquifères, qui s'étendent au-delà des frontières algériennes (Tunisie et Libye) : le Continental Intercalaire (CI) et le Complexe Terminal (CT).

La nappe du Complexe Terminal (CT) s'étend sur une superficie de 350 000 km² avec une profondeur oscillant entre 100 et 500m. Cette nappe regroupe deux systèmes aquifères, la nappe des sables et la nappe des calcaires, qui sont en charge sous les formations argileuses du Mio-Pliocène dans la partie nord et libre dans la partie sud. L'écoulement général se fait vers les Chotts et vers le golfe de Gabès (Tunisie). Les eaux de cet aquifère se caractérisent par une température peu élevée; l'eau est moins chargée en sels sur les bordures et relativement plus chargée au centre (plus de 5g/l).

La nappe du Continental Intercalaire présente un réservoir considérable qui s'étend sur tout le Sahara septentrional (600 000 km²) avec une épaisseur qui peut atteindre les 1000 mètres au nord-est du Sahara. La plus grande partie des eaux de cet aquifère a été remplie pendant les périodes pluvieuses du quaternaire et sont caractérisées par une température qui dépasse les 60°C, sauf aux endroits où l'aquifère est proche de la surface du sol, et par une minéralisation qui oscille entre 1 et 2g/l de résidu sec. L'alimentation de la nappe, relativement faible, se fait par ruissellement à la périphérie du réservoir, tout au long et à l'extrémité des Oueds, qui descendent des monts de l'Atlas saharien.

La quantification des ressources en eau de ces régions ne peut être que de nature économique : c'est le débit correspondant à une valeur et à un accroissement admissible des investissements et des coûts d'exploitation pour une répartition géographique donnée.

L'utilisation de quelques milliards de m³ d'eau par an créera fatalement une perturbation importante dans les nappes du Continental Intercalaire et du Complexe Terminal, notamment dans les zones sensibles du nord du Sahara. Ces prélèvements entraîneront :

- la disparition de l'artésianisme dans tout le Sahara ;
- l'assèchement des puits de faibles profondeurs et des foggaras ;
- le tarissement des exutoires des deux aquifères ;
- la dégradation de la qualité des eaux, notamment celle du Complexe Terminal, principalement dans les régions des Chotts et dans l'Oued R'hir ;
- des affaissements de terrains sur des superficies variables ;
- la remontée vers la surface du sol des sels et des nappes phréatiques nuisibles pour les cultures.

La manifestation la plus apparente est celle des néoformations blanchâtres de sels, et même parfois de croûtes, à la surface du sol. L'accumulation des sels dans les sols peut atteindre en surface les 50 mmhos/cm.

1.2. Ressources en sols

La formation et l'évolution des sols du Sahara sont principalement conditionnées par le climat et la salinité. Le climat très aride influe sur la pédogenèse par une forte évaporation, ce qui a engendré dans certaines zones de très fortes accumulations salines, surtout après la mise en irrigation. Ce phénomène est aggravé le plus souvent par une topographie généralement plane, qui ne facilite pas le drainage des eaux excédentaires, et par une eau d'irrigation relativement chargée en sels. L'inventaire des études de sols réalisé dans les différentes régions du Sahara fait ressortir une superficie cartographiée en toutes échelles confondues de 2 328 730 hectares, dont 362 551 ha irrigables pour une superficie effectivement irriguée de 176 590 hectares.

Les sols des palmeraies sont le plus souvent cultivés et leur matière minérale n'a pas subi d'altération sensible ; par contre, elle a pu se désagréger et se fragmenter par des phénomènes physiques. Les sels minéraux, y compris les carbonates et les sulfates, ainsi que les cations, peuvent avoir des redistributions et des migrations. Ces sols présentent une faible teneur en matières organiques, en éléments fertilisants ; le PH est voisin de la neutralité à légèrement alcalin. Du point de vue classification pédologique, les sols des palmeraies se regroupent généralement dans les classes des sols peu évolués, halomorphes ou/et hydromorphes. L'apport est le plus souvent éolien ou anthropique.

1.3. Salinité des sols

La majorité des sols des régions sahariennes est plus ou moins affectée par la salure. Cette concentration de sels, notamment dans les horizons de surface, où elle peut dépasser les 50 mmhos/cm, s'explique par la remontée capillaire de la nappe phréatique salée avec un dépôt ascensionnel ; la manifestation la plus apparente est celle des néoformations d'efflorescences blanchâtres et parfois des croûtes à la surface du sol. Ce phénomène d'halomorphisme dans les milieux saturés en eau, connu par ses fluctuations à grandes amplitudes, confirme la relation très étroite entre la nappe phréatique - le sol - la salinité et l'évaporation. Ce qui a aggravé encore plus le problème de salinité des sols dans ces régions c'est l'utilisation des eaux salées pour l'irrigation avec un drainage défectueux.

Néanmoins, on peut remédier cette contrainte qui n'est pas irréversible, par une opération de drainage (dessalage) de certaines zones, soit pour rabattre une nappe phréatique proche de la surface du sol, qui est nuisible pour les cultures, soit pour évacuer les eaux salées (lessivage). Pour d'autres zones défavorables, même si l'opération de drainage est à conseiller, sa concrétisation sur le terrain est fastidieuse et parfois irréalisable et ce, pour des raisons liées à la topographie de certaines zones, ne présente aucun exutoire proche des périmètres irrigués.

Etant donné que la grande majorité des sols de la région présente des textures grossières à très grossières, un lessivage d'hiver devrait suffire pour évacuer tout excès de sels accumulé au cours de la campagne. Ces opérations de dessalage n'intéressent que les zones moyennement salées et présentant une topographie permettant l'écoulement de l'eau vers un exutoire.

1.4. Les Sols des Ghouts (cuvettes)

La culture du palmier dans les Ghouts, principalement localisée dans la Wilaya d'El Oued et au sud de Touggourt, est complètement différente des autres palmeraies. Cette technique, qui consiste à planter les djebars (jeunes plants) au contact direct de l'horizon humide de la nappe phréatique, ne nécessite ni irrigation ni drainage. Les sols de ces palmeraies présentent une texture grossière tout le long du profil pédologique, avec une consistance et une cohésion faibles à très faibles ; ils peuvent présenter des tâches d'hydromorphie en profondeur et même des niveaux de nappes proches de la surface du sol (principalement près des agglomérations). La salinité des sols des Ghouts est faible à négligeable, ce qui s'explique par l'absence d'un plan d'eau (nappe phréatique) proche de la surface du sol qui empêche les sels de remonter en surface et aussi par des apports d'irrigation. La matière organique est généralement faible à très faible et le PH est relativement alcalin.

1.5. L'Irrigation dans les oasis

En plus de l'irrigation par forages, il existe des systèmes traditionnels de captage et d'irrigation adaptés aux conditions locales, mais ne pouvant pas répondre aux perspectives de développement de l'agriculture saharienne par extension des surfaces à mettre en valeur et par l'amélioration de l'existant. L'introduction timide de l'irrigation par aspersion dans les régions sahariennes a montré ses limites, car les conditions des sols et de climat sont différentes (sols très filtrants, salés, forte évaporation et vent violent). Quant au système d'irrigation par pivot, d'une portée de 300m et plus et pouvant irriguer jusqu'à une superficie de plus de 40 hectares d'un seul tenant, il a engendré des problèmes techniques et de gestion qui ont mis un frein à l'engouement constaté lors des premières années. En revanche, l'introduction de la micro-irrigation (goutte à goutte) a été une réussite, notamment dans les régions de Biskra et d'El Oued (Souf).

2. Étude de cas dans le nord-est du Sahara

En vue de mesurer l'impact de l'utilisation de l'eau sur le milieu dans les régions sahariennes, il a été jugé utile de présenter trois cas localisés dans le nord-est du Sahara, à savoir les vallées de Oued Souf et de Oued Rhir et la cuvette de Ouargla.

2.1. Cuvette de Ouargla

a) Situation et caractéristiques hydrauliques

La cuvette de Ouargla est d'une superficie de 99 000 ha, et est située dans le prolongement du grand bassin de la partie nord-est du Sahara avec une population estimée à 150 000 habitants. Le climat est aride, avec une pluviométrie moyenne annuelle de 50mm, et une évaporation potentielle de l'ordre de 2 000mm/an. Le volume d'eau prélevé à partir des 291 forages dans la nappe du complexe terminal et des 4 forages profonds dans la nappe du continental intercalaire est évalué à 150 hm³/an, dont 27 hm³ pour les besoins urbains. La dotation moyenne par jour et par habitant pour l'alimentation en eau potable dépasse les 450 litres.

Cette zone souffre depuis longtemps d'un excès d'eau, dont l'origine est due à la remontée des eaux de la nappe phréatique. Cette situation a créé de graves problèmes écologiques dans les zones urbaines et agricoles. Le résidu sec de l'eau de cette nappe est de l'ordre de 5 à 10 g/l et, parfois, peut dépasser les 20 g/l.

Les fluctuations saisonnières du niveau de la nappe provoquent souvent des affaissements de terrain et créent un milieu anaérobique néfaste pour les cultures et le palmier.

Une des causes principales de la remontée des eaux dans la cuvette de Ouargla est d'ordre morphologique, avec une topographie très plane conjuguée à un manque d'exutoire naturel. Cette situation est aggravée par l'irrigation (submersion) non-contrôlée des palmeraies (plus de 120 millions de m³/an pour une superficie ne dépassant pas les 4 000 ha irrigués). L'alimentation de la nappe phréatique provient essentiellement :

- des eaux excédentaires liées à une irrigation irrationnelle des palmeraies ;
- de l'apport des eaux d'anciens forages, dont le tubage est détérioré ;
- des rejets d'eaux usées d'origine domestique ;
- des eaux de ruissellement venant des parties hautes et des apports de crues des trois oueds dans la cuvette (N'ça, M'Ya, M'Zab).

b) Caractéristiques des sols et contraintes

Les sols se caractérisent par une pédogenèse dominée par l'action de l'eau et des sels. La texture des sols est très grossière et la structure est le plus souvent médiocre. Certains horizons de profils de surface présentent des taches d'hydromorphie. Ces sols possèdent également une forte teneur en gypse et un faible taux de matières organiques et d'éléments fertilisants.

c) Travaux réalisés et propositions d'amélioration

Les effets nuisibles de la remontée des eaux dans la cuvette sont atténués par l'existence de réseaux de drainage par canaux à ciel ouvert dans les palmeraies, ainsi que d'un collecteur d'eaux usées. Le réseau principal de drainage est constitué d'un canal collecteur et de canaux secondaires d'une longueur totale de 66 000ml. L'ensemble des eaux de rejets est évacué par pompage vers la zone d'Oum Raneb située à 8km de la ville de Ouargla, avec une station de pompage d'une capacité de

279 000 m³/an et une conduite de refoulement de 4 800m de longueur. Ces infrastructures hydrauliques ont été complétées par des actions de bouchage de forages détériorés, la réalisation de canaux collecteurs sur des dizaines de kilomètres, et l'ouverture d'un émissaire à travers l'erg en direction du lac de Sebkhath Essoufioune (exutoire).

Pour ce qui est de la problématique hydro-agricole (hydromorphie et halomorphie), il serait nécessaire d'entreprendre une opération de drainage en vue de rabattre la nappe phréatique proche de la surface du sol, ou pour évacuer les eaux provenant du dessalage des sols. Il est également important de tenir compte de la qualité des eaux d'irrigation, qui est un élément fondamental dans la détermination des doses d'irrigation. Il est enfin important de souligner que le drainage ne doit pas être considéré comme un aménagement réalisé de façon définitive ; c'est une opération qui doit être suivie d'entretien pour obtenir un effet sur les rendements.

2.2. Vallée de Oued Rhir

a) Situation et caractéristiques hydrauliques

La vallée de l'Oued Rhir est une entité géographique allongée sur un axe nord-sud (Biskra - Ouargla), sur environ 136km. Le climat est de type saharien et se caractérise par des précipitations très faibles et aléatoires, de fortes amplitudes thermiques et de faibles humidités relatives de l'air. Les ressources en eau proviennent du Continental Intercalaire (CI) et du Complexe Terminal (CT) à des profondeurs de 200 à 500 mètres pour le CT et de 1800 mètres et plus pour le CI dont la température des eaux est supérieure à 50°C.

b) Caractéristiques des sols et contraintes

L'existence d'un excès d'eau dans les sols de la vallée a entraîné un déficit d'aération. Cet engorgement des sols est en relation directe avec la nappe phréatique, dont le niveau hydrostatique est le plus souvent stable. Les sols à caractère hydromorphe se localisent principalement dans la région de Touggourt et même dans la région de Djemaa et ce, malgré la réalisation des réseaux de drainage. Cette situation a engendré une remontée du niveau de la nappe phréatique et une concentration des sels, surtout dans les horizons de surface. Cette nappe phréatique peut jouer généralement un rôle d'appoint dans l'alimentation en eau des palmiers. Lorsque l'eau de la nappe est chargée en sels, elle joue donc un rôle négatif par ses fluctuations, surtout en période de déficit hydrique.

c) Travaux réalisés et propositions d'amélioration

Des travaux de drainage et le bouchage de centaines de puits et de forages détériorés ont été réalisés, de même que le curage du collecteur principal de Oued Rhir sur une distance de 100km environ. L'irrigation a été renforcée par la réalisation de quelques dizaines de forages sur l'ensemble de la vallée. Et malgré la réalisation de ces travaux de réaménagement dans les palmeraies de la vallée, les sols de plusieurs zones sont restés saturés en eau et en sels toxiques. Cette situation s'explique par le manque d'entretien de la majorité des drains collecteurs secondaires, obstrués par la végétation.

2.3. Vallée de Oued Souf

a) Situation et caractéristiques hydrauliques

La région du Souf qui s'étend sur une superficie de 80 000 km², est limitée au nord par les chotts Melghir et Merouane, au sud par l'extension de l'Erg oriental, à l'ouest

par l'Oued Rhir et à l'est par la frontière tunisienne. La population est estimée à 380 000 habitants, répartie à travers 18 communes.

La superficie occupée par la phoénicioculture dans les Ghouts est de plus de 11 000 ha avec environ un million de palmiers dattiers, auxquels s'ajoutent 2 500 ha de cultures maraîchères et plus de 1 500 ha de cultures industrielles. Des milliers d'hectares ont été mis en valeur en dehors des Ghouts, avec un développement des cultures maraîchères, notamment la pomme de terre, la culture de tabac, et même l'arboriculture (olivier et amandier). Cependant, ces nouvelles implantations ont nécessité des investissements conséquents (forages, réseaux d'irrigation et de drainage, électrification, pistes etc....).

La région du Souf est réputée pour son système hydro-agricole traditionnel s'étendant sur quelques 9500 Ghouts, où les palmiers puisent l'eau dans la nappe phréatique par leurs racines. Cette nappe phréatique correspond à la partie supérieure des formations continentales déposées à la fin du quaternaire, avec une profondeur variant entre 2 et 60 mètres, et un résidu sec qui oscille entre 2 et 6g/l selon les zones.

La vallée du Souf souffre actuellement des conséquences négatives de la remontée des eaux de la nappe phréatique, qui a engendré l'inondation de la quasi-totalité des Ghouts ainsi que des zones basses de la ville d'El Oued et de sa périphérie.

On évalue la production d'eau dans le Souf à 80 millions de m³ à partir de 80 forages exploitant la nappe du Pontien, par pompage, et de 3 forages artésiens dans l'albien. L'approvisionnement en eau potable utilise 80% de ce volume avec une dotation moyenne de plus de 450 l/j/hab. Le service de distribution d'eau potable connaît toutefois de nombreuses insuffisances : réseau vétuste, branchements illicites, absence de compteurs d'eau, utilisation de l'eau pour l'arrosage des jardins. L'ensemble de ces insuffisances génère des pertes et des gaspillages aggravant l'alimentation de la nappe phréatique.

Sur un autre plan, la topographie de la région d'El-Oued, est très vallonnée avec des zones basses et des dépressions, ainsi qu'une très forte perméabilité des sols (90% de sable) facilitant l'infiltration des eaux d'irrigation et de pluie vers la nappe phréatique. Cette situation est aggravée par le manque d'exutoire naturel proche de la région.

b) Caractéristiques des sols et contraintes

Les types de sols de la région sont constitués surtout par une seule formation d'apport éolien avec des caractères d'halomorphie et d'hydromorphie. La salinité des sols est fortement liée à la présence d'une nappe à faible profondeur. Ainsi, presque tous les sols halomorphes de la région se situent dans des dépressions où la nappe est proche de la surface du sol à une profondeur inférieure à 2 mètres. La cause de ce phénomène s'explique par l'ascension capillaire et les pertes par évaporation. Sur le terrain, la salinité se traduit par une végétation de type halophile et le plus souvent par l'apparition d'efflorescences salines blanchâtres en surface. La texture grossière empêche le développement de la structure. Il y a cependant une légère tendance à la structure massive, particulaire et fondue. La faible capacité totale d'échange et les fortes teneurs en calcium (carbonate de calcium et gypse) empêchent l'alcalinisation du complexe absorbant.

c) Travaux réalisés et propositions d'amélioration

L'amélioration de la situation engendrée par la remontée des eaux dans la vallée d'Oued Souf est conditionnée par le rabattement de la nappe phréatique. A cet effet,

plusieurs actions ont été engagées, à savoir : le bouchage des forages non-exploités ou vétustes, l'extension et la réhabilitation du réseau d'assainissement, l'arrêt total de la réalisation de nouveaux forages, l'encouragement de l'utilisation des eaux de la nappe phréatique pour l'irrigation, et une meilleure gestion de la distribution d'eau potable. En outre, d'autres actions complémentaires ont été réalisées, axées notamment sur le remblaiement de l'ensemble des Ghouts en zone urbaine, le reboisement des Ghouts avec des arbres hydrophiles et la généralisation du comptage de l'eau potable. Il est à souligner que d'autres travaux sont en cours de réalisation et concernent principalement la réalisation de canaux collecteurs sur des dizaines de kilomètres et l'ouverture d'un émissaire à travers l'erg ; de même que la construction de stations d'épuration des eaux usées permettant leur utilisation pour l'agriculture.

3. Expériences acquises dans les régions sahariennes

L'analyse de la gestion hydro-agricole, qu'il s'agisse des palmeraies de type traditionnel ou des opérations récentes de mise en valeur, permet d'identifier à la fois une expérience négative ayant engendré des problèmes sur le potentiel productif et l'environnement, et une expérience positive, grâce à l'introduction d'outils et de méthodes modernes et adaptées aux conditions du milieu saharien.

3.1. Expérience négative

L'utilisation irrationnelle des ressources en eau souterraines, notamment dans les trois régions, bien pourvues en eau, a engendré des conséquences négatives sur le milieu. En effet, l'accroissement rapide de l'utilisation de ces ressources sans une politique de planification et de gestion cohérente a créé d'énormes problèmes liés directement aux conditions naturelles (morphologie du terrain, forte évaporation, salinité des eaux et des sols) et à la mauvaise exploitation hydro-agricole (travaux culturels, entretien, mode d'irrigation, etc.).

Les opérations de mise en valeur sur de grandes étendues ont été engagées le plus souvent sans études préalables des sols, de choix des cultures, de techniques d'irrigation et de drainage. L'utilisation d'eau salée pour l'irrigation avec un drainage défectueux a aggravé le problème de salinité des sols.

Ces insuffisances, conjuguées à une utilisation excessive des eaux profondes pour l'irrigation (submersion), se sont traduites par la remontée de la nappe phréatique, qui est devenue nuisible pour le milieu. Quant à la pollution d'origine domestique (rejets d'eaux usées), elle est surtout liée à l'insuffisance ou l'absence de réseaux d'assainissement, notamment dans les grands centres urbains et également par la défaillance ou l'arrêt des stations d'épuration.

3.2. Expérience positive

Dans la grande majorité des palmeraies du nord-est du Sahara et notamment dans les vallées de Oued Souf et de Oued Rhir, le niveau hydrostatique de la nappe phréatique a baissé et la teneur en sels des sols a diminué. Cette amélioration s'explique par les travaux de curage et d'entretien des canaux de drainage et de réaménagement hydro-agricole. De plus, l'introduction de la micro-irrigation a permis d'économiser l'eau et d'étendre les superficies agricoles.

Dans le cadre de la sensibilisation des usagers à l'économie de l'eau et à sa protection contre la pollution, plusieurs organismes, et notamment l'Agence de Bassin Hydrographique Sahara, organisent souvent, dans plusieurs régions du Sahara, des journées techniques consacrées à l'utilisation de l'eau pour l'agriculture et pour l'industrie. Ces journées techniques regroupent généralement, en plus des

autorités locales (élus et représentants et membres du comité de bassin), les agriculteurs et les industriels.

En outre, ces organismes ont mis en oeuvre une série d'actions de sensibilisation liée à l'économie de l'eau dans les milieux scolaires et le grand public (médias audiovisuel, presse écrite, classes d'eau, conférences, etc.).

Par ailleurs, d'autres actions ont permis de remédier ou d'atténuer les effets négatifs sur le milieu, à savoir :

- le bouchage des forages non-exploités ou vétustes en vue de protéger la ressource en eau ;
- la réhabilitation et l'extension des réseaux d'assainissement ;
- l'arrêt de la réalisation de nouveaux forages pour l'alimentation en eau potable et l'amélioration de la gestion de la distribution d'eau ;
- l'encouragement de l'utilisation des eaux de la nappe phréatique pour l'irrigation, dans le but d'en rabattre le niveau ;
- le remblaiement de l'ensemble des Ghouts en zone urbaine (région de Oued Souf) ;
- le suivi de l'exploitation des ressources en eau de point de vue quantité et qualité.

Conclusion

La lutte contre la désertification passe impérativement par une gestion rationnelle des ressources en eau et en sols et la maîtrise des techniques hydro-agricoles au service d'une agriculture saharienne moderne. Cette gestion durable des ressources nécessite la mobilisation de moyens financiers, matériels, techniques et scientifiques adéquats. Et comme le facteur humain reste déterminant, le renforcement de l'encadrement sera facilité par l'application de mesures d'incitation et de stimulation sur le plan social et professionnel.

Certes, le développement de la plasticulture (maraîchage) avec le système du goutte à goutte et la plantation de plus d'un million et demi de djebars de palmiers ont donné des résultats probants. Toutefois, ces expériences restent, malgré tout, limitées. Les investissements importants engagés par l'Etat dans l'électrification ou dans les réseaux de communication ont créé les conditions pour permettre une extension de la mise en valeur sur des dizaines, voire des centaines de milliers d'hectares, avec de véritables complexes agroalimentaires intégrés, fortement encadrés et utilisant des techniques modernes de cultures.

L'évolution décroissante des ratios de ressources naturelles par habitant dans la région, qu'il s'agisse des ressources en eau ou des terres irriguées, indiquent clairement la nature et l'importance des enjeux liés à leur préservation et à leur valorisation.

La réussite des politiques de développement fondées sur des politiques sectorielles intégrées (eau, agriculture, environnement) implique que des mesures techniques et organisationnelles appropriées soient mises en oeuvre à court et moyen termes pour que les effets attendus ne soient pas irrémédiablement compromis par une gestion non-maîtrisée des ressources en eau et en sols.

4. Échanges de connaissances, de savoir-faire et de coopération internationale

Quatre thèmes spécifiques aux régions sahariennes présentent les conditions adéquates pour développer des actions de coopération internationale en matière de recherche - développement.

Les résultats de cette recherche doivent permettre de remédier les effets engendrés par les contraintes liées à l'action de l'eau.

1er thème : Amélioration de la qualité des eaux de consommation humaine dans certaines régions du bas Sahara

La ressource en eau au Sahara est généralement disponible et ce, grâce à d'importants aquifères, surtout au bas Sahara (Sahara septentrional) ; mais sa qualité physico-chimique est souvent médiocre. La salinité des eaux, dont une partie est d'origine géologique (primaire de type chlorure sodique), s'accroît continuellement à cause d'une mauvaise gestion de la ressource (salinisation secondaire) avec une détérioration aggravée, dans certains cas, par une pollution d'origine anthropique, ce qui rend l'eau le plus souvent impropre à la consommation et parfois même à l'irrigation.

Une recherche dans ce domaine pourrait contribuer à améliorer la qualité des eaux, pour les rendre aptes à la consommation humaine et à l'irrigation.

2e thème : Préservation des foggaras contre l'érosion interne et le rabattement du niveau hydrostatique influencé par les forages (région du Touat et Gourara)

Le système de captage traditionnel des eaux du continental intercalaire (albien) par les foggaras mérite d'être étudié en vue de protéger et préserver cette technique hydraulique datant du dixième siècle.

La recherche à mener devrait prendre en compte notamment les éléments suivants :

- l'apport des foggaras dans l'agriculture traditionnelle (volume total soutiré, superficie irriguée, déficit en eau, etc.) ;
- la relation entre la foggara et le forage (interférence due au rabattement du niveau hydrostatique, variation des paramètres chimiques) ;
- contraintes et propositions d'amélioration du fonctionnement des foggaras (technique moderne de curage) ; et
- les aspects socio-économique et culturel des foggaras.

3e thème : Réutilisation des eaux de drainage pour l'irrigation et étude des contraintes de salinité des eaux et des sols dans la vallée de l'Oued Rhir

La vallée de l'Oued Rhir est une entité géographique qui se distingue en tant que zone dépressionnaire à écoulement d'eau permanent vers le collecteur principal de drainage (canal) qui fait transiter un débit moyen d'environ $5\text{m}^3/\text{s}$, soit plus de 150 million de m^3/an . L'activité économique de la vallée est axée principalement sur la phoéniculture avec quelques 2 millions de palmiers qui produisent la plus grande partie des dattes algériennes dans la variété Deglet-nour.

La recherche à mener devrait être axée sur la détermination des possibilités de réutilisation de cet important volume d'eau pour l'irrigation des terres de la vallée, de même que l'étude du phénomène de la salinisation des eaux et des sols.

4e thème : Réaménagement et protection du lac de Temacine (région de Oued Rhir).

Le lac de Temacine se situe dans la vallée de Oued Rhir (Wilaya de Ouargla), avec une dimension touristique dont la réputation dépasse les frontières de la région, voire du pays. Sa situation géomorphologique se présente sous la forme d'une dépression, qui est à priori un exutoire naturel de toutes les eaux d'irrigation drainées (salées à plus de 10 g/l de résidu sec). Ce lac reçoit également les rejets d'eaux usées, notamment de la commune de Temacine, ainsi que des dépôts d'ordures ménagères.

Les principales contraintes dont souffre le lac de Temacine sont liées à la problématique particulière de la vallée de Oued Rhir. L'utilisation excessive des eaux profondes pour l'irrigation par submersion s'est traduite par la remontée de la nappe phréatique, nuisible pour les cultures et les palmeraies. Le réaménagement du lac et sa protection durable contre la pollution, surtout d'origine anthropique, nécessite plusieurs actions intersectorielles, axées principalement sur des travaux de drainage agricole, d'assainissement urbain, de communication et de sensibilisation des populations riveraines.

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Desertification and Sustainable Development in the Algerian Sahara - Field Surveys in Tidikelt

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Introduction

This paper draws on the results of field surveys focusing on the evolution of oases with Foggara in Tidikelt. These surveys were conducted by scientific missions, composed of Algerian, Japanese and French researchers, and directed by Iwao Kabori (Tokyo University, Meiji University and United Nations University), during the period from 1962 until 2005 (Kabori 1969, 1976, 1982, 1995, 1996, 2005). This lifetime's work in the Algerian Sahara has been the subject of a recent documentary film (Procom International, 2003).

Before these surveys were conducted in Tidikelt, a few studies of the Saharan oases existed from the colonial period. These included Rohlfs (1861-1864), Martin (1908), Voignot (1908), Travaux de l'institut de Recherches Sahariennes (I.R.S.) Lô, C. (1953, 1954) and Archives de l'Institut Pasteur d'Alger (1958). Building on this earlier work, the field studies that are reviewed in this paper traced developments in a southern oasis, effectively spanning the full lifetime of the current People's Democratic Republic of Algeria.

Through these sustained investigations, the research team learned a great deal from the Algerian authorities, regional and local peoples and their wisdom. This paper describes the various changes that were witnessed in the policies of the national and regional government regarding sustainable development in the remote and marginal dryland oases, focusing on the oasis of In Belbel. Based on these observations, a series of policy recommendations are made.

Early Studies in Tidikelt before Algerian Independence

Prof. Kabori began field surveys in the Algerian Sahara in 1961. This was during the time of the Algerian war, while the Sahara was still under French administration. Thanks to careful assistance from French academia in Saharan Studies such as Jean Dresch, Henri Lhote, Robert Capot-Rey (Author of *Le Sahara Francais*, (Capot Rey, 1953)) and Pierre Rognon, preliminary feasibility studies were undertaken. These studies were supported through a Tokyo University research grant, and through friendly support and advice from colleagues in Japan. The purpose of these initial studies was to find a suitable base to start comparative studies of oases with Foggara (Qanat- see Kabori, 2005). Fortunately, through the kind introduction of the Chief of Aoulef, Tidikelt, Prof. Kabori met Hamadi Ahmed El-Hadj, who has his own garden irrigated by Foggara. At that time, El-Hadj was working as an assistant to the Chief, and he was able to introduce Prof. Kabori to a network of Foggara in and outside of Aoulef.

Field Surveys in the Algerian Sahara

Following the end of the Military Administration in Algeria, which was in place up until 1962, the independent national government took over responsibility for the development of the southern region (Sahara). Due to political and economic conditions during the 1960s and 1970s, the Algerian government activities in the south were necessarily limited. Throughout this period, it was also not possible for the research missions to stay continuously in the region. However, Prof. Kabori was able

to continue with brief visits to the Sahara in 1964 and 1968 (Kobori, 1969), until finally receiving a research grant to conduct the comparative study of the Foggara oases in the arid zone of the old continent over three years of field surveys. In 1977, the research team made a general survey of the important oases in the Sahara. This survey concluded that the Aoulef region was very suitable for continued study. Within this region, In Belbel oasis, 120 km north of Aoulef, was considered an ideal village in which to study the Foggara. This decision took into account the dependence of the population on the Foggara, and the relative geographical isolation of the oasis, at the center of the Algerian Sahara (for further details on this study and its findings, see Kobori, 1982).

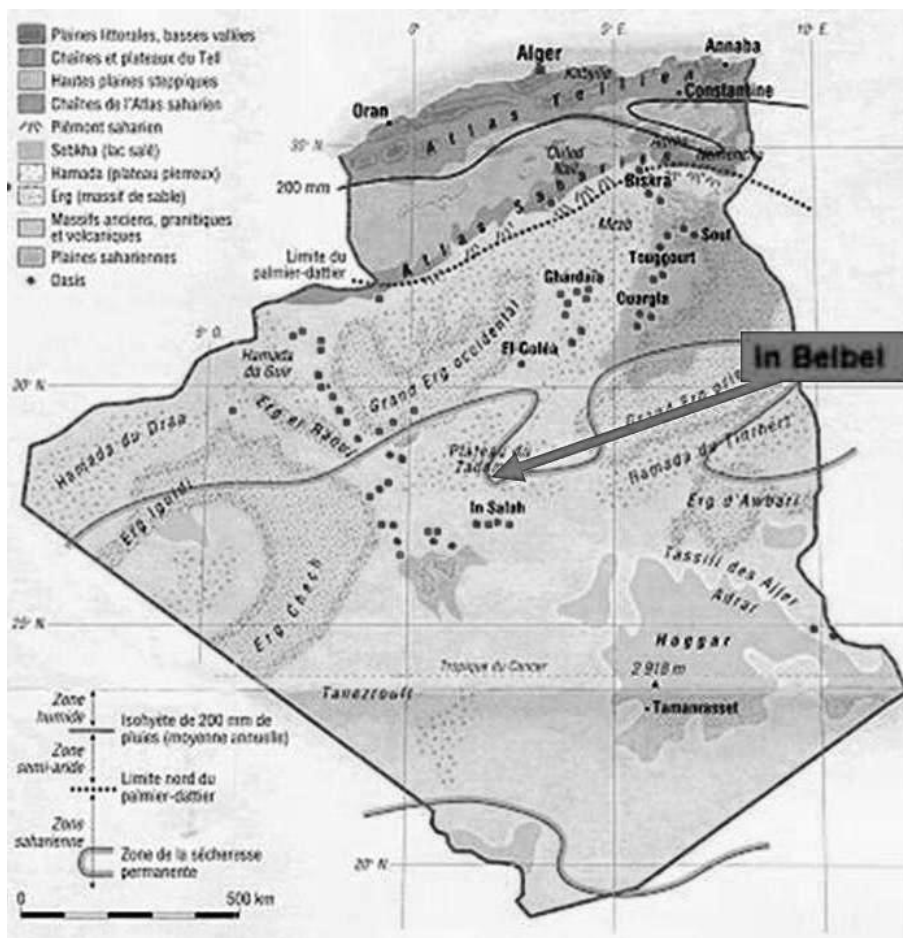


Figure 1. Location of In Belbel.

Between 1978 and 1980, the research team concentrated its efforts on making a base map (scale 1/5000) of the In Belbel area. Interviews were conducted with local households, including whole families. These interviews focused enquiries on water law, farming systems, and other issues of relevance to the Foggara. The report was published by Tokyo University (Kobori, 1982). Based on the results obtained, the research team continued to pursue its studies on the evolution of the Foggara oasis-case study in In Belbel, conducting further investigations in 1992-1993, 1999, 2002 and 2005. These investigations were funded by the Toyota Foundation and by the European Commission Foggara Working Group.

Observations of Development Activities at In Belbel Oasis

During their frequent field studies, the research team was able to observe the steady development of the oasis. Generally speaking, the Algerian Sahara, when it was under French control, was administered in close relation with military governance. Because of the remoteness from the capital, Algiers, inhabitants in the Sahara could get special subsidies for daily life essentials. However, after the Algerian Independence, the central government had many difficulties to build a new regime, and special attention to address the development needs of the South was delayed. For example, in 1964 there was a shortage of essential materials for domestic life in Aoulef oasis, such as tea (which was mostly imported from China). Primary school students had difficulties to buy pencils.

In 1977, when the research team began its work in earnest, In Belbel was a very small village with old Foggara on the edge of Tademait Plateau at an altitude of around 400m. It had 300 inhabitants, one tiny school with one teacher and seven male students. The main source of income was from date palm gardens and trans-saharan trade including Tuareg caravans. To travel by camel to the nearest oasis at Aoulef, 120 km away, it took three days. Unfortunately, after the Sahel drought in 1978, caravans operated by camel almost disappeared. For irrigation and portable water, the inhabitants of the oasis depended almost entirely on one Foggara and a very small pump. The traditional water distribution network, including Seguia (open aquaduct), Kesaria (small diversion system), and Majene (pool), functioned well. In the center of the village, there was a tomb of a Marabout (Saint), who was said to have been the founder of the oasis. According to the legend, the Marabout discovered a small fountain around two or three centuries ago, and founded the settlement of In Belbel oasis. To dig underground canals in hard limestone, as was needed to create the Foggara, is hard work even now.

The central government started a new plan to develop the South from the 1980s. One of the practical measures undertaken was to have a special salary scheme for official service staff including teachers. A regional development program was launched, in order to improve infrastructure such as the trunk road between Adrar, Reganne and Aoulef. In 1961, the road was a rough desert road, but now it is completely asphalted. As one unique development, the government built a solar energy operated lighthouse between Reganne and Bordi-mokhtar to support night driving along the desert road. The introduction of central pivot irrigation systems started around the 1980s, especially in the Wilaya of Adrar. In some areas, such as Aoulef, it was not very successful, because of extremely high rates of evaporation. As a result, the soils of the irrigated fields have become salinized. On the other hand, the pivot irrigation systems were more successful in El Oued or Biskra.

While the research team was carrying out its work, In Belbel oasis changed rapidly under the new policy regime of the Algerian Government. The population grew from 300 in 1977 to 1000 in 2002. The old Foggara were almost entirely replaced by motor pump wells. However, the distribution of water still depends on the Foggara network. A power station operated by diesel engine and a greenhouse system has been introduced. In Belbel has recently developed the export of vegetables to Aoulef. At present, there is a school with 17 teachers and 140 coeducational students.

While conducting fieldwork at In Belbel, the research team carried messages from the villagers to local, regional and central government authorities. These messages concerned, for example, the construction of a power station, improvement of the desert road between In Belbel and Aoulef, introduction of an ambulance car and post office, etc. Prof. Kobori reported on these matters to the Daira (Chief) of Aoulef, Wali (Governor) of Adrar Province and Ministers concerned in the Central Government. It is not possible to determine to what extent these reports were taken into account in

decision-making processes, but at least the power station and post office were constructed. Now each house at In Belbel receives electricity.

Policy Issues Identified by the Research Team

Through the studies conducted by the research team, several questions concerning policy makers were identified. Numerous observations were encountered concerning the negative approach to the South. Informants reported that officers in the northern region, especially in Algiers very seldom visited the South. The extreme arid zone, in which the Saharan Foggara are located is officially excluded from the accepted definition of desertification by the UNCCD. This is illogical because the same phenomena such as sand shifting, salinization and land degradation affect the oases. The IGU Desertification commission published a report on this matter on the occasion of the 24th International Geographical Congress in Japan (1980).

Bureaucratic barriers between ministries and international organizations make the procedure for decision making in relation to the Foggara and efforts to combat desertification in the oases excessively complicated. For example, matters concerning the use of Foggara within irrigation systems are under the supervision of the Ministry of Agriculture. On the other hand, the role of Foggara in providing water resources means that they also fall under the purview of the Ministry of Water Resources. This Ministry has made a good inventory of Foggara in Adrar through the Agence National des Ressources Hydrauliques. For desertification-related matters, the official focal point in relation to the UNCCD is the Ministry of Agriculture (Forestry Department) and other Ministries such as the Ministry of Higher Education (Centre National de Recherche Scientifique et Technologique sur les Régions Arides (C.R.S.T.R.A.) (Biskra) and Universities) and the Ministry of Environment, under which the Association des Deserts du Monde was established. International organizations such as UNESCO (Project on Rehabilitation of Oases and Cultural Heritage in the Sahara) are also interested in the South. Sometimes various projects are going on at the same time without inter-linkage.

Based on the observation of the evolution of In Belbel Oasis, the research team would like to propose the following policy recommendations for the future sustainable development of the South, including Tidikelt:

- 1) Synchronization of central, regional and local activities to achieve better and faster results as needed;
- 2) More tools or equipment necessary to local communities;
- 3) A careful and better coordination of activities including NGOs, universities and others working on Foggara and Combating Desertification;
- 4) Capacity building to train the trainers in order to maintain the existing equipments and educate future generations on the pressing local issues;
- 5) Investment in the South from the central government is key to solving the issue of immigration from the South to urban areas and Europe;
- 6) Decision makers should visit areas with pressing problems before taking any decisions to seek to address them.

Acknowledgements

During almost more than 40 years of contact with Algerian Authorities, regional and local peoples, I have learned very precious lessons from them. My research would have been impossible without local collaborators. I was so happy to have met Mr. Hadj at early stage and later Mr. Benkhalifa in 1992 when I attended the Desertification Congress, organized by Algerian Government in memory of the 30 years Anniversary of Independence of Algeria. It was held in Ghardaia and the

secretary of the congress was Professor Nicole Bounaga, who introduced me to her best student (Benkhalifa) to follow up our mission.

The University of Algiers has been our official counterpart institution, and we owe very much to Professors Djilali and Nicole Bounaga and the Centre National de Recherches sur Zones Arides (C.N.R.Z.A.), and recently, the Ministry of Environment and other government organizations in Algeria.

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SESSION 4:

**SUB-REGIONAL CASE
STUDIES**

Policies to Combat Desertification: A Perspective on the Latin American and the Caribbean Region

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1. Introduction

The importance of policies on desertification in Latin America and the Caribbean (LAC) relates to their potential to simultaneously address major regional concerns on environmental degradation, poverty and social inequality. Severe processes of land degradation affect about 75% of the LAC drylands representing one quarter of the region. Hyper-arid, semi-arid and arid regions of South America along the Pacific coast, the high and dry plains of the Andean mountains, the more eastern Chaco and northeastern Brazil, along almost half of Central America, the eastern Caribbean islands and most of Mexico, undergo land degradation processes due to extreme climate conditions, deforestation, inappropriate agricultural and irrigation practices, overgrazing, and overexploitation of the soils and of the forests. Agricultural land, on which more than 30% of the population depends, is particularly threatened to the extreme that regional food security and self-reliance is at risk (UNCCD, 2004).

Desertification stands predominantly as a rural phenomenon, because it is deeply rooted on unsustainable agricultural practices and deforestation but, above all, because it affects the poorest segment of the population comprised of medium and small producers and landless agricultural workers. Almost 64% of the rural population in LAC lives under the threshold of poverty, and the number of poor has increased both in absolute and in relative terms during the last two decades. According to IFAD (2002), 32% of the rural poor lives in arid and sub-arid subtropical zones, and indigenous populations, with more than 200 ethnic groups, comprise one third of them. The rural poor in the drylands endure not only the deterioration of the natural resource base and its economic implications, but the extreme inequalities of the region in terms of income distribution (UNDP, 2005), education and highly skewed land distribution (Morley, 2001).

During the last ten years, most governments have reported major advances in setting up solid legislative and institutional frameworks for intervening effectively in promoting sustainable development and the successful implementation of the Rio Conventions, particularly the Convention to Combat Desertification (CCD), through measures such as land tenure reforms, regulations on natural resource use, and promotion of participatory processes. However, some organizations have noted a deterioration in the implementation of policies devoted to social equity and environmental sustainability during the last decades, as well as serious setbacks to governmental capacities to combat land degradation (see for example IFAD, 2002 and the Declaration of *Redes de Organizaciones no Gubernamentales de America Latina y el Caribe*, 2001). Among others, these observations point to the limited effects of governmental policies, and to the need to explore their contents and the challenges and opportunities involved.

This document aims to provide an overview of the current policy framework to combat desertification in the Latin American region and to identify key challenges and factors contributing to the success or failure of these policies. In the context of this paper, policies comprise legal, institutional and financial arrangements set up by national governments to prevent, reduce or reverse the effects of land degradation in arid, semi-arid and dry sub-humid areas.

Legislative scenario

Since the international community shed light on the risks, causes and consequences of environmental degradation, and particularly since the adoption of the Convention to Combat Desertification in 1994, most countries of the region have: introduced land tenure reforms that take into account land vocation and capacity; set limits on natural resource use, particularly forests; extended protected areas; and, promoted participatory processes on natural resource management. In many cases, the entire body of legislation has been rationalized to eliminate obsolete or conflicting laws and rules and introduce integrated legislative instruments to deal with macro-economic policy, social affairs, indebtedness and trade (Synthesis and preliminary analysis of the second national reports, 2002). The third national reports to the fifth Committee of the Review of the Implementation of the Convention (CRIC 5) submitted this year highlight significant steps towards the creation and strengthening of favourable legislative frameworks to combat desertification and drought. A number of countries have adopted comprehensive and pertinent measures for sustainable water management, elimination of sources of soil contamination due to mining activities and solid waste disposal, establishment of protected areas, and regulations on the use and tenure of land, forest and water resources.

By 2000, the 33 countries of the region had ratified the text of the Convention and four of them had presented their national action programs (NAPs). By 2002, seven countries had officially presented their NAPs, while this year they are 17; nine have final drafts, and the remaining seven have already initiated the process of NAP formulation (UNCCD, 2006). The last four years have also witnessed relevant advances in the elaboration and application of the NAPs as tools for environmental state policies. Some countries reported to have officially integrated their NAPs into their environmental laws and regulations as well as into national Poverty Reduction Strategies to provide inputs and guidance for the revision, updating and adaptation of legislation and national policies. Other countries are undergoing the same review process or studying the possibility of updating their NAP in accordance with the latest modifications in their environmental regulations.

Additionally to the integration of some NAPs into national legislative instruments, many reports underline the inclusion of the CCD principles into socio-economic and environmental regulations. The main steps forward entail policies on rural labour and credit as means to reduce poverty levels and, therefore, lower the pressure over land while increasing local investment capacities. Institutional arrangements have accompanied these measures through the creation of national and regional mechanisms of economic promotion and public participation on rural, agricultural and forest development.

Despite of the multiplication of development projects promoting the use of solar energy and efficient use of biomass, legislation on energy in connection to environmental degradation remains incipient. Only three LAC countries report having implemented energy policies related to the use of new and renewable energy, and one of them has disseminated its experiences to other countries both in the region and worldwide. Part of the problem may lie on the lack of data. The third national reports presented this year revealed that almost half of the countries have neither production nor consumption data on renewable energy, even though the region benefits from enormous water, solar and biomass sources.

Almost all LAC countries have established national coordinating bodies (NCB) with the central mandate of organizing and harmonizing activities to fulfill their commitments within the CCD framework. Some NCBs have succeeded in providing advice, raising proposals and coordinating actions among governmental and non-governmental institutions that work in dryland regions. Moreover, the synergy of

political and technical skills from institutional representatives involved has contributed to analyse and harmonise legislative and institutional arrangements aimed at fostering the implementation of the Rio Conventions (UNCCD, 2006). The contribution from the civil society has been instrumental to the NCBs in broadening its legitimacy at the civil society level.

In spite of the remarkable achievements in some countries, others remain at the early stages of integrating their accumulated knowledge, experience, current programs and projects to combat desertification and mitigate the effects of drought. Additionally, the persistence of outdated and incoherent sets of laws, lack of compliance with sustainable development legislative regulations, as well as mechanisms to enforce them, afflict all countries to different extents.

Institutional scenario

The strengthening of the institutional scenario to address land degradation in drylands constitutes the most evident achievement regarding policy implementation in the region. The creation, modification and adaptation of governmental institutional structures devoted to design and carry out projects in sustainable natural resource management have taken place in all countries during the last decade. The reinforcement of the institutional framework has enabled a comprehensive set of actions that resulted in the widening and deepening of the knowledge related to both vulnerability and productive capacity of dryland ecosystems, mainly watersheds and high mountain ecosystems. Likewise, it has promoted countless efforts in the application of measures for the rehabilitation of degraded land, mitigation and prevention of soil degradation, expansion and improved management of protected areas, and creation of early warning systems for mitigating the effects of drought. Countries with economies that rely partly on the mining industry have taken actions to control soil and water pollution involved on their extractive activities. These efforts are accompanied by the increasing number of studies and initiatives on integrated solid waste management. Also worth mentioning are the institutional efforts of many Andean and Caribbean countries to establish in situ conservation of local varieties and the development of urban agriculture in Central American and Caribbean countries.

More than 95% of the Latin American and Caribbean countries reported the execution of institutional interventions in the framework of the CCD and their national development strategies. According to the synthesis of these reports (UNCCD, 2006) there are at least three concurrent matters where these actions have taken place, namely: (i) poverty reduction strategies; (ii) rural development strategies; and (iii) local development through the enforcement of people's rights, particularly indigenous people, to natural resource management and the building of local capacities. Likewise, most reports underline the expansion of technical and scientific institutional associations at the national and international levels, aimed mainly at monitoring the effects of environmental changes and strengthening the access to modern technology and know-how. Increasingly, countries of the region participate in international early warning and global climate monitoring systems.

The strengthening of environmental national institutions has facilitated international coordination within the subregional programs as well as South – South cooperation. A wide range of initiatives articulated under subregional programmes look mainly to the rehabilitation of degraded land in shared ecosystems. Although not yet fully implemented, the subregional programs constitute the most effective mechanism to extensively cover territory and people in transnational remote areas too. On the same line, countries with long institutional and academic tradition share with other countries their knowledge and experience on issues such as the identification of benchmarks

and indicators of drought, monitoring of land degradation and other biophysical factors.

In some countries, political and administrative instability, weak technical capacities and lack of coordination both among governmental actors and between them and the civil society constitute enduring threats to the accomplishment of strong environmental institutions. These factors delay and very often jeopardize the design and execution of the NAPs as well as the successful management of human, technical and financial resources.

Financial scenario

The financial scenario constitutes the weakest link in combating desertification and mitigating the effects of drought in the region. Programs, projects, and many institutions depend directly on uncertain resources channelled by the international community; additionally, despite remarkable advances, the incorporation of environmental criteria into domestic funding policies is still in its early stages. As the analysis of the third national reports concludes, national governments and external cooperation alike have not yet translated environmental concerns into a sustainable financial mechanism to meet the needs identified in several diagnoses and plans, including those of the NAPs (UNCCD, 2006).

Several countries, nevertheless, have devised alternative mechanisms to gain access to financial resources. Four of these mechanisms stand out. First, the establishment of subregional associations for common lobbying and for management of resources from the international cooperation. Additionally, associated countries contribute with financial and human resources to common projects of larger scale and impact. Second, the modest increase of the share of national funds on the execution of environmental projects. The impact of these funds, together with those of the international cooperation, has been multiplied through the channelling to decentralized organizations. Third, the incentives provided to ecotourism activities from which many local and indigenous communities have increased their revenues as well as their motivations to protect their natural environment. Fourth, there are remarkable experiences in channelling resources from debt relief, the privatization of national enterprises, and the system of payment for environmental services to small producers and land owners. The last modality has been particularly adopted for many Central American countries.

Worth noticing is that while some countries now invest more resources on natural resource conservation and management, others have reduced their direct investments as well as their expenditure on administration and personnel devoted to these ends. This responds mainly to internal economic deficits that some governments try to solve by promoting short-term production, diminishing the public expenditure and social programs that worsen the situation of the poorest ones.

The international community financial contributions have been devoted mainly to promoting local participation, institutional strengthening, identification of benchmarks for monitoring and assessing the impacts of drought and desertification phenomena. While countries of the region recognize the fundamental support of the international community, tensions remain, as many of the financial offers come tied-up with unilateral identification of priorities, do not live up to the commitments made by developed countries on international events, and do not allow for a horizontal monitoring of the financial mechanisms and their results.

2. Policy Related Factors of Failure and Success

Latin American and the Caribbean countries face similar threats from drought events and desertification processes, which affect mainly their agricultural production, plant and animal biodiversity. Nevertheless, these threats are addressed differently depending on the characteristics of the ecosystems, culture, institutional and economic capacities, and accumulated knowledge and experience. The advancement in the combat against desertification has been, therefore, unequal in the region in terms of priorities established, actions implemented and results achieved. This heterogeneous scenario makes clear that there is not a set of policies appropriate to all cases; experience, however, has shown the relevance of key elements critical to any approach to combat desertification. Based on recent reports provided by national governments and some NGOs, the present section identifies six factors related to the successes of national policies to combat desertification.

Participatory institutional articulation

The elaboration of more than 70% of the NAPs during the last four years, the presentation of the three national reports (2000, 2002, and 2006) and the declaration of 2006 as the United Nations International Year of Deserts and Desertification have been privileged opportunities taken for most countries of the region to involve governmental actors and civil society alike in actions to combat desertification. Most of these actions are aimed at increasing public consultations, sensitisation and awareness, but they also implied the creation of institutional coordination bodies. The last national reports (2006) clearly show that the coordination among well-established institutions has resulted in a greater capacity to influence public policy and achieve local participation. Also, the involvement of private actors, such as mining industries and producers associations, have informed the decisions taken by governmental actors and have facilitated their intervention. On the contrary, initiatives in countries lacking coordinating bodies among public institutions and between them and the civil society and private actors tend to be fragmented into isolated spaces, where financial and human resources are dispersed.

Promotion of education and research

Research and education constitute long-term strategies rather than one government approach whereby state policies are followed for several years. Only few countries in the region enjoy the benefits of well-established educational and research systems that address environmental issues in general, and drought and desertification in particular. The scientific and educational tradition in these countries has influenced the proliferation of high-quality studies, diagnoses on watersheds and highland ecosystems, implementation of in-depth case studies, and creation of technical proposals. By and large, these countries have more access to modern technology, rely on highly educated national experts and technicians, and actively participate in international debates and know-how dissemination. Moreover, these countries have been the first ones to invest their institutional, human and technical capacities to catalyse the promotion of the three Rio Conventions around activities such as reforestation, afforestation, early warning systems and the monitoring of biophysical phenomena.

Decentralized action at the regional, municipal and/or districted levels

The administrative, political and economic decentralization processes that took place in most countries in LAC during the last two decades have been translated into greater transparency and accountability as well as responsibility and capacity building, including the environmental sector, at the local level. They also allowed the inclusion of geographically, socially and politically marginalized populations in

decision-making processes that affect their lives. The synthesis and analysis of the third national reports (UNCCD, 2006) reveals that decentralized institutions commanding environmental projects at the regional and municipal levels act as two-way channels: bottom-up for the identification of needs and proposals, and top-down for the application of plans and strategies. The mentioned reports also point out to the facilitating role of decentralized institutions in disseminating information and coordinating with local non-governmental and educational institutions. Some local agreements have resulted in educational programs to combat desertification adopted by schools and universities, and in joint efforts among governments, NGOs and local communities. Regional coordination bodies and discussion tables established in some countries as subsidiaries of national coordination bodies also constitute examples of the possibility to go beyond the centralized mechanisms of UNCCD implementation.

Follow-up and quantification of results

The amount of knowledge and experience related to combating desertification and mitigating the effects of drought in the region goes back to pre-colonial times, as indigenous communities made rational use of diverse ecosystems and applied different methods of soil restoration and conservation. During the last forty years, NGOs, universities, and governmental institutions alike produced critical scientific knowledge that remains mostly dispersed in institutional reports. Lack of systematisation, evaluation and appropriate dissemination cause the repetition of experiences and the loss of knowledge and resources, and prevent stakeholders from building upon existing knowledge and previous efforts. Currently, many make use of improved technology such as computing systems and land and satellite stations for monitoring vegetation cover and others. Nevertheless, only few of them have the capacity to provide data related to land degradation and its effects such as the amount of agricultural land affected, deforestation index, loss of vegetation cover, and others. The lack of data is even poorer when rehabilitation measures or quantifications of results under the umbrella of the UNCCD are taken into consideration.

Investment of national resources on the implementation of local plans

As mentioned before, some governments have increased their share of national investment on natural resource conservation and management. Channeled through regional and municipal governments as part of development environmental projects, it has resulted in more local autonomy of decision-making, increasing negotiation capacity with co-funders and greater appropriation of projects. Additionally, some governments at the national and local levels have been able to multiply their investments by attracting funds from the private sector and the international community through co-financing schemes. The freeing of national resources through debt-relief and the valuing of environmental services have increased the availability of resources and, in many cases, allowed the execution of specific projects together with targeted groups, such as indigenous communities and small producers.

Incentives for land restoration and conservation

Aside from some examples in waste management and others in the forest sector, market mechanisms of incentives are still at their early stages in most LAC countries. Part of the problem resides in the lack of policies of incentives, probably derived from the priority given to social and technical aspects of desertification in detriment to the economic ones. As Matallo (2005) explains, any article in the UNCCD addresses neither the economic impacts of desertification nor the costs of soil recovery. The same author mentions the difficulties in estimating the direct value of ecosystems and their resources as a constraint to calculate the costs of desertification and the

necessary investments to protect those ecosystems. The same author suggests that a balanced comparison between control and prevention costs with the costs of current interventions could help countries to make economic estimations. Besides these reflections, it is not possible to ignore the weight of the private sector's traditional reluctance to consider and internalize environmental costs as well as the weak capacity of most governments to enforce effective environmental regulations.

Experiences with economic and non-economic incentives with local communities and small and medium producers have been successful in improving the local quality of life or have resulted in concrete possibilities to increase agricultural production. Both governments and NGOs reported on these practices, although they still need to be systematized and disseminated.

3. Key Policy Challenges

LAC countries benefit from important natural and human capital, accumulated traditional and modern knowledge and, more recently, from access to advanced technological tools. However, desertification and drought as well as its environmental, social and economic impacts remain underestimated in the region by both the international community and national governments alike. The fact that the region has the largest forest extension, with almost 25% of the world forests, and is a major producer of commodities such as coffee, sugar, corn, and bananas, gives the misleading notion that LAC is comprised only of green fertile fields. Several successful experiences on land rehabilitation have also contributed to ignore the severity of the problem, overlooking the fact that rehabilitation practices depends on availability of human, economic, and technical resources, and long negotiation processes.

Above all, combating desertification and poverty in LAC remains a political issue in nature. As it is extensively documented, the poorest living in rural areas are the ones who bear most of the impact of desertification processes and drought events (see for example the Millennium Ecosystem Assessment, 2005; IFAD, 2002; and UNCCD – LAC, 2002). Uneven distribution of resources, development models based on the unsustainable use of natural resources on which many people directly depend, and unbalanced terms of market exchange worsen the impacts of extreme climatic events, geographical remoteness, and poor infrastructure and services in many drylands communities. The discussion of the problem complexity and possible solutions surpasses the scope of this paper. Nevertheless, five main key policy areas are identified as necessary, although not sufficient, to be considered in comprehensive state policies to combat desertification.

Land tenure

Land tenure persists as the axis that gives order to many social and economic relations in LAC. In spite of radical agrarian reforms (Mexico, 1910–1917; Bolivia, 1953; and Cuba, 1959), moderate ones (e.g. in countries such as Costa Rica, Guatemala, Ecuador, Colombia, Brazil, Peru and Chile during the 1970s), and reforms carried out after civil wars in the 1980s in Central America, all aiming at the expropriation of land to achieve social justice and realize national interests, the results have been mixed (Deere and Leon, 2000). Most reforms did not achieve a fair land distribution and very often succumbed to counter-reform movements, which perpetuated the unequal access to land, credit, water and technical means.

Currently, land tenure systems tend to ignore the aspects of customary land access in dryland areas, namely: systems of multiple resource use including different categories of users (individuals, households, ethnic groups); users of different status (owners, secondary and tertiary users); and different uses and different kinds of rights

(UNDP, ACTS, CISDL, 2003). Policies on land privatization and expansion of land markets tend to eliminate uncomfortable and complex issues such as communal access to resources, management and access to more than one ecosystem, nomadic land use, and alternative uses of land other than for commercial purposes. More often than not, land tenure reforms try to adapt customary uses to formal regulations instead of regulating them. In that way, instead of guaranteeing property rights and rational land exploitation, rules of engagement among users, customary rights and benefits for the disadvantaged within the communities, and trust-based communal rules have been disrupted. For many individuals and communities, security on access and rights to use land and its products is more important than the ownership of the land itself.

Unambiguous and clear rules must accompany a fair distribution of land. There is a lack of policies supportive of common property regimes so typical in dryland areas. Important steps have been taken, among others, in strengthening institutions governing transactions or property rights, creation of and access to data on land use patterns, land value, availability of water, and traditional land-tenure patterns and management, but still the politics of land distribution do not allow equitable access to and use of land. For example, joint titles for married couples have been long identified as a way of ensuring women to benefit from land distribution programs (Deere and Leon, 2000). Nevertheless, there are few attempts to implement this recommendation as political will fails to challenge traditional power relations.

Agricultural policy

Given the importance of the agricultural sector for the economy and particularly for the livelihood of the population in the region, most LAC governments have traditionally established clear policies for domestic agriculture and foreign imports. LAC countries have consecutively promoted agricultural structures based on exploitations of cheap labour to sustain mining industries or foreign markets, agricultural enterprises devoted to satisfy domestic demands, and more recently, commercially extensive enterprises aimed at satisfying global markets. Few countries undergo these changes considering the sustainable use of agricultural land, agroindustrial rationalization, implementation of rural reforms or initiatives that promote best practices in crop and livestock production systems. Most of the policies implemented respond exclusively to paradigms of economic growth and integration into global markets. National governments and the international community often overlook the facts that: i) some of the economic, financial and trade imperatives driving the process of globalization seem to contribute to growing income discrepancies and to the deterioration of the terms of trade between rich and poor countries (UNCCD, 2002); ii) expansion of large-scale commercial farms in dryland areas has severe impacts such as preventing local people from accessing prime dry season grazing land (UNDP, 2003); iii) commodity prices directly influence the expansion (or constriction) of agricultural frontiers and rational management of natural resources; iv) trade liberalization, macroeconomic reforms, and a focus on raising production for exports can lead to desertification (Millennium Ecosystem Assessment, 2005), and v) trade marginalization can translate into technological marginalization with further impacts on global income distribution and poverty (UNDP, 2005).

Reaching world-wide and domestic equity in agricultural terms of production and marketing constitutes one of the most pressing global challenges to assure effective elimination of poverty. Only few national governments have taken appropriate actions to improve and protect people and production in the drylands, showing that targeted agricultural and environmental policies can make a difference to local people.

Natural resource management

Much has been done to study, classify, value and preserve natural resources, as well as to determine the best management practices in LAC. In terms of policies to combat desertification, however, two weaknesses afflict many countries. First, most of the produced knowledge and initiatives are not seen under the umbrella of the CCD but remains dispersed among different disciplinary approaches. For example, sustainable agricultural production, establishment of natural reserves, sanitation, irrigation schemes, early warning systems and others may contribute to fighting land degradation but they are neither integrated into national anti-desertification policies nor followed-up and monitored in accordance with the CCD implementation and its strategic objectives. Second, regulations on grassland, forest and water management remain, for the most part, unclear and ambiguous. Most countries lack strategic and effective policies due to the lack of information, awareness, and monitoring and compliance mechanisms with the law. This provides opportunities for the abusive exploitation and rapid resource-based deterioration, specifically considering dryland characteristics.

Traditional knowledge

One of the major potentials of the region lies in the accumulated modern and traditional knowledge to control and rehabilitate degraded land and manage water, soil and vegetation in a sustainable way. The absence of policies aimed at identifying, protecting and disseminating this knowledge has been a source of concern expressed in many regional meetings in the CCD framework. Additionally, the rapid expansion of intellectual and property rights world-wide and the industrial use of indigenous knowledge without proper acknowledgment are issues that need to be addressed through comprehensive and balanced policies, particularly related to the just protection of indigenous property rights and their integration into international property rights systems.

Economic policies focused on income-generating activities

The increasing loss of competitiveness of dryland areas concerning traditional agriculture activities leads their population to look for income alternatives, such as seasonal labour, in other agricultural zones or urban areas, development of handcrafts, tourism services and others. However, most of these initiatives are not articulated and supported by national policies and remain as survival strategies rather than development ones.

The economic contribution of drylands to national incomes in terms of agricultural goods, industrial production and services is generally unknown and so are the economic implications of implementing specific policies. Lack of tradition in establishing different scenarios leads to execution of programs and projects without certainty on their possible real short- and long-term economic effects. The NAPs constitute baselines to fight poverty in dryland areas and are instrumental to governments that have to apply specific policies towards the generation of agricultural and non-agricultural employment. Key to these policies is the technological reconversion to improve production patterns (Matallo, 2005) and increased access of dryland products to international markets. Additionally, policy design should consider that desertification can be avoided by creating economic opportunities in drylands' urban centers and areas outside drylands (Millennium Ecosystem Assessment, 2005).

Gender and pro-poor oriented policies

Gender and pro-poor oriented policies remain largely paternalistic and do not touch structural factors that keep power, social and economic unbalances. For many years, the failures to combat desertification have been linked to the lack of local resource-user involvement, accountability, transparency and public information-sharing. Under those circumstances, most important users of dryland services are prevented from playing a relevant role in sustainable natural resource management. The CCD framework offers a favourable ground to promote broader participation, however, a participative process of decision-making, implementation and evaluation has not yet found its roots in governmental policies of environmental and anti-desertification processes.

4. Conclusions and Lessons Learned

This paper has attempted to present a general perspective on policies to address desertification during the last 10 years in Latin America and the Caribbean. From the discussion above, the following conclusions stand out:

- The extent and impact of desertification processes deepening poverty and deteriorating the environment in the region remain largely underestimated. This fact influences the scarcity of appropriate policies at national and international levels.
- Among the three main components of comprehensive policies, legislation, institutions and finance, this last one constitutes the weakest link, while the second has seen fundamental advances.
- Legislation, on its part, requires harmonization, updating, adaptation to specific conditions in drylands and mechanisms of enforcement.
- LAC region remains largely dependent on industrialized countries as recipients of its export products, particularly manufacturing exports and agricultural products. This, together with the need to fulfill international obligations (external debt, access to credit), influences the tendency to promote short-term results, in detriment of long-term policy planning.
- South-South cooperation has the potential to alleviate technological, human resource and economic gaps. Policies to expand and improve sub-regional and regional cooperation are, therefore, fundamental to the region.
- Developmental models based on economic growth and integration into international markets under unfair exchange rules and without considering social, environmental and micro-economic impacts threaten local livelihoods in drylands. This remains the responsibility of the international community as a whole and of single governments alike.
- The UNCCD offers an appropriate framework for a democratic and participatory way to address desertification processes. Nevertheless, a lot still needs to be done to improve the relations between cooperation partners and affected countries, as well as among national actors, in order to ensure concerted and effective actions. Horizontal evaluations of the priority and use given to resources at the multilateral level as well as the deepening of decentralization processes at the national level are examples of possible ways to improve these relations.

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Policies Towards Combating Desertification in Africa

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1. Introduction

Given the African population's large dependence on agriculture for livelihood support and export, desertification and land degradation, which affects about two-thirds of Africa's land area and about 30 million Africans, has been recognized as one of the primary causes of poverty and under-development in the continent. Causes of land degradation and desertification are many, but can principally be attributed to: the continent's high rate of population growth and its consequential unsustainable natural resources exploitation for export and domestic use; the extension of agricultural activities to marginal lands; recurrent droughts; land clearance and loss of vegetation cover; inappropriate irrigation methods; and, 'over-cultivation' and inadequate application of appropriate soil and water management practices. Due to their contribution to environmental degradation in general, these phenomena exacerbate the state of poverty and food insecurity in the continent, particularly amongst the rural populations.

The UNEP Global Environment Outlook 3 (GEO 3) reported that "by 1999 about 202 million ha of land in Africa were under cultivation (32% of the potentially cultivable area), and 906 million ha were being used as permanent pasture". The report further indicated that as a result of land degradation, deforestation, drought and desertification and other environmental and natural resources problems, Africa's grain yields are projected to decrease. Well over 500 million hectares of land have been degraded in Africa since 1950, affecting as much as 65% of the agricultural Lands (UNEP/Global Environment Outlook 2000). Desertification is expected to increase in intensity and coverage, while biodiversity is expected to reduce as a result of extinction of some plant and animal species. These scenarios will continue to compromise food security, affecting the livelihoods of the rural populations and important economic sectors, such as tourism and agriculture, of many African countries.

African governments recognize the strong link between environmental resource degradation, particularly land and water, with poverty in the continent of Africa. The continent further recognizes that it needs to formulate and implement broad integrated policy frameworks to effectively deal with the poverty and natural resources degradation nexus for greater economic benefits and to enable it to attain the Millennium Development Goals and sustainable development. Faced with complex development challenges, the continent sees the necessity to identify priority areas and actions that take into consideration the synergies between the economic, social and environmental sectors. Drought, desertification and land degradation, which, when addressed on a broad front, will go a long way in solving poverty, food security and development constraints, should be part of such priorities for the continent. Since agriculture contributes about 40% of the GDP of the African continent and employs more than 60% of the labour force, land degradation and desertification, which directly affect land productivity, therefore requires serious attention if the livelihoods of the majority of the African population are to be improved.

In recognition of the important and urgent need to fight land degradation, desertification and to mitigate drought, Africa strongly argued at the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, for the international community to draw up an international convention to combat land

degradation, desertification and mitigate the effect of droughts. Since it entered into force in 1996, the resulting “United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa”, has been ratified by all Member States of the African Union. The region-wide effective implementation of the Convention holds promise for addressing the land degradation/desertification-poverty nexus in Africa.

2. What Policy Considerations Need to be Taken into Account at the Continental Level?

2.1. African Union

At the continental level, African governments have adopted policy frameworks that seek to address the development challenges in the agricultural and environmental sectors, with special attention given to land resources management. Amongst these policy frameworks are the Comprehensive Africa Agricultural Development Programme (CAADP) and the Environment Action Plan of NEPAD, adopted in July 2003, as well as the Sirte Declaration on Agriculture and Water, which was adopted by the Extraordinary Summit of the African Union in January 2004. The Commission of the African Union, the NEPAD Secretariat and the Regional Economic Communities have agreed on an integrated CAADP-Sirte framework to enhance coordinated implementation, alignment of efforts, and common reporting systems during its implementation.

Beyond the adoption of the aforementioned policy frameworks, the African Union operates a policy instrument in the form of the Special Emergency Assistance Fund for Drought and Famine in Africa. This fund has been used not only to provide emergency relief to Member States that have suffered from natural disasters, but also to implement land degradation and desertification control.

One other important policy instrument of the African Union is the revised African Convention on the Conservation of Nature and Natural Resources (Maputo Convention), adopted by the Heads of State in June 2003. The Convention integrates land resources management and desertification control in a manner that allow simultaneous realization of the African country Parties’ obligations under the UNCCD.

Other instruments for the implementation of the framework policies include the recently launched (7 December 2007), multifaceted and integrated, Green Wall for the Sahara Initiative, which seeks to slow the southwards advance of the Sahara desert and improve the livelihoods of the inhabitants of the Sahara and Sahelian zones. Furthermore, at the request of the Regional Economic Communities and relevant inter-governmental organizations, and with the support of the European Commission, the Commission of the African Union will, from 2007, host the Africa Monitoring of the Environment for Sustainable Development (AMESD). AMESD is a land and water resources monitoring project, using satellite data and information for policy development and to inform policy implementation activities.

2.2. African Development Bank

As the premier financial institution in Africa, the African Development Bank took cognizance of the fact of interdependence between environmental and economic development, and that the environment can constrain the prospects of attaining the MDGs in Africa, when it adopted a revised policy in 2004 that considers environmental issues, including land degradation and desertification, and their inclusion in the Bank’s lending policy. Through the said policy, the Bank commits to routinely integrate environmental consideration into country assessment and project design in order to:

- help improve quality of life of the people of Africa; and
- enhance the ecological capital and life support systems across the continent of Africa.

2.3. National governments

In an effort to meet the Millennium Development Goals and to attain sustainable development, many African governments have begun to review their land governance and development policies and laws to create enabling environments for gender sensitive and equitable access to land. Many African countries, e.g. Ghana, Lesotho, Malawi, Zambia and South Africa, have policies and laws that recognize customary land tenure and land rights, thereby giving confidence to land owners to invest in the protection and development of their lands in a way that could help to combat land degradation and desertification as well as address conflicts over land.

Furthermore, about 30 of the 53 Member States of the African Union have prepared National Action Programmes (NAPs) to combat desertification, land degradation and drought. The others are at various stages of elaboration of similar programmes. The NAPs constitute a national policy framework to implement the UNCCD and other development policies of the continent. Recognizing the link between desertification and poverty, many African countries are in the process of integrating the combat against desertification, drought and land degradation into their national poverty reduction policy framework. This will ensure that the issues of land and land resources management are factored into economic development activities at all levels, as relevant.

3. Sub-Regional Policies and Programmes to Combat Land Degradation and Desertification

For the effective implementation of the UNCCD, Africa has elaborated Regional, Sub-regional and National Action Plans, which, in many cases, calls for a policy review with regards to land ownership, development and management. Many Regional Economic Communities (RECs) have evolved policies for the environment and natural resources sector that could combat land degradation and desertification.

3.1. Southern African Development Community (SADC)

Southern African Development Community's (SADC) Regional Indicative Strategic Development Plan of 2003 seeks, in the context of achieving integrated and sustainable development, to commit SADC Member States to environmental protection through concerted implementation of regional and multilateral environmental agreements (MEAs) including, principally, the UNCCD and the UN Framework Convention on Climate Change (UNFCCC). SADC's policy focuses on:

- the promotion of regional cooperation on the environment and natural resources;
- environmental monitoring in development;
- assessment, monitoring and reporting on environment; and
- capacity building and information sharing on the environment and natural resources issues.

3.2. L'Union du Maghreb Arabe (UMA)

In the Arab Maghreb Union (AMU), partnership arrangements/agreements have been concluded on environmental resources monitoring systems (e.g. OSS-AMU-CILSS regional Observatory). These arrangements provide the States with valuable data

and information for the operationalization of policies to combat land degradation and desertification and to mitigate the effects of droughts.

3.3. Intergovernmental Authority on Development (IGAD)

One of the Intergovernmental Authority on Development's (IGAD) missions is to achieve food security and environmental protection. To this end, important policy orientations for IGAD with regards to land degradation and desertification control include:

- policy harmonization in natural resources;
- combating drought and natural disasters; and
- sustainable development of natural resources and environmental protection.

In the above context and within the general framework of the implementation of the United Nations Convention to Combat Desertification, IGAD has completed a comprehensive Sub-regional Action Programme (SRAP) to combat land degradation and desertification. The principal objectives of the sub-regional action plan being: to address land degradation effectively; to improve food security by reversing losses in the productivity of land due to degradation and desertification; to reduce migration and population movement in response to reductions in the land's carrying capacity brought about by drought and desertification; and, to prepare National Action Plans. To achieve these objectives, IGAD would undertake awareness creation activities; institutional and legal framework development; facilitation of participatory and bottom-up approaches for a wider engagement of stakeholders in land degradation and desertification control.

3.4. Economic Community of West African State (ECOWAS)

The Economic Community of West African States (ECOWAS) has designated the Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) as its focal institution for land degradation and desertification control in the sub-region. To this latter end, CILSS has formulated and is implementing policies on land degradation, desertification and drought control to ensure that there is:

- food security and sustainable economic growth;
- combating of poverty;
- harmonization and implementation of National Action Programmes for land degradation and desertification control;
- sustainable natural resources with a focus on: sustainable transboundary water management; transboundary animal and vegetation management; management of energy resources; combating forest and crop pests; drought early warning systems; scientific and technical cooperation; and information and communication.

CILSS is currently also focusing, for the period of 2004 to 2008, on the implementation of its Sub-Regional Action Programme to combat desertification. This Programme constitutes the policy framework for the sub-region's land degradation and desertification control efforts in the framework of the NEPAD Environmental Action Plan. The policy orientations for the period would be:

- to increase the compatibility and synergy of actions of all actors in order to consolidate sustainable development in the sub-region;
- supporting networks to share experiences and to disseminate information on transboundary resources management; and
- implementation of pilot projects, amongst others.

3.5. Community of Sahel-Saharan States (CEN-SAD)

An economically integrated grouping of 23 States, the Community of Sahel-Saharan States (CEN-SAD) was established with the main purpose of strengthening peace, security and stability, and to achieve economic and social development in the community. The majority of its members fall within the Sahel and Sahara zone and are, one way or another, seriously affected by land degradation and desertification. Consequently, one of CEN-SAD's focus activities at the national level is the fight against land degradation, desertification and poverty in its Member States. To this end, CEN-SAD has concluded partnerships with Sahel-Sahara Observatory (OSS) to undertake related activities toward combating land degradation and desertification in the sub-region. Furthermore, CEN-SAD is an important partner of the Commission of the African Union for the implementation of the Green Wall for the Sahara Initiative, which directly concerns 16 of its 23 Member States. In addition, many CEN-SAD Member States have had policies to implement activities similar to what the Green Wall seeks to achieve on a much larger scale. Examples of such countries include Algeria, Libya, Senegal, Burkina Faso, Nigeria and Niger.

4. Constraints

In spite of the apparent policy commitment of the various African Institutions and Member States of the African Union to land degradation and desertification control in the continent, efforts to combat the phenomena have been stifled by the inadequacy of human and financial resources to translate the policies into effective and sustainable actions on the ground. Many African countries have yet to sufficiently integrate environmental considerations in their national poverty reduction strategies. Due to the multiplicity of problems with which they are faced, the governments are confronted with the difficult task of allocating their limited financial resources to development activities. Given the urgency of some of the needs, such as food import, emergencies, etc., the slow-setting nature of land degradation and desertification has meant that the phenomena is often lost on the radar of development planners.

Furthermore, progress in the fight against land degradation and desertification have, in some cases, been compromised by conflicts which either diverts the attention of development workers, or results in a concentration of internally displaced people or refugees, exacerbating the environmental degradation in their places of settlement.

Climate variation has also been a limiting factor in the fight against desertification. Many tree-planting exercises have suffered failures due to unexpected shortfalls in rainfall.

Many affected countries have not built effective partnerships with local communities to ensure their sustained involvement in the fight against land degradation and desertification. Often, people have failed to recognize or link their involvement in the activities, which are usually mainly government driven, with benefits that directly or indirectly accrue to them. One of the limiting factors here is insufficient public awareness, and poverty. Due to the urgent needs to meet urgent family/household needs, farmers are often forced to turn their attention to alternate livelihood measures at the expense of activities on land degradation and desertification control.

Government and development partner-sponsored activities are usually implemented on a project basis. Given that projects have a lifespan and governments do not have sufficient resources to continue these works, the project activities usually are not sustained.

High rates of attrition amongst the government civil servants have in many cases affected the sustainability and success of desertification interventions.

AU Remedies

The African Union Commission has created a full-fledged Environment and Natural Resources Division, which, in concert with other units of the Commission, will continue to sensitize Member States and development partners with the need to ensure that environmental considerations are kept alive at all times during development planning and implementation.

Enabling Policy Environment to Enhance Uptake of Natural Resources Management Technologies in Marginal Drylands: Empirical Evidence from Morocco and Tunisia

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1. Introduction

The low rainfall areas (200–350 mm) of West Asia and North Africa (WANA) region are characterized by low levels of economic activity, a high incidence of land degradation, and a high percentage of rural population. Agriculture accounts for nearly 30% of total labor force in the region. Public and private sector investment in agricultural research and technology transfer are small and hence adoption rates of improved technologies are low. Coupled with increased incidences of drought, the lack of appropriate new technologies has resulted in increased poverty among small producers and environmental degradation in rural areas. More than 38 million people in the WANA region live in rural areas and depend mainly on farming for their livelihoods.

Crop-livestock systems are the predominant farming systems, with the major share of household income generated from small ruminant production. Traditionally, the source of livestock feed during winter and spring is extensive rangeland grazing. In summer and fall, livestock depend on crop areas for grazing of cereal stubbles and other crop residues. But the contribution of native rangeland to animal feed requirements has decreased from 70% five decades ago to no more than 25% at present, due mainly to increased animal population numbers. Inappropriate land use policies and absence of secure property rights have often contributed to unsustainable use of land and rangeland resources. Land degradation resulting from the loss of vegetation through overgrazing, plowing and fuel wood extraction, and consequent soil erosion via wind and water, is also common to WANA countries (Thomas *et al.*, 2003). This problem is exacerbated by land ownership and tenure issues, where land is either collectively owned or is public.

Research at ICARDA and collaborating NARS has led to the development and promotion of technologies that can improve crop/livestock integration in the drier areas by enhancing and stabilizing the production and quality of animal feed and by controlling soil erosion and thus reducing pressure on common rangelands. The alley-cropping systems using fodder shrubs with other annual forage alternatives are one of the cropping systems alternatives that can increase feed availability, particularly under low rainfall and marginal land conditions. This cropping system was introduced in the marginal lands of Morocco and Tunisia through the Mashreq/Maghreb (M&M) adaptive research project, which combined research on NRM with research on integrated crop-livestock production.

Introduction of *Atriplex* and *Cactus* for animal feeding and resource conservation in alley-cropping systems are two cited examples of NRM technologies. The Mashreq/Maghreb Research Project has established technical information on the agronomic and ecological performance of new alley cropping techniques as well as its effects on animal feeding.

Because the technology has the potential to reduce negative externalities of agricultural intensification in dryland areas and farmers are unlikely to adopt alley cropping without incentives, the governments in Tunisia and Morocco have established programs that subsidize the planting of *cactus* and *Atriplex* species in alley-cropping systems.

The objectives of this study are to assess the impacts of the *cactus* and *Atriplex* alley-cropping technology on farmers' income, the poverty reduction effects in the communities that have adopted the technology, and the efficiency of the R&D investment from the society's point of view. Benefit-cost (B-C) analysis was applied to calculate the financial and economic rate of return of the public and private investment in implementing and disseminating the *cactus* and *Atriplex* alley-cropping technology.

2. Methodology

The common theoretical framework on which these two case studies are based is cost-benefit analysis. This framework follows a theoretical discussion of the role of subsidies on promoting sustainable technologies in marginal areas. It provides a formal method for valuation of subsidies in cost-benefit analyses where environmental benefits cannot be monetized. The framework also bridges environmental and farm-level benefits, thus helping to isolate factors that determine the private and social rates of returns of the technology (CGIAR, 2006).

The analysis of the Tunisia case is based on data collected from the Zoghmar community, Central Tunisia, a community included in a dry area characterized with less than 350 mm rainfall and periodic droughts. Agro-pastoral systems with a high degree of livestock and crop integration are the dominant production systems. In this area, the spineless *cactus* in alley cropping represents an interesting opportunity to overcome the problems of the existing low productivity and unsustainable traditional barley/fallow cropping system.

The methodology used in this study follows a community-based multi-period mathematical programming model. The rate and the degree of adoption were assessed from project records and econometric analysis was carried out to identify the determinants of adoption, which facilitates the projection of the adoption rate over the life span of the project. Then, the rates of return on investment from the farmer, the aggregated project level and from the society level were calculated.

For the adoption and rate of return calculations, data were collected from a cross sectional sample of farmers within the target area and a larger survey conducted within the Mashreq/Maghreb Project and FEMISE project¹. Through OEP (Office de l'Elevage et du Pâturage) monitoring, additional data such as the number of adopters, the planted area, etc. were collected. The sample farmers used are selected by stratified random sampling on a basis of an exhaustive survey in the community (317 households). The household surveys provide an (unbalanced) panel data of 45 farm households from Zoghmar community, surveyed in 1999, 2002 and 2003. Household surveys included data from the plot, the farm and household levels. These data were used for the community model and for econometric analysis. Crop and livestock monitoring activities within the Mashreq/Maghreb project were performed in order to gather data on the farmers' practices and productive performances and establish "engineering production functions".

¹ The FEMISE project (2003–2004) focused on the obstacles to technology adoption for small and medium farms in the arid and semi-arid areas of Maghreb has been funded by the European Commission and coordinated by ICARDA.

Supplementary data including soil pH, soil moisture, soil organic matter content and biomass produced from cactus, crops and natural vegetation were collected from on-farm trials of four types of cropping systems, namely (1) natural rangeland, (2) barley without fertilizer use (farmer practice), (3) alley cropping with natural vegetation between the alleys and (4) alley cropping cactus with barley between rows but no fertilizer for barley.

In Morocco, the study was carried out in the Irzaine area, located in the rural commune of Tancherfi, in the Oujda province of Morocco. The agro-ecological conditions in the study site are typical for the dryland areas of Morocco characterized by poor soils and under shifting cultivation with a barley/fallow system where alley-cropping system with *Atriplex* was introduced since 1999 by the Research and Development Project of Taourirt–Tafouralet (RDPTT) funded by IFAD. The project aims at improving rangeland productivity through the introduction of fodder shrubs (mainly *Atriplex*) in pastoral zones, and provision of in-kind subsidy (establishment cost including land preparation, provision of transplants, 1–2 irrigations during the first year, and labor cost) to farmers to enhance the adoption of *Atriplex* plantation. The most frequent crops are cereals such as soft wheat, durum wheat and barley. Alley cropping with *Atriplex* is mostly done with barley or oats.

The methodology used for estimating the biophysical and the economic effects of the NRM technology is the application of a bio-simulation model called the “Soil Change Under Agro-Forestry” (SCUAF) model (Young and Muraya, 1990). SCUAF was calibrated using data from field trials and farm household surveys of traditional barley/farming and *Atriplex* alley cropping in the communities of the study area.

This model has been applied to similar cases (e.g., Menz and Grist, 1996; Trewin, 1997; Young, Menz, Muraya and Smith, 1998). The advantage of the model is that it links relevant parameters such as soil texture, soil and topsoil depth and agro-climatic factors to long-term productivity of crops. SCUAF is a deterministic model designed to predict the effects of various tree/shrub and crop combinations on the characteristics of specific soils (fertility and erosion) and commodity outputs. Erosion is calculated in terms of kilograms per hectare per year from a formula incorporating climate, soil erodibility, slope and cover crop and tree factors.

The bio-physical module of the SCUAF model generates yield and erosion outcomes for both cropping system. These physical measures are combined with a simple economic module to generate the revenues over time. Using the opportunity costs of capital as the discount rate and applying the at-risk procedure allows the calculation of cumulative distribution functions of the net present value and internal rate of return of the NRM technology.

The farm survey data, conducted in 2004, were used to assess factors affecting the adoption of *Atriplex* alley cropping and to document the ex-post impact of the technology on barley production, changes in the use of feed resources, flock size, and feeding costs. Farmers’ costs and prices are combined with the yield results of the SCUAF model to estimate net present values and IRR.

To document the adoption status of the alley cropping technology in terms of the rate and degree of its adoption and factors affecting the adoption process, a farm survey data of 100 farmers was conducted in the study area in March 2004. A stratified sampling approach, based on type of participation in the program, and proportional allocation (in relation to the total population in each stratum) were used in selecting the sample farms. Based on extension records, the sample was stratified in adopters and non-adopters of the NRM technology, by type of enterprise (specialized crop production, specialized livestock production, integrated crop and livestock), and by place of residency (within and outside Irzaine community). The adoption regression

equation was estimated using Logit and Probit models, while, the conservation regression was estimated by Tobit model. The three models were estimated using farm survey data to study the adoption of the *Atriplex* alley cropping, where the probability of adoption depends on the characteristics of the technology, farming systems, and farmers.

3. Results

Technology adoption

Adoption indicators of cactus and *Atriplex* alley cropping systems are presented in Table 1. The adoption rate in Tunisia is around 31% with a degree of adoption of nearly 30%. A general pattern that can be observed was that adoption of cactus alley cropping increases with farm and herd size.

Table 1. Adoption Indicators of Alley Cropping systems in Morocco and Tunisia.

Alley Cropping System/ Country	Adoption Rate (%)	Adoption degree (%)
Atriplex – Morocco	33	24
Cactus – Tunisia	31	30

Adoption rate: is the percentage of farmers adopting the technology. Adoption degree: is the percentage of area planted in an alley-cropping system

In Morocco, *Atriplex* alley cropping has been adopted by 33% of farmers, who devoted nearly 24% of their farmland to this technology. Among the adopters, only a small percentage of farmers (7%) adopted the technology without subsidy. All farmers, regardless of their size and social capital, have equal opportunity to participate in the program and be granted the subsidy provided that they allocate part of their land to *Atriplex* plantation. However, intensity of adoption increases as the farm size increases. The availability of subsidy, farm size, and flock size were the three key determinants of *Atriplex* adoption. Of the three, subsidies had the greatest impact. The subsidy is a key determinant for the area planted in *Atriplex*. Regression results imply that the net impact of the subsidy is to increase the area devoted to *Atriplex* plantation by 79% (Shideed, et al., 2007).

The farm survey also demonstrates the importance of farm size in the adoption of the *Atriplex* alley cropping. All large farmers (average farm size is 77 ha) adopted the *Atriplex* technology. However, only about half of the small farmers (< 20 ha), which is the majority of farmers in the study area, do so.

Flock size is another important factor affecting the technology adoption. All farmers who do not own small ruminants (12% of the sample farms) do not adopt the technology. Nearly one-half of small-flock farmers (< 40 heads) adopted alley cropping, and the majority of the medium-flock farmers (40–80 heads) adopted the technology. Meanwhile, almost all large-flock farmers (average flock size of 104 heads) have adopted the *Atriplex* alley cropping. Regressions of Logit and Probit models confirmed these results. Their estimated coefficients show that policy subsidy, farm size, and flock size are the three main factors affecting the probability of *Atriplex* adoption, with the subsidy is having the major positive and highly significant impact on the likelihood of technology adoption.

Productivity increase and feeding cost reduction

The benefits from *Atriplex* are the increase in barley and biomass production and the reduction in the costs of animal feed. As a secondary benefit, the flock size of small ruminants increases. Among the environmental benefits, reducing soil erosion and improvement in soil organic matter must be considered.

Increases in barley productivity and reduction in feeding costs of small ruminants are key performance indicators used to assess the farm-level impact of the alley cropping systems. Results are summarized in Table 2.

Table 2. Barley Productivity Increase and Feeding Cost Reduction.

Performance indicator	Morocco	Tunisia
Barley Productivity Increase (%)	17 (grain yield)	57 (biomass yield)
Feeding cost reduction (%)	33	13

To assess the productivity effects of the technology, a Cobb Douglas production function was estimated in order to separate the effects of the technology from those of other factors. It is shown that *Atriplex* significantly increases the straw yield in Morocco but no significant effect can be confirmed for grain yield, although the regression coefficient has the expected sign.

The technology effect on flock size, a regression model, was specified relating changes in flock size to explanatory factors, including the adoption of alley cropping technology, and estimated using OLS estimation procedure. A Heckman procedure was used to estimate the specified model and Mills ratios were used as mechanisms to correct and to estimate the impact of the technology on the flock size. Results imply that alley cropping increase the number of small ruminants by 25% among technology adopters compared to the non-adopters.

The third component of the benefits that were attributed to *Atriplex* plantation was the reduction of feed costs. The use of *Atriplex* in animal feeding has resulted in a reduction in the consumption of sugar beet pulp, wheat bran, and barley grain, as compared to non-adopters. On average, reduction in feeding costs is estimated at 33%.

In Tunis, the total barley biomass yield registers an increase of 57% due to an increase of 29% of herbs (weeds + straw); but mainly to the dramatic increase of grain yield (171%). These yield effects are a result of the microenvironment created by shrubs, which play a role as “wind breaks” that reduce water loss and increase soil moisture. Also, the shrubs play a role as a trap of several “moving seeds” creating a kind of niche to the emergence of valuable pasture plant species.

The additional feed supply has caused reduction of feed costs, which was around 13.2% per animal in 2001-02. The results are more mitigated between adopters and non-adopters of the technology.

Returns on investment

Benefit-cost (B-C) analysis is used to calculate the financial (FIRR) and economic (EIRR) rates of return to investments in developing and disseminating the alley-cropping systems. The analysis requires defining the stream of benefits and costs over the lifespan of the project. Both research and dissemination costs (including the

subsidy provided by the development projects) were included in the calculation of the costs and benefits of alley cropping. Benefit streams include the values of shrubs biomass and increased barley production. It was assumed that the additional barley production, due to the alley cropping, does not affect the market price of barley. Hence only producers' welfare was considered.

Atriplex biomass was valued using the opportunity cost principle. Thus, the "substitute valuation" method has been used by assuming that *Atriplex* is a perfect substitute for barley which is a market product² (Forum for Economics and Environment, 2002).

Based on above information, the FIRR and the EIRR were calculated using stochastic simulation by at-risk programme from Palisade. These estimates are presented in Table 3, which clearly support the effectiveness and economic feasibility of research investments in *Atriplex* technology. The EIRR is 25% at the community level, which will increase to 48% at the national level, due mainly to larger *Atriplex* area. Provision of establishment cost by the development program would double the IRR from the private point of view (FIRR = 50%). Cumulative distribution of IRR showed that nearly 55% of the time a farmer would have a negative IRR if all costs are paid by him. This will decrease to 47% if only opportunity cost of land is included (FIRR at the program level). At the national level, the possibility of having negative IRR will become 48% and 36% for EIRR and FIRR, respectively.

Table 3. Returns to Investments in *Atriplex* and Cactus Alley-Cropping.

Returns to Investments	Morocco	Tunisia
FIRR (%)	50	40
EIRR (%)	25	15

Likewise, the FIRR and EIRR of the investment in developing and introducing the cactus alley cropping technology show the financial and the economic profitability of this NRM R&D technology.

The output of cactus included the yield of cactus pads and the additional barley yield for the barley cropping system or the biomass output for the rangeland system³. Hence, the reference systems used in this study are barley or rangeland without alley cropping. Two pricing scenarios for pads were considered: 1) with market; the pads are sold at 0.040 Tunisian Dinar each, and 2) without market; the pads are used as animal feed and are valued based on their energy equivalent (forage unit) compared to barley grain.

Results clearly support the effectiveness and economic feasibility of research investments in cactus technology. The provisions of establishment cost by the development program would more than double the IRR from the private point of view (FIRR = 40%). Cumulative distribution of FIRR showed that nearly 59% of the time a

² The price of barley grain in the project area was estimated at 2 DM. Calculation of the substitution rate of *Atriplex* with barley (= the ratio between the digestible DM of *Atriplex* and the digestible DM of the barley), estimated at 0.35. Calculation of the value of non-traded good by multiplying the price of the marketed good in the study area times the technical substitution rate, resulting in an *Atriplex* biomass value of 0.70 DM/kg.

³ Note that in this study the market value of cactus fruits is not considered even if they are used for self-consumption. In the area considered in this study, fruits are not sold. Only children collect small quantity of fruits and sell them by the roadside to buy some school things.

farmer would have a negative IRR without the pad market; this period is reduced to 36% with pad market.

The EIRR and FIRR are around 7% and 20%, respectively, without pad market compared to 15% and 40% with the market for the cactus barley system. The higher IRRs in the case of pad markets show the expected profitability of the technology, if there were public efforts to develop a market for pads.

Environmental Impacts

The environmental Impacts of *Atriplex* Alley Cropping on the Environment were assessed as the *Atriplex* technology clearly generates positive environmental effects. The SCUAF model explained above allows quantifying some of these effects. Results of simulations show that *Atriplex* + continuous barley and *Atriplex* + barley in rotation with fallow systems reduces soil erosion considerably and stabilizes soil losses after about 10 years compared to farmers' conventional practice of barley/fallow cropping.

Another environmental benefit of *Atriplex* is the time-change of soil organic carbon under the alley-cropping systems. Continuous barley with *Atriplex* alley cropping can help to maintain the level of soil organic carbon during this same period. However, adding fallow periods to this system can help to sequester additional organic carbon.

Using the opportunity cost approach, the monetary value of the environmental benefits of *Atriplex* can be calculated (Dung, 2001). The benefits of soil erosion were defined as the difference between the present values of the cumulative net financial returns of *Atriplex* alley-cropping and barley/fallow systems. The difference was calculated at 22.2 million Moroccan Dirham (MD) (or 2.2 million USD). Meanwhile, the difference in soil loss is 17 tons/ha over the study period, implying that the cost of soil erosion is about 1288 MD/ha. Considering the estimated marginal effect of the subsidy on the probability of adopting *Atriplex* of 0.33, suggests to multiply this probability by per ha net benefits of 12886 MD/ha. This yields a value of 4252.4 MD per hectare which is well above the subsidy of 2500-3000 MD per hectare provided to farmers by the development project to disseminate the technology. Based on these indicative calculations, the subsidy can be justified due to the environmental benefits generated by the NRM technology.

4. Concluding Remarks

Unlike the patterns typically seen in areas of high agriculture production, the adoption of new technologies in marginal dry areas is often low because of the variability of returns to farmers and institutional constraints such as land tenure. Subsidies are therefore necessary to promote technology adoption.

The analysis of both country cases has shown that investments in these environments can be economically justified if appropriate technologies are being introduced. Results of the two country studies provide evidence of the effectiveness of alley-cropping systems in increasing barley straw yield (and to some extent barley grain yield), biomass production, reducing feed costs through reduction of purchased feeds, maintaining livestock production during drought seasons, improving soil organic matter, and reducing soil erosion. On the other hand, the financial analysis showed that the rates of return for farmers to invest in these soil conservation technologies are often not high enough to trigger technology adoption. Therefore, incentives provided by development projects are important to stimulate technology adoption. Such subsidies can be justified, because the Economic Internal Rate of Return (EIRR) is satisfactory if these costs are accounted for. In addition, there are environmental benefits. In the case of Morocco, conservative valuation shows that the

environmental benefits are justifying the additional investment the governments are making.

Results of this study should encourage policy makers and donors to invest in marginal rainfed areas. Such investments in the form of in-kind incentives (subsidies) for shrub establishments have proven to be an essential enabling policy environment to boost the adoption of NRM technologies for crop-livestock farming to fight land degradation in the dry areas. The availability of subsidies, farm size, and flock size were the three key determinants of *Atriplex* adoption. Of the three, subsidies had the greatest effect.

There are important lessons that can be drawn from this study, which contain the two country cases that have similarities as well as differences.

First the development of the Cactus/*Atriplex* technology alley cropping has been successful as it has encouraged public investment in agriculture in the dry areas. Such public investment has resulted in increasing the productive capacity of households' main natural asset, which is land. Through this, the livelihoods of rural communities would improve on a sustainable basis. The benefits of the technology are expected to encourage the wide adoption by farmers in similar agro-ecological zones in Morocco and Tunisia, as well as other countries. Cactus/*Atriplex* alley cropping can be considered to be a technology that can help mitigate drought through increasing and stabilizing the fodder reserve, and therefore the technology can be an effective risk hedging strategy for the dry areas.

Comparing this study with evidence provided by previous research on investment in agriculture in the dry areas (cited examples are in Algeria, Iraq, Jordan, Mexico, and Syria, where alley cropping is demonstrated in farmers' fields) in the WANA region (Mashreq/Maghreb project Annual Reports, 1999-2002), another lesson emerges. Most previous public investments have targeted irrigated areas. Thus, the results of this study would encourage policy makers and donors to invest in marginal areas.

There are also issues that need more attention in future studies. For example, results of this study showed that land tenure is an important factor affecting the adoption of alley cropping. Almost all adopters are of privately owned land tenure. The long-run benefits of conservation of alley cropping may be irrelevant to farmers whose planning horizon is limited by insecure land tenure. Accordingly, this technology is recommended for private and secured land tenures because the dissemination is difficult for common rangeland areas. Well-defined and secure property rights are important in encouraging farmers to invest in marginal dry areas; without them, few farmers will take the risk of improving land which they may lose (DFID, 2005). Results of this study would help policy makers to make decisions leading to investments in productive assets, like the drought-resistant *Atriplex*/Cactus shrubs, rather than on feed subsidy.

Farmers' decisions to adopt new farming practices are complex, as farmers apply a range of decision criteria to meet multiple objectives, subject to their production possibilities and constraints. In low-input farming systems, the adoption decisions of farmers may be heavily influenced by the possibility of negative returns in any year, even though expected net present value is positive in the long run (Nelson and Cramb, 2001). Access to credit to compensate for negative or low returns in establishment years may be essential for farmers' survival. Again, secured land tenure as security to borrow money is particularly important for farmers who would otherwise have limited access to credit.

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SESSION 5:

**KNOWLEDGE MANAGEMENT
FOR ACTION ON
DESERTIFICATION**

The Challenges of Measuring the Impact of Desertification Interventions

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Introduction

As ever-larger desertification figures seem to capture the headlines (Niemeijer and Mazzucato 2002), it is easy to forget that a lot of progress has been made over the last decades in terms of how desertification is addressed. Progress that ranges from international attention in the form of a UN Convention to Combat Desertification (UNCCD) and the International Year of Deserts and Desertification (IYDD) in 2006, to increased collaboration between governments, NGOs and international organizations in combating desertification, to a more holistic approach on the ground. Progress has also been made in terms of the ability to measure and analyze desertification data with more advanced remote sensing technology, GPS, and more powerful computers. If the attention has increased, the approaches have improved and the technology is better, why are we apparently not making more progress...?

The easy answer is that desertification is just growing at such a high rate that it is hard to catch up with it. This is an easy answer in that it does not force us to question our own approaches to tackling the desertification issues and could easily be interpreted as simply a demand for more means and more money. But, given that we do not really know the current state of desertification (more on that below), it is an all too easy answer.

The harder answer is that we do not know whether desertification has increased because we do not have a good way of measuring it, nor have we a good way to track the success of our efforts in combating it. Part of the problem is that we do not have a good baseline against which to measure progress, nor a good monitoring infrastructure with which to track progress; issues that were again raised in the Millennium Ecosystem Assessment's Desertification Synthesis report (Millennium Ecosystem Assessment, 2005). The other part of the problem, the part that this paper focuses on, is that there is no good way available to track the impacts of our interventions. While the holistic approach to sustainable land management (SLM) and desertification prevention is a major improvement compared to the sectoral approaches of the past, it is a major nightmare for anyone wanting to assess the impact of sustainable land management programs. It is basically on theoretical grounds that it is assumed that, in addition to on-the-ground interventions, knowledge management, capacity building, mainstreaming, creation of an enabling policy environment, are so much better than the traditional technical assistance. Due to the relatively short-term nature of interventions, the complexity of desertification processes, the limited funds for long-term monitoring and the indirect nature of interventions such as capacity building, it is not known in any quantitative way how successful our interventions really are. This poses a major challenge. Assuming it will always remain easier to get money to undertake action than to track the impact of action, any approach to better track the impact of desertification interventions will have to be both affordable and practical. This paper suggests a number of steps and approaches that can help better measure the impact of desertification interventions. Some of these approaches will likely be used for the "Ensuring Impacts for SLM – Development of a Global Indicator System" project, a multi-agency initiative to improve the accountability (not in a financial sense, but in terms of environmental impact) of land degradation interventions and develop a basis for better knowledge management within projects and agencies.

The Challenge

The major challenge is to obtain a reasonably accurate estimate of the impact of desertification interventions. For the traditional technical assistance kind of interventions, this was a relatively straightforward task, often expressed in terms of the area of land “rehabilitated” or “improved”. For indirect interventions such as capacity building and knowledge management, which have gained considerable popularity over the last few years, impact assessment is far less straightforward. Not only is the impact of these kind of interventions indirect, but the impact will typically occur over much longer time frames, going beyond actual project duration.

There are essentially two possible solutions to tackle this challenge, each starting from opposite ends of the equation. The first solution would be to measure actual changes in the condition of the land, and then try to attribute these to current and past interventions. The second solution would be to make estimates of likely impacts based on a thorough understanding of project activities.

The first solution has the benefit of measuring where it counts, namely the condition of the land; but it also has a range of drawbacks. Even if only a limited number of indicators were measured and heavy use were made of remote sensing, it would still be a very expensive approach. It would require long-term measurements as desertification-prone environments show high degrees of spatial and temporal variations in key soil- and vegetation-related indicators. Measurable impacts of interventions, going beyond such variability as well as beyond measurement error margins, may require several decades of monitoring. Finally, it would be far from easy to attribute any changes to particular interventions in a situation where multiple national and international agencies as well as the local population are active in the same territory. A “lighter,” more practical, variant of this approach would be to work with proxy indicators that are easier and cheaper to measure, but still face the attribution problem (we will return to this point towards the end of this paper).

The second solution has the benefit of focusing on the actual interventions, thus eliminating the problem of attribution. A drawback is, of course, that we cannot actually measure the impacts, but only estimate them. However, these estimates can be adjusted and improved over time as the project unfolds. In fact, unlike the first solution, impacts can already be estimated from the moment plans are formulated, without a need to wait until many years after the fact to establish the impact.

The second solution is more realistic in terms of the required resources and finances. It is also far more practical in the sense that it can provide early feedback on the impact of interventions, whereas the first solution will only allow for evaluation after many years. It is therefore the second option that will be further explored in this paper.

A Need for Transparency

In order to estimate the impact of interventions, a high degree of transparency is needed from a project. Only when there is true clarity on what a project's activities involve can one estimate what the impacts will be on desertification prevention or reduction. One of the first steps that will need to be taken to facilitate such transparency is a harmonization process across executing, implementing and funding agencies of key definitions and funding requirements. After all, differences in definitions and requirements almost force the submitter of a project proposal to pull up smoke screens of different colors to meet the requirements of different agencies, instead of bringing out into the open what the exact intentions of the project are. If a project already starts out with a proposal that excels in vagueness while evoking all

the right terms to get funding, it is harder at a later date to introduce the necessary transparency to estimate impacts. Terms such as “ecosystem integrity” and “global environmental benefits” should be defined in clear and scientific terms, not based on political definitions that are only intended to benefit the needs of the funding or executing agency (see also Niemeijer and Moran 2006). The more variation there is in definitions and understanding of these kinds of key terms, the more likely people end up talking about very different things under the exact same flag. There is thus a strong need for the various agencies to streamline their definitions and requirements.

Also, at the level of the project itself, more transparency is needed regarding planned and executed interventions. There should be clarity on the current state of desertification and which specific aspects of it will be addressed. In terms of the activities of the project, it should be very clear which actions are undertaken and how these will lead to the desired impacts. At present, the trajectory from activities to desired impacts often remains very vague. This kind of clarity could be provided at the proposal stage, but could equally be provided after proposal acceptance. Note that there would be no reason to cast all this in stone. Transparency on the details of activities and expected impacts does not have to be in contradiction with adaptive management; in fact, adaptive management gains only in quality with a greater degree of transparency because it will be easier to pinpoint potential issues and respond in a proactive manner.

Pre-intervention Analysis

A first step in estimating impacts is a detailed pre-intervention analysis (which could be post-proposal acceptance). This involves at least 4 components: (1) the establishment of a desertification baseline; (2) an analysis of specific gaps and impediments; (3) the establishment of the key ecosystem services involved; (4) an evaluation of tradeoffs.

The development of a desertification baseline should focus on determining what the exact local issues are that need to be addressed and include how these issues vary in time and space. This thus involves a spatially and temporality dynamic baseline that could be expressed in quantitative or qualitative terms. The main objective is that in order to track the impact of interventions, it is necessary to know in detail what specific desertification issues need to be addressed through the interventions.

The analysis of specific gaps and impediments should focus on the gaps in knowledge and the legal frameworks, as well as any impediments to sustainable land management caused by the physical infrastructure or the social, political and economic environment. In other words, locally, what are the specific issues that prevent proper land management or hamper rehabilitation of already desertified land? Such an analysis should go beyond common places or vague statements, and should involve an in-depth description of the specific problems of the intervention area.

The establishment of an overview of the key ecosystem services should focus on which ecosystem services are threatened by desertification, which ecosystem services will be improved when desertification is addressed and how these ecosystem services are particularly important for human wellbeing in the intervention region. Following the definition of the Millennium Ecosystem Assessment (2003), four categories of ecosystem services can be distinguished, each with multiple sub-categories: supporting services, provisioning services, regulating services, and cultural services. Supporting services are those ecosystem services that are necessary for the production of all other ecosystem services. Their impacts on people are either indirect or occur over a very long period of time. Provisioning services are the products people obtain from the ecosystem (these are sometimes also referred to as ecosystem goods). Regulation services are the benefits people obtain from the

regulation of ecosystem processes. Finally, cultural services are the non-material benefits people obtain from the ecosystem. Establishment of the ecosystem services at stake is important because it provides insight into the interactions and feedbacks between land use, land degradation and human wellbeing.

The evaluation of tradeoffs should focus on what side effects will occur if the earlier identified gaps and impediments are addressed. The key question is whether addressing those issues will introduce undesirable tradeoffs, which could involve increased desertification, effects on human wellbeing, social equity, etc. (Scholes and von Maltitz 2006). Once the potential tradeoffs are identified, an evaluation can be made as to how to address these tradeoffs or how to adjust the intended intervention to reduce negative side effects.

This extensive pre-intervention analysis will not only facilitate estimating and tracking impacts, but it will also lead to better project implementation. This improvement can be expected because the pre-intervention analysis will bring out and make explicit the tacit knowledge of the project team, making it easier to discuss the various aspects and increase transparency.

Implementation Analysis

The next step involves a careful analysis of how the project implementation will address the issues identified during the pre-intervention analysis. This involves at least three aspects: (1) determining how the identified gaps and impediments will be addressed; (2) identifying which concrete activities will be pursued and what their spatial reach will be; (3) establishing timelines and scale of expected impacts. In each case, it is very important that the analysis is as concrete as possible. For example, an item such as “Capacity building in the ministry of agriculture”, that may be in the project log frame, needs to be specified in terms of what capacities should be enhanced, for which staff, within which time frame, and how this will eventually lead to desertification prevention or reduction and in which areas. Similarly, a log frame item such as “SLM adoption in 50 villages” should be expanded in terms of a specification of the specific SLM methods, which villagers will be involved, what area per village will be affected, and within what time frame.

Figure 1 shows a very simple example of how a gap in farmer knowledge, namely unfamiliarity with a certain modern technology, could be addressed. This example shows the basic logic of how the issue will be addressed, but does not include information on the time frame or spatial scales.

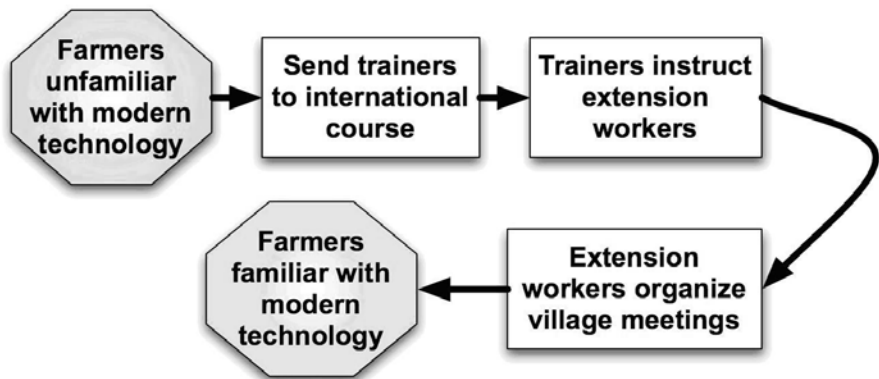


Figure 1: An example of how the solution to a particular gap can be shown graphically.

Figure 2, instead, shows a timeline for various interventions and shows how certain activities are expected to extend beyond the end of the project and thus offer sustained impacts, whereas other activities are expected to end with the project. For impact assessment this is valuable information, as it will make it easier to take into account the longer-term impacts of indirect interventions such as the creation of an enabling environment and any sustained SLM activities that may occur because of the indirect intervention. If we were to simply measure changes in the field at the end of the project, an underestimation of the true impact of the project would occur, which in turn might lead to a preference in projects for short-term impacts in order to obtain a positive evaluation.

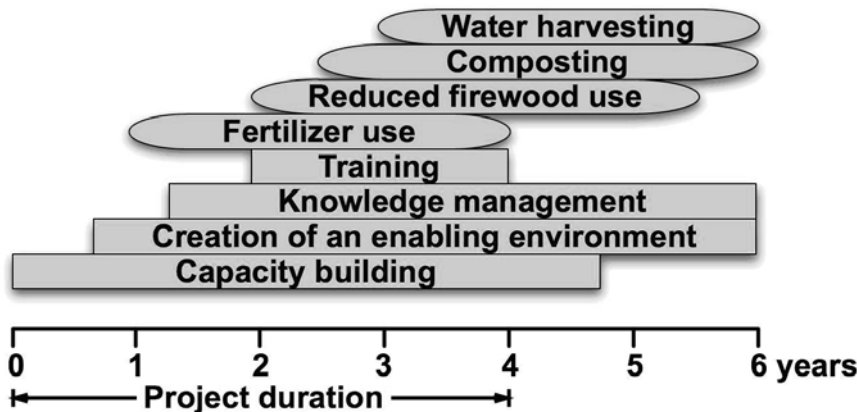


Figure 2. An example of a hypothetical timeline of interventions and extended impacts for a 4-year project.

Probably the most straightforward way of dealing with the three inter-related aspects of project implementation is by developing solution trees. A solution tree reveals what steps need to be taken to address a specific issue and can also include information on the timeline and spatial reach of the expected impact. Figure 3 shows a simple sample solution tree with only a rough indication of the timeline. The most important aspect of this style of solution tree is that it indicates the expected response rates or uptake levels for each step in the tree. This is vital information for making an educated estimate of the expected impact of the intervention, in this case of the capacity building within the ministry of agriculture towards enhanced knowledge among the extension workers.

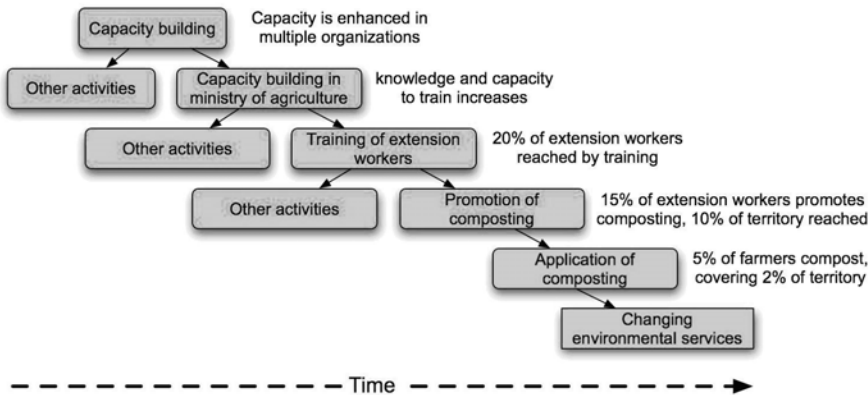


Figure 3. A simple sample solution tree.

One of the key benefits of solution trees such as the one in Figure 3, and timelines such as the one in Figure 2, is that they make explicit the tacit knowledge of the project team in a way that can aid internal discussions within the project team on the best approaches to achieve the project objectives. This allows external experts to provide more appropriate and better feedback to the project team, and provides a transparent way to estimate impacts in terms of intensity, timing, duration and spatial coverage.

Solution trees provide a far more transparent and reliable way to predict expected impacts from indirect interventions such as knowledge management or capacity building, and even from direct interventions such as the application of specific SLM practices, than a project log frame. A log frame is more an administrative tool that provides insight into the logic of a project or makes explicit the tacit knowledge of the project team that is behind the project implementation.

Adaptive Management and Impact Tracking

The implementation analysis is only the first step of the process. It can provide an initial estimate of the expected impacts. The true benefit of the solution trees comes from the ability to use them for adaptive management and impact tracking. Over time, as the project is implemented, insights will be gained into actual uptake and response ratios, as well as into timing and spatial coverage. This information can be used to update the solution trees and re-estimate expected impacts, but can also be used to explore alternative strategies and facilitate adaptive management. A spreadsheet-based calculation tool could help to calculate multiple what-if scenarios by changing uptake ratios or spatial coverage in response to experiences with on-going activities or by considering alternative interventions. Optimization could be done for long-lasting impacts, for short-term impacts, for spatially wide reaching impacts, etc. Many such decisions are also made today, based on consultation with experts, feedback from evaluation missions, or lessons learned by the project team. However, in many cases these kinds of decisions are made based on tacit knowledge and experience, which can be made transparent and explicit using the solution trees. Making these insights explicit can potentially lead to better decisions and enhanced impacts. It will certainly lead to better estimates of the impacts of the project activities. Impact is no longer something that can only be established after the fact and often with great difficulty; impact becomes something that can be tracked dynamically.

For mid-term and final evaluations, objectives can be compared with estimates of the achieved impacts, achieved uptake and response ratios can be evaluated, and temporal and spatial reach can be examined. This does not mean that a project should be pinned down on initial plans. Impacts can be achieved in many different ways, and using solution trees a project manager can easily argue why there were deviations from original plans or why different impacts were achieved than originally envisioned.

Impacts can be expressed in terms of specific ecosystem services that have been enhanced, or in terms of proxy-indicators such as human wellbeing, or in terms of changes in the condition of the land. In some cases, measurements can corroborate the estimated impacts from the solution trees. In other cases, the impact estimated from solution trees can be supported by peer review or expert evaluation. Impact can be expressed relative to the area reached or relative to the population that benefits from it.

Knowledge management and impact indicators

As more data becomes available from projects implementing solution tree based adaptive management and impact tracking, it becomes possible to use this

information for knowledge management at agency or even global levels (Niamir-Fuller 2006). By collecting data on actual uptake ratios and response levels for a variety of interventions, insight will be developed into the variability of these ratios and levels, as well as their averages. Knowledge will also be gained regarding successful solution trajectories and particular tradeoffs. This will form a very valuable basis for well-structured knowledge management within projects and agencies. On the basis of the growing experience and knowledge base, it will be possible to make better initial estimates of impacts, uptake ratios and response levels, timing and duration of impacts and their spatial reach, as well as effective solution paths. This will allow for better initial decisions and also facilitate adaptive management within projects and agencies.

Parallel to the approach outlined in this paper, an indicator system could be developed based on proxy indicators that are not as expensive or hard to measure as the real condition of the land indicators, but that can still provide a reasonable estimate of how the land is developing. One can think of indicators such as crop yield, plant cover, and human wellbeing. Such indicators can, in most cases, only provide an indication of the impact of interventions after the fact and have problems of attribution, but they can nevertheless be very valuable in serving as a basis for triangulation with the results from the approach outlined in this paper. For this kind of measurement and proxy-based assessment, it would be good to compare the trends, over time, of selected indicators for the “treated” intervention sites with comparable “untreated” areas. While such an approach can facilitate attribution, it is not a cure-all solution, as “untreated” areas may experience other developments or interventions that affect desertification. Additionally, the “untreated” areas are likely to be affected by the indirect interventions, such as the creation of an enabling environment, in similar ways to the official “treated” area. Still, by estimating impact in different ways, by enhancing transparency through solution trees, and by analyzing the results from multiple projects, it should be possible to achieve far better insight into the actual impact of interventions.

Conclusions

The newer, integrated and holistic approaches to combating desertification are without doubt an improvement over the sectoral technical assistance of the past. Yet at the same time, there is little actual proof of these approaches leading to the desired effect: a reduction of desertification. It is therefore important to have a better picture of the impact of indirect interventions such as knowledge management and mainstreaming, as well as direct interventions such as specific sustainable land management practices.

The approach outlined in this paper suggests that greater transparency is needed in terms of what are the exact issues that a project addresses and how the project activities will lead to actual impacts on the land. Solution trees can help to add transparency to project implementation decisions, can help to make the tacit knowledge of project teams more explicit, can help to facilitate adaptive management, and can lead to reasonably good estimates of achieved impacts, in both time and space. This will enhance the accountability of interventions in environmental terms, and facilitate knowledge management within both projects and agencies.

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Land Degradation Assessment in Drylands

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Introduction

The Land Degradation Assessment in Drylands (LADA) project develops tools and methods to assess and quantify the nature, extent, severity and impacts of land degradation on dryland ecosystems, watersheds and river basins, carbon storage and biological diversity at a range of spatial and temporal scales. It also builds the national, regional and international capacity to analyze, design, plan and implement interventions to mitigate land degradation and establish sustainable land use and management practices. A contribution will be made to the Developmental Goals of UNCCD and UN multi-lateral agencies to improve people's livelihoods and economic wellbeing.

To achieve these objectives, LADA develops standardized and improved methods for dryland degradation assessment, including stratification, with guidelines for their implementation in a range of scales. Using these methods, it will assess the regional and global baseline condition of land degradation with the view of highlighting the areas at greatest risk. These assessments will be supplemented by detailed local assessments that will focus on root cause analysis of land degradation and on local (traditional and adapted) technologies for the mitigation of land degradation. Areas where land degradation is well controlled will be included in the analysis. 'Best practice' guidelines will be developed and the results widely disseminated in various media. The project is intended to make an innovative generic contribution to the methodologies and monitoring systems for land degradation, supplemented by empirically-derived lessons from the six main partner countries involved in the project – Argentina, China, Cuba, Senegal, South Africa and Tunisia – up-scaled to countries within their regional remit.

Background

Many efforts have been carried out in the last decades in order to understand, assess and monitor land degradation, although to date there is no mechanism in place that collects and disseminates comparable information within countries, across regions and at an international level. To respond to the needs of up-to-date and comparable land degradation information, the Global Environmental Facility (GEF) has funded the Land Degradation Assessment in Drylands (LADA) project, to be implemented by the United Nations Environmental Programme (UNEP) and executed by the Food and Agriculture Organization of the United Nations (FAO). This project has benefited from the support of the United Nations Convention to Combat Desertification (UNCCD), the International Soil Reference and Information Centre (ISRIC), the United Nations University (UNU), the Global Land Cover Network (GLCN) and other regional and national partners. The project started in May 2006. The present project has been prepared through a PDF-A phase (2000-2001) and a PDF-B phase (2002-2004).

Pilot countries

Six countries participate in the project as pilot countries. They are: Argentina, China, Cuba, Senegal, South Africa and Tunisia. They will contribute to the project in-kind and/or in-cash.

Objectives

- To develop and implement strategies, methods and tools to assess, quantify and analyse the nature, extent, severity and impacts of land degradation on ecosystems, watersheds and river basins, and carbon storage in drylands at a range of spatial and temporal scales.
- To carry out a global assessment of land degradation.
- To build national, regional and global assessment capacities to enable the design, planning and implementation of interventions to mitigate land degradation and establish sustainable land use and management practices.

Outcomes

As a result of the land degradation assessment it will be possible to identify:

- The status or baseline, and trends of land degradation in drylands.
- The hot spots: in the LADA context, hot spots are areas where swift rehabilitation action is required as land degradation is particularly severe or fast, with actual or expected harmful or extensive impacts on-site or off-site. A hot spot may also be an area where the land is vulnerable and threatened by degradation.
- The bright spots: in the context of LADA, areas without significant land degradation that are stable naturally or under the present conditions of sustainable management. A bright spot can also be a formerly degraded or vulnerable area where land protection or rehabilitation has been successful or is in progress.
- The major driving forces and pressures leading to land degradation in hot spots and to improvements in bright spots.
- The status of land degradation at national and sub-national scale, and the driving forces and pressures leading to resource degradation for the pilot countries.
- Quick and participatory local assessment tools, for which guidelines will be prepared and distributed to the pilot countries.

In the final part of the project, an analysis of the findings will be carried out, aimed at identifying cause-effect relations between the different indicators of land degradation within the DPSIR conceptual framework.

Finally, a global action plan will be prepared and proposed to the partner countries and the international community at large, containing all the findings of the project and conclusions and recommendations for further action.

The LADA Approach

Based on the outcome of the preparatory studies, a seven-step approach has been formulated, which is considered to be the modular part of the LADA methodological framework. The seven steps of the LADA approach are:

1. Preparation of initial studies.
2. Establishment of national LADA task forces.
3. Stocktaking and preliminary analysis.
4. Developing a stratification and sampling strategy.
5. Field survey and local assessments.
6. Development of a LADA decision-support tool.
7. Development of a LADA monitoring tool.

At every stage a feedback loop is included.

This LADA approach integrates biophysical and socio-economic components of land degradation at different scales, recognising that socio-economic issues are also driving forces of pressures that have an impact on land conditions.

The LADA approach further recognises that land degradation assessments should: (i) capitalise on existing initiatives, (ii) focus on the goods and services of the drylands, (iii) work with local stakeholders, and (iv) develop a standardised methodology that will monitor land degradation in time. It also recognises that humans are an integral component of most ecosystems and emphasises the understanding of the immediate and underlying causes of threats to biodiversity, leading to policy and management interventions at appropriate levels. The LADA approach applies the integrated approach to ecosystem management at local, agro-ecological zones, and national levels.

The LADA methodological framework comprises the LADA approach and a set of tools for the different scales of land degradation assessment, from the global to the sub-national level. It incorporates: participatory rural appraisals; expert assessments; field measurements; remote sensing, geographic information systems (GIS), modelling and other modern means of data generation and dissemination for analysing and sharing information.

Key elements of this strategic approach are:

- participation and inclusion of different perceptions of land degradation;
- combination of expert assessment and local knowledge;
- use of adapted assessment tools for specific environments.

To understand the process of land degradation at sub-national, national and regional levels, the LADA approach relies on the “Driving Force – Pressure – State – Impact – Response (DPSIR) Framework”. The DPSIR framework states that driving forces exert pressures on the environment and that these pressures can induce changes in its state or condition. The subsequent impacts on socio-economic and biophysical attributes cause society to respond by developing or modifying environmental and economic policies and programmes aimed at preventing, minimising or mitigating pressures and driving forces.

Indicators toolbox and visual soil assessment tool

During the PDF-B phase, the LADA project started developing an indicator toolbox containing a minimum set of indicators that can be measured at local and global scales, and which allow for extrapolation at these different scales. Development of the toolbox will continue during the full-scale LADA project. The LADA indicators are relatively easy to measure or obtain and are therefore of low cost. The LADA indicators are related to several conditions of the land, in such a way that they can describe the system in a cost-effective way.

The LADA project has also developed a local assessment tool, a set of simple and inexpensive assessment techniques which can be gradually learned by farmers and which are related to their needs for improving land conditions. These Visual Soil Assessment (VSA) indicators are morphological and measured soil characteristics that allow for the transfer of information between sites, soil types, land uses, etc., while providing a cross-check and physical reality to structure descriptors.

Structure of the Project

The project operates at different levels of scale. It has a global component, which will be based mostly on remote sensing information, with a relatively small amount of groundtruthing. The national component will combine remotely sensed datasets with information collected at the national level and expert knowledge.

Finally, the local level will be based on field work and local expertise.

Global component

The global component consists basically of three lines of work.

a) A study of the trends in Net Primary Productivity (NPP) and Rainfall Use Efficiency (RUE) through the analysis of NDVI data

This method takes into account 21 years worth of a series of NDVI data. They are then converted into NPP and RUE. Those areas where the RUE has constantly decreased in the past years will be considered as hot spots for this specific indicator, while the areas where the RUE has increased will be noted as bright spots.

This method has been developed by ISRIC, and has been tested in China and in Kenya in the LADA framework.

b) A study of the land cover change to agricultural and urban areas through the analysis of Landsat data

This method has been developed by GLCN. It uses a comparison between the current land cover, as it appears from the most recent Landsat images, and the situation as it appears in two other series of images taken in the '70s and the '80s. Those areas where there has been a change from forest or rangeland to agriculture or urban will be considered hot spots for this indicator.

c) Farming systems mapping at the global level

The global farming system will be created following a methodology proposed by Dixon *et al.*¹, and developed at FAO, to be adapted to the needs of a land degradation assessment. It is based on the analysis of three sets of biophysical data (LGP, DEM, LC), using a combination of expert knowledge and simple spatial modelling, to form a spatial information base on land use which can be flexibly queried by end-users to support a wide range of land interventions. The resulting map could be used in planning local assessments of land degradation as well as in formulating interventions for reducing land degradation. The map units are then characterized using other sets of biophysical and socio-economic data to be used as DPSIR indicators. These mapping units will become the cartographic basis for the subsequent national assessment.

National component

The national component of LADA will be carried out mostly by national institutions in the partner countries, supported by the project. It will consist basically of a collection and analysis of locally available data and information and their processing, in order to make them compatible with international standards and to make them comparable with the results of the global studies. In doing so, the countries will be able to refine

¹ Dixon J., Gulliver A., Gibbon D. and Hall, M. – Farming systems and poverty – FAO and World Bank – Rome and Washington D.C. - 2001

and detail the maps obtained under the global study and to have a national cartographic base for land degradation assessment.

National expert knowledge will be applied to characterize the base map with land degradation and land management characteristics at the sub-national level. The results of this exercise will be compared with the hot and bright spots identified at the global level, and will serve as a basis to guide the local assessment survey described below.

Local component

Local assessments will be carried out in areas selected by each country following the national land degradation assessment. Each participating country will initiate detailed assessments for at least two sites, supported by national-level policy forums to create the linkage processes to local by-laws, national planning and development practices. The steps towards achievement of the planned result will commence with the training of relevant professionals in land degradation assessment, impact analysis and related developmental factors. These assessments will be made according to low costs and speedy procedures, like the Visual Soil Assessment method, and will follow a participatory approach in order to obtain a stronger involvement of local stakeholders. The local assessments will also analyze indicators in the DPSIR framework, taking into account both biophysical and socio-economic indicators. The detailed assessment methodology will be defined in guidelines to be prepared in collaboration with the University of East Anglia, the VSA group, WOCAT and in consultation with ISRIC.

The local assessment activity will also give the opportunity for groundtruthing of the remote sensing information utilized for the global assessment.

Capacity building

As already seen, capacity building is one the main objectives of the project. At all stages of interventions, substantial attention will be given to training, institutional and technical capacity building. Institutions will be facilitated and integrated in policy and decision-making. Particular emphases will be on multi-stakeholder involvement and participation, especially of land users, farmers and the rural poor at the local level, and of policymakers at the national and global levels. Local professionals and extension agents will be trained in field assessment of land degradation through the adoption of a farmer-perspective and through the use of a sustainable rural livelihoods approach. Best practices will also identify the synergies between different global benefits (biodiversity, climate change, international fresh water basins/river systems) and between global and local benefits (food security, livelihood support, and poverty alleviation). A further feature of LADA will be to adapt scientific knowledge at global, regional and national levels in order to integrate with the local knowledge where local people have successfully controlled land degradation.

It is worth noting that the capacity building activity will have a special focus at the regional level, through the establishment in the pilot countries of six regional training centres on land degradation issues. The regional centres will be created with the collaboration of the national partners, their trainers will be prepared and the curricula studiorum will be defined.

Relevance of LADA for Policy Making

The new capacities and knowledge base that will be produced by the project will constitute a base for more awareness of policy making at the national and global levels. All the information will be made available to interested parties through a set of

means such as workshops, publications, web-based information systems and the increased expertise of the national and international organizations involved.

LADA will communicate and exchange land degradation information in order to complete the linkage to policy process and decision-making. It will do this through policy guidance (for example, in UNCCD Regional, Sub-regional and National Action Programmes), GEF and implementation agency interventions in land degradation control, and the identification of priority actions, such as policy and institutional reforms and development investments, at all levels. Communication and exchange will be furthered by the implementation of the best practices to identify land degradation issues and employ lessons to check and reverse problem issues and the development of monitoring on the changing severity of land degradation and effectiveness of remedial control measures.

LADA Links with Other Initiatives

Land degradation is a global issue which cannot be properly addressed in isolation. Hence, the project collaborates with several other initiatives at the international level, as follows:

- Cooperation with the World Bank on the Terrafrica project and with UNEP in the Global Environment Outlook (GEO-4) assessment.
- Implementation of the LADA information system part in the CACILM project, a GEF/ADB initiative in Central Asia.
- Close cooperation with the GEF/UNDP KM:Land project, the PAP/RAC project and with several EU initiatives (DeSurvey, MEDCOASTLAND, DESERTLINK).

Other contacts, links and collaborations will be sought, in order to contribute to the international efforts towards sustainable agriculture and land management in the framework of the Multilateral Environmental Agreements (MEAs), most notably UNCCD, UNFCCC and UNCBD.

Acronyms

CACILM	Central Asian Countries Initiative for Land Management
DEM	Digital Elevation Model
DPSIR	Driving force, Pressure, State, Impact, Response
FAO	Food and Agriculture Organization
GEF	Global Environment Facility
GLCN	Global Land Cover Network
ISRIC	International Soil Reference and Information Centre
LADA	Land Degradation Assessment in Drylands
LGP	Length of Growing Period
LC	Land Cover
NDVI	Normalized Difference Vegetation Index
NPP	Net Primary Productivity
RUE	Rainfall Use Efficiency
UNCBD	United Nations Convention on Biodiversity
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VSA	Visual Soil Assessment
WOCAT	World Overview of Conservation Approaches and Technologies

Knowledge Management and Policy in Combating Desertification in China

Wang Hong

Capacity Building to Combat Land Degradation Project under The PRC-GEF Partnership on Land Degradation in Dryland Ecosystems

1. Introduction

Knowledge management and accumulation are necessary for policy making. The more important aspect is to involve policy makers in the knowledge management system. Therefore, knowledge management needs the participation of government officials, scientists and local peoples at the community level. Clear objectives should be made for knowledge management of combating desertification. These objectives are relevant to the priorities of combating desertification. In order to improve knowledge management on combating desertification, the specific organization should be responsible for this mission.

China is one of the countries in the world suffering from a vast area and wide distribution of desertification. By the end of 2004, the area of desertification was 2.6362 million km², taking up 27.46% of the total territory. With rapid increase of population, intensification of conflicts between the demand of humans' living and the fragile ecosystem, unwise human activities such as excessive cultivation, overgrazing, deforestation, excessive fuel wood collection and plants harvesting and irrational water resource use are continuously prevailing problems. The desertification process is still ongoing.

Recently, China drafted the National Action Programme (NAP) for the implementation of the UNCCD. This paper will focus on reviewing the NAP to identify the priorities of UNCCD implementations in China. Policy making requirements at national, regional, local levels will be analyzed in order to overcome the barriers mentioned above. Do existing knowledge management systems and approaches provide necessary information to the policy making? The gaps between knowledge management and policy-making on combating desertification will be identified. Finally, recommendations on knowledge management and policy-making for better implementation of the UNCCD will be given.

2. Features of Knowledge Management (KM)

KM is a new concept

In China, KM is a new concept. Searching on the internet, you will find that most case studies refer to business companies. However, this doesn't mean that KM has not happened in other agencies in China. It was just expressed using different words. Examples such as archives management, compilation of scientific and technological results, and proceedings of workshops and seminars with specific topics belong to KM.

Adaptive approach to KM

KM is a kind of management and it needs a clear objective. It is driven by requirements. The analysis is a very important process of KM. It is more than just simple knowledge accumulation and search. An analysis process as a brainstorm should be associated with past experiences, current situations and future strategies.

Duly adjusting strategies of an analysis process according to new situations is necessary. Therefore, KM should take an adaptive management approach.

KM needs an effective organization mechanism

Another important aspect of KM is information sharing. The most effective technique is internet-based. The specific institution should be responsible for the tasks, including data and information collection, analysis, compilation and distribution to target groups. A solid funding is necessary to support KM practices. The quality of KM relies on the investment of time, human resources and funds.

KM of Combating Desertification in China

Desertification is a complex issue that covers different aspects of the natural and social sciences. It is a challenge to carry on KM of combating desertification. KM of combating desertification should aim at issue resolution rather than focusing purely on management.

The Status of desertification

China suffers from a vast area of desertified land, with wide distribution and complex types. The climatic zones prone to desertification in China cover the vast area of the foot hill west of the Daxinganling Mountain and to the north of the Great Wall, and the western and northern parts of the Qinghai-Tibet Plateau, which totals 3.317 million km², taking up 34.6% of the total territory, and is distributed over 498 counties (cities/banners, hereinafter referred to as counties) in 18 provinces.

According to the 3rd National Monitoring Survey for Desertification and Sandification, by the end of 2004, the area of desertified land in China totaled 2.632 million km², taking up 27.46% of the territory and 79.4% of the total area prone to desertification, which is higher than the world's average of 69%. The area of desertified land as a result of wind erosion totals 1.839 million km², taking up 19.16% and 69.77% of the total territory and desertified land, respectively, and it is distributed in 13 provinces in northwest, north and northeast China, thus forming a sandified zone from the Tarim Basin in the west to the Songnen Plain in the east. The area of desertified land as a result of water erosion totals 259 300 km², distributed mostly in the Loess Plateau in the upper and middle reaches of the Yellow River. The area of desertified land as a result of freezing and thawing totals 363 600 km², distributed mostly in the alpine zone of the Qinghai-Tibet Plateau. The area of salinized desertification land totals 173 700 km², distributed mainly in the oasis around the Tarim Basin, the alluvial plain at the northern foot of the Tianshan Mountain, Hetao Plain and Huabei Plain.

KM of science and technology

In the 1950s, a survey on water and soil conservation was started in the middle reaches of the Yellow River, led by the Chinese Academy of Science (CAS). The task force comprised 30 institutes and universities and more than 300 research scientists. Integrated agriculture, nature and economic planning, water and soil conservation planning, land use planning in priority districts and measures of water and soil conservation of different types was developed based on the investigation of physical, social and economic conditions.

KM of science and technology for combating desertification is closely connected with the research institutes. Institutions with different research fields and missions were established in the CAS in the 1950s. Presently, they have been regrouped into new institutes, such as the Cold and Arid Region of Environmental and Engineering Research Institute, Xinjiang Institute of Ecology and Geography, Shenyang Institute

of Applied Ecology, Institute of Botany, Institute of Geographical Sciences and Natural Resources Research, Institute of Atmospheric Physics, Xian Institute of Earth Environment, Research Center of Ecology and Environment and Institute of Water and Soil Conservation, etc. These institutes provide scientific information for the decision-making of the government on the sustainable development of nature, economy and society.

Aside from the research institutes of CAS, the research academy under government agencies such as the State Forestry Administrative, the Ministry of Agriculture, the Ministry of Water Resources, etc. engaged in the research activities of combating desertification. Moreover, research institutes with regional characteristics were established on the experimental station of sand control in the 1950s, such as Gansu Desert Control Research Institute, Liaoning Sand Control and Silviculture Institute, Shaanxi Sand Control Institute, Forestry Academy of Inner Mongolia, Ningxia Academy of Agriculture and Forestry, Xijiang Forestry Academy, and Qinghai Forestry Research Institute. They carried on many investigations and experiments at the local level. Successful practices and measures of combating desertification suitable to local conditions were summarized.

KM of laws and policies

Human activities are one of the main causes of desertification. Enacting laws and implementing policies will play an important role in restricting human activities. In the past decades, legislative framework for combating desertification has been improved.

China has promulgated a series of laws related to combating desertification, including the Prevention and Control Desertification Law (2002), the Environmental Impact Evaluation Law (2003), the Meteorology Law (2000), the Law of Land Contract in Rural Areas (2003), and the Renewable Energy Law (2006). The Law of Grassland (2002), the Water Law (2002) and the Law of Land Management (2004) were enacted in the 1980s and recently revised. The Forest Law (1984) and the Environmental Law (1989) are currently being revised.

In addition, the national and local governments have developed and promulgated a range of supporting rules and regulations, which give rise to a legal framework for combating desertification, such as Administrative Measures for Profitable Prevention and the Control of Desertification (2004), Administrative Measures for the Monitoring of National Desertification and Desert Land (2003), and Administrative Measures for the Collection of Licorice Roots and Chinese Ephedra (2001). Other such rules and regulations include the Land Reclamation Regulation (1988), Regulations on Arable Land Restoring to Forestry (2002), Administrative Measures for Harnessing and Developing Four Rural Wasteland Resources (1998), Administrative Measures for Balanced Grass and Husbandry (2005), Administrative Measures for Forestry Management over Protective Construction Projects for Natural Forestry (2004), Administrative Measures for the Transfer of Contracted Land in Rural Areas (2005) and Tentative Procedures for Public Hearing of Administrative Permission in Environmental Protection (2006).

In the last 10 years, a series of policies have been promulgated focusing on logging restrictions on windbreak and sand fixation forests, quickening the restructuring of rural living energy in desertification-affected areas, strengthening the extent of energy saving techniques, improving energy efficiency, enforcing construction and management of sandified area reserves and implementing environmental impacts assessment on the newly launched exploitation and construction projects. The government formulated the relevant policies to establish a system of responsibility for desertification control and stable input mechanism, to provide preferential taxation and concessional loan support to encourage all stakeholders' participation in

combating desertification, and to safeguard lawful rights and interests of the persons involved in combating desertification. Practices of a series of policy measures effectively facilitate desertification control and prevention in China, which include: further enlarged opening of forestry-related departments; lifting the ban on the development of non-public owned forestry through facilitating rational transfer of use rights of forest and forest land; operation of the administrative mechanism based on classified forestry management.

Law and policy promulgation are based on thorough investigation, studies and comments. Each law and policy promulgation is a good example of KM.

3. Approaches for Effective Knowledge Management

Effective KM can contribute to policy making. KM is a tool rather than an objective of policy formulation. Therefore, identifying the future requirements of policy making is an effective approach of KM.

The international Conventions and national macro-policies

IYDD activities have referred to a lot of international Conventions and policies. This context is not repeated in this paper.

The Eleventh Five Year Plan (2006-2010) in China was formulated earlier this year. It is the main guideline for future policy-making, which includes a people-centered, scientific approach, with coordination among regions, and emphasis on natural restoration of ecology and environment, socialism in new rural construction, sustainable development of economy and society etc. Public participation and civil society were included in the government agenda.

In its revision, the National Action Plan of the UNCCD has identified priorities in combating desertification. They are: (1) to set up a programmatic system for combating desertification focused on national priority programs; (2) to establish and improve policy and legal systems for combating desertification; (3) to establish a scientific management mechanism for combating desertification; (4) to strengthen a science and technology supporting system for combating desertification; (5) to enhance personnel training for combating desertification; (6) to establish desertification monitoring, early warning and drought control systems; and (7) to instruct and facilitate the establishment of a sustainable industry system in sandy areas.

The Eleventh Five Year Plan and priorities of combating desertification in the NAP put forward the objectives and strategies of KM in the future.

The gaps for policy improvement

The legal framework for combating desertification is not perfect, despite a number of laws and regulations relevant to desertification control being enacted. The interlinkages among these legal instruments and between instruments and policies needs harmonizing, and the procedures for enforcing them needs improvement. Loose control is common in some areas because of the insufficiency of publication and popularization of the provisions. Moreover, efficiency in law enforcement is reduced due to the legislative defects in some of the legal instruments, such as weak operation and lack of powerful clauses, which can effectively restrict activities such as excessive cultivation, overgrazing, excessive logging, excessive herb collection and uncontrolled exploitation of water resources.

Policy measures, such as financial support encouraging the participation of private sectors, taxation incentives, favorable land use policies, and the protection of legal rights and benefits of individuals who manage land, are still in the stage of testing and evaluation, and will need further improvement.

Introducing new ideas and approaches to policymakers

New ideas and approaches, such as integrated basin management, integrated ecosystem management, public participation, and participatory land use planning etc., were introduced through international cooperation project implementation. These new ideas have been integrated into all aspect of society in China and have a positive impact on policy makers.

Knowledge management and accumulation are necessary for policy making. The most important aspect is to involve policy makers in the knowledge management system. KM needs the participation of government officials.

Intensifying capacity building

Efforts should be given to the implementation of compulsory education on desertified areas, so as to enhance the overall education level in these areas in a short period of time. Training of technicians related to all desertification control techniques should be strengthened, and on-the-job training and education will be encouraged. International cooperation and cross-regional cooperation nation-wide should be promoted as part of capacity building for improving the quality of policies.

4. Conclusions and Recommendations

KM is a new concept in China. KM of combating desertification needs clear objectives and effective organization mechanisms. KM should be based on the past accumulation of knowledge and experience. Effective KM should follow the international Conventions and macro-policies at national levels, identify the gaps for policy improvement, introduce new ideas and approaches, and involve policy makers into knowledge management systems aimed at future policy making.

La Recherche scientifique, un moyen de lutte contre la désertification

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Introduction

La désertification est un des problèmes environnementaux majeurs de ces dernières décennies. La communauté scientifique a démontré le caractère multidimensionnel (ressources en eau, sols, forêts, climat, agriculture, pauvreté) du processus. Lors du Sommet de la terre (CNUED, Rio de Janeiro, 1992), elle a permis la prise de conscience par la communauté internationale de l'importance du phénomène, qui a atteint aujourd'hui une dimension planétaire. La désertification touche près d'un sixième de la population mondiale et 70% de la surface totale des terres arides. 10 millions d'hectares de terres arables se dégradent tous les ans, un tiers de la superficie des terres émergées du globe, soit 4 milliards d'hectares, est menacé par la désertification et plus de 250 millions de personnes sont directement affectées par ce problème. Ce constat a donné lieu à la Convention des Nations Unies sur la Lutte contre la Désertification (CCD), adoptée à Paris en juin 1994 après de dures négociations. Le programme d'action défini dans l'Agenda 21 préconise une gestion des écosystèmes fragiles par la lutte contre la sécheresse et la désertification. Dans ce contexte, la Convention a invité la communauté scientifique, par l'intermédiaire du Comité de la Science et de la Technologie, à s'impliquer dans les actions de lutte contre la dégradation des ressources naturelles et des conditions des milieux en développant des recherches appliquées dans les zones affectées par ce phénomène. Les participants au Sommet de Johannesburg en 2002 ont recommandé que les connaissances scientifiques doivent influencer sur la prise de décision et assurer un accès peu coûteux à la connaissance scientifique.

Le spécialiste devrait être un soutien scientifique et technique pour la conception et l'élaboration de méthodes d'actions de préservation des écosystèmes ; il doit fournir des outils d'aide à la décision, validés en permanence, et le décideur ne devrait agir que sur la base d'une consultation et d'une expertise sur l'efficacité de son action auprès d'experts reconnus par leurs pairs.

1. La Lutte contre la désertification par la connaissance : la contribution de la recherche scientifique

2.1. Intérêt de la recherche pour les régions arides

Les recherches scientifiques dans les régions arides, et se rapportant au processus de la dégradation des terres, remontent assez loin dans l'histoire contemporaine. Lavauden en 1927 avait donné une signification scientifique à la désertification et en a imputé les causes à l'action de l'homme (Cornet, 2001).

Les études sur l'écologie des zones arides et semi-arides ont vu le jour avec les programmes de recherche de l'UNESCO vers la fin des années cinquante. Les écosystèmes arides et semi-arides ont été étudiés dans leur structure et dans leur fonctionnement dans différentes régions du globe.

Un grand essor a été donné aux recherches entreprises, de par le monde, sur la dégradation des ressources naturelles dans les zones sèches, à vocation essentiellement pastorale, durant les années soixante-dix, après la Conférence des Nations Unies sur l'Environnement Humain organisée à Stockholm en 1972 et après

la grande sécheresse qui a sévi dans le Sahel, de 1968 à 1970 et de 1973 à 1974, et la grande famine qui s'en est suivie. L'Assemblée Générale des Nations Unies a adopté un Plan d'Action pour Combattre la Désertification (PACD), dont la mise en œuvre a été confiée au PNUE, nouvellement créé.

Les scientifiques ont axé leurs travaux sur la compréhension du phénomène, l'évaluation de la dégradation, et sur la perte des ressources naturelles ; les principales études ont été menées le plus souvent à des niveaux stationnels et très peu à l'échelle nationale.

Depuis, au fur et à mesure de l'avancée des connaissances, la désertification a connu de nombreuses définitions qui ont fait l'objet de controverses intellectuelles. Cornet, en 2001, a même suggéré que le nombre et la variété de définitions utilisées pour le terme désertification ont été des tentatives de mobilisation de moyens supplémentaires pour la lutte contre la désertification.

Au-delà des compromis politiques, une définition consensuelle du processus a été proposée par la CCD : « la désertification désigne la dégradation des terres dans les zones arides, semi-arides et subhumides sèches par suite de divers facteurs, parmi lesquels les variations climatiques et les activités humaines ». La désertification concerne donc un processus de dégradation des terres lié à des facteurs naturels exacerbés par l'action de l'homme. La manifestation apparente du phénomène se traduit par une diminution de la couverture végétale et des potentialités des systèmes écologiques et une détérioration des sols et des ressources hydriques.

Les chercheurs du monde entier se sont mobilisés pour donner une assise scientifique à la mise en œuvre de la Convention. Différents programmes d'études et de recherches ont été élaborés pour définir les causes et appréhender les conséquences de la désertification sur les populations et sur les milieux naturels. Les chercheurs ont également essayé, à travers des projets concrets, de trouver des solutions pour lutter contre la dégradation du milieu et contribuer au développement durable.

De nombreuses institutions et organismes scientifiques, des réseaux spécialisés dans la problématique des régions arides ont vu le jour dans différents pays pour mieux développer la recherche dans ce domaine ; on peut citer : l'Institut des Déserts de l'Académie des Sciences du Turkménistan, l'Institut du Sahel (INSAH, créée en 1976), l'Observatoire du Sahara et du Sahel (OSS), l'Université des Nations Unies (UNU), l'Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD, Ligue Arabe), le Desert Research Institute (DRI, USA), l'International Center for Arid and Semi-Arid Land studies (ICASAL, USA), l'Institut des Régions Arides (IRA, Tunisie), le Centre Scientifique et Technique sur les recherches en régions arides (CRSTRA, Algérie), le Comité Scientifique Français de la Désertification (CSFD), le German Competence Network for Research to Combat Desertification, le START (Global Change System for Analysis, Research and Training)...

Toutes ces institutions et tous ces réseaux ont pour mission de piloter et de réaliser les programmes de recherche scientifiques et techniques sur les régions arides ou menacées de désertification.

2.2. Les résultats de la recherche sur la désertification

Les approches scientifiques et techniques de la désertification ont été un élément essentiel pour la compréhension des processus, pour l'évaluation des causes et des conséquences, et ont contribué à la recherche et au développement d'indicateurs et de méthodes de gestion durable des ressources naturelles

Pendant de nombreuses années, les chercheurs se sont entendus pour reconnaître que les causes de la désertification sont, avant tout, climatiques, les longues périodes de sécheresse ayant entraîné la dégradation des sols et la perte de la productivité végétale. Les perturbations climatiques sont, en effet, une cause importante de la fragilité de ces milieux déjà très sensibles et provoquent des crises écologiques se répercutant sur l'ensemble de l'écosystème (Le Houerou, 1993). La pluviosité moyenne annuelle a diminué de 17 à 27% dans les steppes algériennes durant le siècle dernier.

Les débats d'experts ont fait ressortir, par la suite, que les causes essentielles de la désertification sont plutôt de nature anthropique et que les effets des actions humaines sont exacerbées par les facteurs écologiques. La désertification est perçue dorénavant comme une rupture de l'équilibre dynamique des écosystèmes en zones arides et semi-arides due à une surexploitation des ressources naturelles. La demande accrue avec la croissance démographique, l'augmentation des besoins des populations rurales et les difficultés d'accès aux ressources, donnaient lieu à une utilisation non-durable de l'offre alimentaire des systèmes écologiques. L'équilibre social et biologique se trouve fortement perturbé par le déphasage entre « l'offre et la demande en services des écosystèmes dans les zones sèches ».

Les scientifiques ont également démontré que les politiques de gestion des terres sèches, qui sont pour la plupart des terres de parcours, sont souvent des politiques importées ou conseillées par des experts étrangers aux systèmes écologiques et, par conséquent, mal adaptées aux conditions locales. Ces politiques ont encouragé les populations à dégrader davantage les terres. D'une manière générale, les recherches ont mis en relief les causes suivantes:

- Un arrachage abusif et une surexploitation des arbres et arbustes à des fins domestiques ou médicinales, entraînant l'érosion des sols et l'ensablement ;
- un surpâturage à l'origine d'une transition régressive de la végétation, de la diminution du couvert végétal pérenne, notamment des espèces palatables, de la richesse floristique et donc de la biodiversité ;
- des pratiques agricoles inadaptées. L'effectif excessif des troupeaux et le déficit fourrager croissant ont conduit les éleveurs à développer des cultures sur des parcours impropres à l'agriculture avec une irrigation mal maîtrisée entraînant le relèvement de la nappe phréatique, la salinisation des sols et par conséquent l'abandon des terres devenues stériles ;
- la sédentarisation des pasteurs nomades, notamment en Afrique du Nord en remplacement de la transhumance, donnant lieu à une conduite d'élevage basée sur la complémentation de l'alimentation du cheptel. L'absence de mobilité et le maintien prolongé du cheptel sur un sol très fragile ont une conséquence néfaste sur les propriétés des sols : tassement, imperméabilité, absence de remontée biologique...

L'activité humaine est donc le principal facteur de l'érosion hydrique et éolienne et de la désertification, entraînant la perte des ressources et développant des conditions de précarité et de pauvreté extrêmes.

2.3. Les lacunes de la recherche scientifique

Les reproches qui ont été faits aux scientifiques travaillant sur la désertification sont multiples et très souvent justifiés :

- La recherche sur les problèmes de dégradation des terres sèches est cloisonnée, sans intégration de toutes les disciplines pour pouvoir présenter une vision globale du phénomène ; peu de travaux ont porté sur les liens dynamiques entre les facteurs biophysiques de la désertification et les

conditions socio-économiques qui prévalent dans ces régions. La recherche doit être à même de pouvoir mettre en synergie les différentes disciplines pour pouvoir comprendre les transformations simultanées de l'espace et de la société.

- Les résultats des recherches ne pouvaient être ni généralisés dans un contexte plus global, ni intégrés dans des actions gouvernementales de protection des écosystèmes et des politiques d'amélioration des conditions de vie, car les travaux sont le plus souvent confinés dans des laboratoires et surtout limités dans le temps et dans l'espace.
- Les recherches ne donnent pas de solutions appropriées pour répondre au dysfonctionnement, à la rupture des équilibres écologiques et à la résolution des problèmes qui se posent à des régions à écologie fragile et qui présentent une si grande diversité biophysique.
- La recherche sur les zones sèches devrait être moins académique et intégrer les méthodes participatives, celles qui font intervenir les acteurs locaux dans le diagnostic de la situation de leur territoire et dans les propositions de gestion de leur patrimoine et proposer des solutions adéquates qui leur conviennent et qui tiennent compte de leur savoir-faire et de leurs valeurs culturelles.
- Enfin, la critique majeure se résume ainsi : les équipes de recherche qui activent, de par le monde, sur les études diagnostiques de la désertification, utilisent pour des mêmes thématiques, des méthodologies disparates d'une région à l'autre et encore plus d'un continent à l'autre. Il s'avère difficile de faire des synthèses régionales ou sous-régionales et dégager des indicateurs communs relatifs aux changements écologiques et socio-économiques

2. L'Evolution de la recherche dans le domaine des études sur la désertification

2.1. La réorganisation de la recherche : la surveillance des écosystèmes, une démarche pluridisciplinaire

Le développement technologique a permis, ces dernières années, l'émergence de nouvelles méthodes développant des méthodes intégratives concernant la surveillance des écosystèmes et des ressources naturelles, la préservation du potentiel biologique et son développement. Les images satellites et la télédétection sont venues compléter les observations sur le terrain permettant, de réaliser des études diachroniques. Le suivi des changements écologiques et des pratiques sociales, grâce à la télédétection, a permis d'évaluer la désertification sur de grandes étendues et de mieux comprendre les mécanismes qui conduisent au processus. De nombreux projets initiés par des organisations internationales ont vu le jour :

- L'Observatoire du Sahara et du Sahel (OSS), dès sa création, a accordé à la surveillance écologique une très grande importance et ce, particulièrement à travers son programme ROSELT (Réseau d'Observatoires de Surveillance à Long Terme) initié en Afrique du Nord et dans les pays du Sahel en 1992. Ce programme a réussi à mettre en place des équipes de recherche pluridisciplinaires dont l'objectif était de capitaliser, à travers des systèmes d'information, des données spatio-temporelles sur les problématiques des régions sèches, de démontrer les impacts des changements agro-écologiques et socio-économiques sur la désertification, et de proposer des méthodes et les techniques en matière de réhabilitation du milieu et de gestion rationnelle des ressources naturelles. Le principe essentiel de ce programme repose sur le fait que le fonctionnement des systèmes écologiques détermine un niveau de

production des ressources et le fonctionnement des sociétés détermine des usages et des pratiques

Le projet DIS-MED, en appui aux processus d'élaboration des PAN et initié par la CCD et la Fondation de Météorologie Appliquée, va permettre la mise en place d'une plate-forme de circulation et d'échange d'informations entre les multiples producteurs, ainsi que l'établissement de mesures initiatives pour encourager la libre circulation de l'information. Des cartes régionales de sensibilité à la désertification ont été élaborées avec le concours de l'OSS.

Un projet de mise en place d'un observatoire sur la sécheresse, la désertification et les catastrophes naturelles au niveau des pays de l'UMA et du CILSS est en voie de concrétisation. Cet observatoire permettra, sur la base des données récoltées et de leur analyse par la recherche scientifique, de prendre les mesures nécessaires pour alléger l'impact des facteurs de dégradation sur la vie sociale et économique. La CCD, la FAO, le PNUD, le PNUE, l'ICARDA et l'OSS sont les partenaires ciblés de ce projet.

Les chercheurs s'attachent aujourd'hui proposer aux utilisateurs de la recherche des indicateurs fiables basés sur des séries de données sur un pas de temps suffisamment long qui permettent de déterminer des tendances évolutives des systèmes atteints par la désertification.

2.2. Une vision plus globale de la désertification

La communauté scientifique essaie également de tenir compte des mutations sociales et des changements économiques et institutionnels, et de contribuer à proposer des solutions pour un développement durable, dans un cadre de synergie des Conventions environnementales.

A cet effet, durant ces dernières années, les recherches se sont attachées à démontrer le caractère transversal et multidimensionnel de la désertification en la mettant en relation avec les conditions climatiques, la perte en sols, en ressources en eau et en biodiversité, l'altération des potentialités agricoles et par conséquent, la croissance de la pauvreté. Au niveau des projets régionaux, on essaie de faire ressortir ces multiples interactions entre la dégradation des sols et la perte de diversité biologique, la pression sur les sols et la déforestation, et donc la perte des réservoirs de carbone provoquant les perturbations climatiques.

3. Comment intégrer la recherche scientifique dans la prise de décision ?

La recherche scientifique peut et doit contribuer à la prise de conscience et à la prise de décision des politiques. Les chercheurs doivent s'impliquer dans les Plans d'Actions Nationaux en développant une concertation scientifique et en mettant en synergie leurs résultats et les programmes d'action. Les chercheurs se doivent de participer à la formation et au développement des capacités des acteurs sur les problématiques concernant le suivi et la lutte contre la désertification, et les institutions se doivent d'être un appui à la recherche et contribuer au renforcement de leurs moyens d'investigation et à l'amélioration de leur environnement scientifique.

La mise en œuvre de la Convention des Nations Unies sur la Lutte contre la Désertification est coordonnée par les Organes Nationaux de Coordination sur la lutte contre la désertification (ONC), chargés du suivi des Plans d'Action Nationaux pour la Lutte Contre la Désertification (PAN/LCD) et leur intégration dans les politiques nationales. Dans ces organes, la recherche scientifique a un représentant qui, le plus souvent, est un représentant du Ministre de l'Enseignement Supérieur et de la

Recherche Scientifique, cadre administratif, très éloigné de la communauté scientifique en œuvre sur le terrain.

Deux outils sont nécessaires pour renforcer la connexion entre les communautés scientifiques et les décideurs politiques : les Conseils Scientifiques Nationaux pour la désertification et les dispositifs nationaux de suivi des écosystèmes. Ces outils peuvent fonctionner grâce à un mécanisme de concertation.

2.1. Les Conseils Scientifiques Nationaux de la Désertification (CSND)

Pour une meilleure coordination chercheurs-décideurs, la mise en place des Conseils Scientifiques Nationaux (CSND) auprès des gestionnaires en charge de la lutte contre la désertification est nécessaire pour faire face aux questions complexes posées par la désertification. Ces conseils, à l'image du CSFD, doivent, dans un esprit pluridisciplinaire et coopératif, réunir toutes les compétences nationales œuvrant dans le domaine des régions arides. Ils seront :

- un instrument d'analyse et de valorisation des résultats de la recherche ;
- un organe de liaison entre les communautés scientifiques et les décideurs ;
- un organe mobilisateur pour la promotion d'une recherche répondant aux besoins des utilisateurs en charge de la lutte contre la désertification ;
- un instrument d'aide à la gestion et à l'élaboration d'information ;
- un instrument de prospection, capable de déceler et d'évaluer les tendances affectant l'évolution des écosystèmes et les forces motrices responsables de ces tendances ;
- un organe consultatif sur l'utilisation des différentes techniques mises en place pour lutter contre la dégradation des systèmes écologiques : mises en défense, introduction d'espèces végétales, et exploitation de l'eau et des pratiques agricoles dans un objectif de développement durable ;
- un système de suivi des programmes de lutte contre la désertification et d'évaluation des impacts des politiques mises en place dans les zones sèches.

Les CSND auront à mobiliser les spécialistes pour organiser des débats et des ateliers de formation pour le transfert des connaissances et des technologies nouvelles à l'attention des agents du développement qui sont sur le terrain et qui ont pour charge la lutte contre la désertification. Les objectifs de ces sessions de formation seront de leur donner les connaissances nécessaires sur les facteurs de dégradation des ressources naturelles, ainsi que sur leurs impacts, et de leur faire acquérir les outils nécessaires pour la gestion rationnelle de ces ressources en relation avec la mise en œuvre des Conventions internationales environnementales.

Les CSND auront à assister les instances politiques dans l'évaluation des Ecosystèmes pour le Millénaire pour le volet désertification, évaluation des décisions prises pour répondre aux différentes Conventions environnementales, demandée en 2000 par le Secrétaire général des Nations Unies dans son rapport à l'Assemblée Générale.

2.2. Les Dispositifs nationaux de surveillance des écosystèmes : moyens de communication avec les décideurs

Des dispositifs nationaux permanents de suivi de la sécheresse et de la désertification, organisés en réseau et réunissant l'ensemble des structures universitaires et institutionnelles conscientes et intéressées par ces phénomènes, permettront de constituer des bases de données sur l'état des écosystèmes, de suivre leur dynamique dans l'espace et dans le temps, d'identifier les causes de la

dégradation et de proposer, sur ces bases, des outils d'aide à la décision, des modèles de gestion rationnelle des ressources naturelles et des méthodes de réhabilitation des zones dégradées en adéquation avec les besoins des populations locales dans une approche participative. Ces dispositifs seront organisés en :

- systèmes de référence, réseaux de sites d'observation à une échelle nationale ;
- systèmes d'informations spatiotemporelles, basés sur l'analyse des données satellitaires et d'évaluation de la désertification ;
- systèmes d'alerte précoce sur les catastrophes naturelles (sécheresse, ensablements, crues...) en vue des préventions contre leurs impacts par les acteurs locaux ;
- systèmes d'élaboration d'indicateurs environnementaux pour éclairer les décisions politiques dans le cadre de l'élaboration de schémas directeurs d'aménagement du territoire ;
- dispositifs pour permettre à la communauté scientifique de vulgariser les résultats de ses recherches, de les mettre à la disposition des décideurs et des communautés et d'organiser des actions d'information, de formation, de valorisation des savoirs traditionnels et de renforcement des capacités institutionnelles.

Dans ces systèmes d'observation, la collection et l'analyse d'informations croisées, montrant l'interconnectivité des écosystèmes, permettront de fournir des indicateurs plus pertinents donnant lieu à des actions intégrées qui favorisent la conservation de la diversité biologique et le renforcement de la capacité de l'écosystème à s'adapter à des conditions météorologiques évolutives dues aux changements climatiques.

Ces dispositifs seraient partie prenante du programme DOSE (Dispositif d'Observation et de Suivi Environnemental) proposé par l'OSS ; ils doivent donner les moyens aux décideurs pour effectuer une bonne gouvernance et pour développer des politiques responsables de gestion durable des terres arides et de la lutte contre la pauvreté.

Le fonctionnement est basé sur les interrelations entre les institutions locales détentrices de la donnée brute et les institutions de recherche chargées de traiter les données, et de les valider auprès du CSND avant de les proposer à l'ONC. La validation finale se fera par un feed-back auprès des institutions locales, ce qui permettra aux décideurs de disposer d'outils fiables et pertinents.

2.3. Les mécanismes de concertation et de coordination

Des groupes de réflexions regroupant la communauté universitaire et les responsables au niveau des décisions peuvent mettre au point des plate-formes pour redynamiser et réorienter la recherche dans les régions soumises à la désertification. Les mécanismes fonctionneront à travers :

- **Des réunions de coordination** régulières à différents niveaux entre toutes les institutions engagées dans le dispositif national de suivi de la désertification.
- **Des ateliers nationaux** de communication des résultats obtenus au niveau des observatoires. Les ateliers sont destinés à analyser les observations, à évaluer les différents impacts et à discuter les actions entreprises, les méthodologies et les approches scientifiques et les adopter aux cas spécifiques.
- **Des systèmes de concertation** qui regrouperaient chercheurs, CSND, décideurs et acteurs locaux pour débattre les thèmes de recherche à

développer et qui répondent à une problématique particulière de la désertification où à une formulation politique.

4. Comment développer une recherche répondant à des formulations politiques et au défi du développement durable ?

De nombreuses actions et mesures incitatives peuvent être mises en place par les autorités compétentes des secteurs de la recherche scientifique et de la lutte contre la désertification pour développer une recherche directement applicable et utilisable.

Il s'agit de :

- mobiliser la recherche scientifique et l'enseignement supérieur autour des programmes de recherche-développement et d'enseignements spécialisés en adéquation avec les besoins du secteur en charge de lutte contre la désertification et la pauvreté. Cette mobilisation serait induite par des mesures incitatives telles que des co-financements conséquents de cette recherche ;
- développer des synergies entre les communautés scientifiques et les centres de prise de décision en multipliant les rencontres-débats sur des thématiques spécifiques et les sessions d'évaluation des actions entreprises pour freiner le processus de désertification et d'élaboration sur la base de ces évaluations de feuilles de route communes ;
- privilégier la recherche pluridisciplinaire et la connexion entre les différentes disciplines dans la perspective d'amélioration des connaissances sur les causes et impacts de la désertification ;
- encourager le développement d'une recherche participative qui tienne compte de l'articulation entre les écosystèmes avec toutes ses composantes et les pratiques sociales ;
- favoriser le transfert des technologies et des connaissances entre les pays développés et les pays qui subissent la désertification dans le domaine de la gestion et la préservation des écosystèmes et des ressources naturelles ;
- faciliter l'acquisition de méthodologies nouvelles permettant de mesurer et de surveiller les modifications de l'environnement, d'en évaluer et d'en valider les conséquences, et d'harmoniser les démarches scientifiques ;
- initier un partenariat entre les chercheurs et les utilisateurs de la recherche pour construire toutes les actions, projets et programmes de recherche dans la même optique de lutte contre la désertification et de durabilité des systèmes écologiques ;
- développer des pôles d'excellence qui seraient un lieu privilégié pour des rencontres nationales et internationales dans le domaine de la connaissance et de la préservation des régions sèches ; et
- mettre en réseaux (réseaux nationaux affiliés aux réseaux internationaux existants) toutes les institutions de recherche et les acteurs de développement, préoccupés par la préservation des terres arides.

Conclusion

La prise de conscience d'une recherche, dans le domaine de la lutte contre la désertification, peu adaptée aux formulations politiques amènera la communauté universitaire à développer une stratégie basée sur une vision plus globale tenant compte des différents aspects de la désertification, et sur les besoins des responsables opérationnels.

Un dispositif de suivi à long terme de la désertification pourra rassembler les différentes disciplines et fournir des indicateurs pertinents qui permettront aux décideurs d'entreprendre des actions de lutte réfléchies et efficaces.

Un Conseil Scientifique National sur la désertification serait la courroie de transmission entre les résultats de la recherche et les centres de prise de décision ; il pourrait impulser une réorganisation de la recherche en favorisant la création d'un pôle d'excellence et des réseaux de compétences dans le domaine de l'étude des régions sèches.

Les pouvoirs publics devraient s'engager également à soutenir la recherche sur la désertification et à lui fournir les moyens nécessaires pour qu'elle puisse lui apporter les solutions aux problèmes qui leur sont posées dans le cadre des prises de décision pour l'amélioration des conditions de vie des populations souffrant de la désertification.

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A New and Sustainable Approach to Policies for Restoring Grasslands in China Based on Scientific Findings

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Introduction

Land degradation is one of the major environmental problems worldwide, and has become particularly severe in China in recent decades with its rapid economic developments. China has an enormous area of grasslands, covering 41% of its territory (3.93 million km²) and is regarded as China's most important natural resource because of its ecological and economic importance. However, anthropogenic activities have led to large-scale land degradation across the vast grassland – the main grassland region of China and part of the Eurasia Steppe that stretches from east China to Hungary in Europe (Wu and Loucks, 1992). Unfortunately, the grasslands now are degrading at varying degrees, which is more than twice as much as was estimated 10 years ago. The land degradation in this region is generally believed to be a major reason for the increasing frequency of severe sand/dust storms in northern China (particularly in Beijing and adjacent regions) in recent decades. Grassland degradation of this magnitude could not only alter the regional and even global environments, but also directly affect the livelihood of millions of people who have lived in this region for generations (Li, 1997; Yoshino, 2001). As the environmental and economic future of the Inner Mongolia grassland is at stake, scientifically sound ecosystem management strategies are urgently needed for the sustainability of this region.

The Chinese Academy of Sciences (CAS) believed that although tree planting and airplane seedling approaches had been widely adopted in an effort to restore the grasslands, this did not work well when compared with the huge investment. To support this point, a case study in restoring the degraded grasslands in the Hunshandake Sandland has been developed. The result showed that degraded grasslands in the Hunshandake Sandland could restore themselves rapidly once grazing is removed. Sustainable strategies for grassland restoration and management must explicitly integrate ecological, economic, and societal issues in the overall framework. There is a great need to educate the local people and policy makers that most of the grasslands can be restored with ecological and economic success if proper measures are rigorously implemented. The participation of local governments and herdsman is of vital importance.

1. Reasons for Grassland Degradation and Causes of Sandstorms

As for the reasons for grassland degradation and causes of sandstorms, so far the community of researchers has not reached a consensus (Qiu *et al*, 2001; Wang *et al*, 1996). According to satellite-relayed remote-sensing data released from the State Meteorological Center, about 66% of the dusty materials comes from Mongolia or places further away to the north or northwest (Yang *et al*, 1998; Ye *et al*, 2000). Another set of data coming from the Chinese Academy of Science-hosted wind-tunnel experiments indicates that 60% of the sandy dust originates from Chinese pasturelands, while 20% are blown from our country's transitional areas caught between farming and herding regions. What conditions would there be from an on-the-spot investigation? According to our own surveys, after the 2002 spell of sandstorms, about 0.2-1cm thick of the topsoil in the grasslands of Xilingol League, Inner Mongolia has been lost; the same figure was 3-21cm in the Hunshandake Sandland. Some other individual cases observed by us were really appalling. On May

2, 2001, for example, a gust of an all-sweeping wind over a herding farm of Baiyinxile led all wheat seeds, chemical fertilizer and an 8cm-thick topsoil from 1,300 hectares of farmland to blow away without a trace. Where did these topsoil grains go? The heavy lumps and nodules in the topsoil fell on the spot to bury herdsman's abodes, sheep fences and highways. Nobody can deny the fact that the lighter materials floating in the air were transferred to their long-distance journey, resulting in the incidence of the sandstorm.

One of the ominous developments now under way right beneath our nose is the large-scale drive of ecological depletion now inflicting our arid or semi-arid grasslands. According to our dynamic monitoring and observation data, during the 1970s, the land desertification rate in China was 1,560 square kilometers per year; the figure became 2,100 during the 1980s, 2,460 during the early five years of the 1990s, and 3,436 during the following five years (National Environmental Protection General Agency, 2005.). From these figures we may see that the on-going momentum of the menacing threat is looming larger and larger. The environmental disaster caused most directly by the ecological depletion of sandy grasslands is the sandstorm (Shu and Jiang, 2002). During the past 100 years, China has been hit by almost 70 sandstorms. However, during the first 30-40 years of the last century, a sandstorm occurred on average once every three years and the situation became more aggravated only in the last decade or so. For example, the figures for the 1960s and 1970s was one sandstorm event every two years; it became one for each year in the 1990s. Very rapidly, the figure went on to 12 spells of dusty weather in 2000 and a total of 18 processes of dusty weather was seen in northern China in 2001, including a strong sandstorm process lasting 41 days in a row. From March 18 to 21, 2002, most areas in northern China experienced the most ferocious dusty weather since the start of the 20th century, sweeping over a land surface up to 1.4 million square kilometers. The inflicted area was so wide that the scourge ravaged in varying degrees over all regions in the country north of the Yangtze Valley. In recent years, the calamitous sandstorms caused enormous economic losses to China and in order to harness them, the national authorities put in handsome funds, and the expenditure grows steadily with the passage of every year (Liu *et al*, 2005). Now, we temporarily admit that 34% of the sandy dust originates from Chinese territory. Even though this is true, we have no reason to feel complacent because a large-scale ecological degradation is now underway in the arid or semi-arid areas of the Chinese hinterland. It is impossible for us to control the ominous development in the Republic of Mongolia and as a matter of fact, the latter's ecological depletion is much less severe than ours.

2. Inaccurate Understandings and Countermeasures

Natural calamities or man-made disasters?

First of all, we will give a sketchy analysis of the changes in six environmental factors capable of supporting an ecosystem's normal performance. As for meteorology, we may see: 1) sunlight sees no change; 2) temperatures fluctuate in normal margins; 3) the atmospheric content of oxygen sees no discernible change; 4) the atmospheric content of CO₂ sees some increase (from 290ppm before the advent of the "Industrial Revolution" to 380ppm at the present-day level); 5) moisture has changed considerably (such as the three-year-long drought from 1999 to 2001). But the annual precipitation remains normal on the whole, although in some recent years rainfall has increased slightly. For example, the annual precipitation in 2002 was heavier than those in past years. In an arid or semi-arid area, water is the main restrictive factor for plant growth. But even in harsh conditions, natural vegetation can survive as a result of the long-term evolution of biosphere. Since favorable climatic conditions for plant growth are still present, why does the plant growth seem to be going from bad to worse with each passing year? The reason lies in: 6) both soil and its mineral

contents have undergone a radical change: the material circulation in nature has been interrupted and suspended by human infringement, leading to aggravated soil erosion. On the grasslands, the topsoil layer on which the native vegetation used to take root is more than 100cm thick at most. (In many places, the figure is less than 10cm.) Beneath the layer, there is sand as thick as several hundred meters. It is evident that the 100cm-thick topsoil layer has the crucial significance in the survival of the whole ecosystem. The grasses, meadows, shrubs and thickets blanket the topsoil and protect it from being blown away by gusts. As soon as they are gone or ravaged due to irrational exploitation by man, the topsoil's compact texture would be loosened, disintegrated and become sandy dust, making its way into the air and on to Beijing, even crossing the immense waters of the Pacific Ocean.

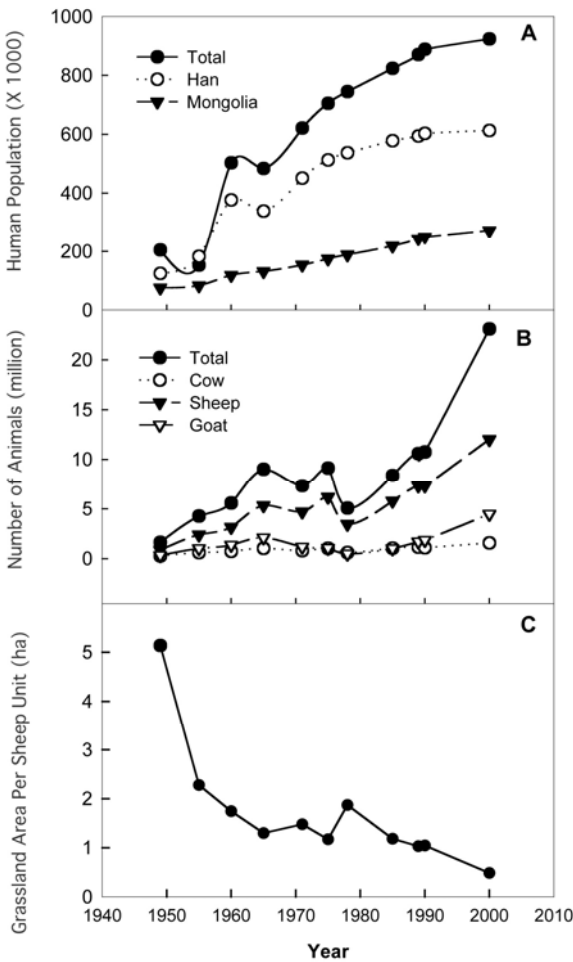


Figure 1. Changes of human population (A), the number of grazing animals (B), and grassland area per sheep unit (C) in the Xilingol League, Inner Mongolia (in which Hunshandak is located) from 1947 to 2000.

Therefore, we don't endorse the view claiming that the sandy grassland's degeneration is caused by the worsening climate situation, although some scholars think the on-going trend of global change intensifies the aridity in some places. Here we would like to list two more facts to further explain this. The first is that on the depleted grasslands in the eastern part of Hulun Buir League and Xilingol League in

Inner Mongolia, the topsoil thickness has been eroded to less than 20cm or so and there are few Mongolian gazelles living there. In sharp contrast, on the opposite side of the national borderline in the Republic of Mongolia, the same figure is still 100cm and more than tens of thousand of roe deer (*Capreolus capreolus*) are seen roaming on the steppe. If the arid climate is to be blamed, the grasslands on the Mongolian side should have been more devastated as they are located further north in the hinterland. The second fact is that on the 10km-wide belts on the Sino-Russian and Sino-Mongolian borderlines, the topsoil thickness is still 100cm, as it was during the 1950s. This fact refutes the following two viewpoints: 1) the arid climate leads to impaired growth of the grass; 2) without the livestock's over-grazing, the grassland cannot do well. As it is well known, no livestock are allowed to graze along a boundary line between two countries.

From these, we might see that the primary reason for degrading grassland ecosystems is the exploding population (McNaughton, 1990; Ware, 1997), i.e., the appearance of sandstorms is caused by human activity and this is the "warning" and "revenge" coming from nature. Since the founding of the People's Republic of China in 1949, the Xilingol League's population has grown from 205,000 to 920,000 presently, a net increase of 348% (Compiling Committee of the Annals of the Xilin Gol League, 1996).

In the wake of population increase, and the insatiable demand for better material conditions in human life, the number of domestic livestock saw a drastic increase from 1.6 million to 23 million heads, a net increase of 1338%. In this way, the foraging pressure on the grasslands goes up at such a fast rate that very soon it exceeds the bearable limits of the whole grassland ecosystem. The average pasture area to support a standard sheep's survival drops from 5.13 to 0.467 hectares. This means the net grazing pressure on the grasslands sees an increase of up to 950%. Another contributive reason is the change in a residential community's lifestyle and related policy orientation. The nomadic life has been replaced by a lot of fixed settlements, plus the modernized targets longed to be realized by local herdsmen for improvement of their living quality. This leads to the ongoing trend of grassland depletion going from bad to worse. The working mechanism for this process is: after a long, tedious and famine-prone winter, the livestock scramble to the budding grass in early spring when the period is at a sensitive juncture because the herbage develops its photosynthetic organs to start the initial growth. The amount of forage consumed by the livestock is less than 1% of the ecosystem's grazing potential. If the grazing livestock is not so enormous in number, the ravage caused in the early spring may be made up by nature itself. If the grazing activity is everywhere on the grassland, the latter would be too suppressed to grow soundly. Year by year, a malignant cycle comes into being.

Does man force sands to retreat?

During the 1950s, there had been a resounding slogan heard everywhere in China, calling the people to launch a march towards the desert. At the time, the Chinese people were high-spirited and rallied to start a heroic expedition for conquering deserts by wielding their spades and hoes. Now, half a century has passed, and it seems the deserts have a prowess far more forceful than our imagination, as few efforts and control models have been successful, despite the large investments made. Today's reckless rampancy of sandstorms gives a convincing proof of this. The obvious fact is that we are engaged in the struggle against desertification without a lull. Yet, to our great regret, the struggle so far has not only failed to stem the scourge, but has also accelerated the latter's tempo. The inflated population is one of the driving factors responsible for this ominous development (Ci and Liu, 2000). The key to containing the worsening momentum of the degeneration lies in a correct self-treatment from the residents themselves. The survival and a way out for future

development of man are the permanent cure, and other measures only constitute a temporary solution to alleviate the symptoms of the scourge. This is to say, for those “diehard areas” that resist all rehabilitation measures, the best method we can adopt is “human withdrawal” by reducing the human infringement so as to let nature repair the depleted ecosystem. Even in those ancient desert areas, the *laissez-faire* attitude wouldn’t do more damage, as the Gobi desert has a natural “shell” blanketing its surface. If we don’t meddle with the “shell,” it can protect the top-soil from being blown away. So, we must “treat the desert properly.” The natural conditions of grasslands and sandy steppe are better than those of deserts so that after the “retreat of the human inhabitants,” the results of vegetation restoration will be much better.

Hence, we recognize the fact that human withdrawal is conducive to the “shrinkage of deserts”, or at least it is effective in “stemming the advancing momentum of deserts.” How to reap the maximum returns from the move? There is a question in need of more scholars and governmental departments to make detailed and deliberate research. In fact, a strategy of “encirclement and transfer of native residents” or “*ex-situ* development” has been exercised in the Inner Mongolia Autonomous Region. This approach is to help the revival of the native vegetation. But new questions are to crop up: how to settle the transferred communities of local residents? Will they cause new ravages on the unspoiled grasslands? All these issues must be treated in a secure and reliable way.

Are tree-planting and airplane seeding reasonable?

At present, the State allocates enormous financial input each year for the restoration of sandy grasslands, (for example, a league in Inner Mongolia received 500 million yuan in 2002 for this purpose). According to investigative results, the money is spent for tree-planting, airplane seeding and well-sinking as a prerequisite for rearing livestock in a fenced enclosure. We maintain that the third measure can be effective, while the former two have few effects in comparison with the large investment required. The question of tree planting used to be a long-standing controversy among scholars. As early as the 1960s, Prof. Huang Bingwei, a geographer and CAS member, had given a figurative metaphor for the role of a tree in an arid or semi-arid area, which, he says, acts just like “a water-pumping engine,” so that he does advise planting trees in an arid area. The current state of public opinion, however, runs contrary to this correct conclusion. If you ask one of the townspeople in Beijing or any big city in the Chinese mainland: How do you bring sandstorms under control? He or she would suggest without hesitation that more trees be planted. Some of them would immediately make monetary contributions on the spot. From this fact, we might see that the tree-planting measure has been widely accepted by the public. But why is tree planting is an irrational step in the harnessing drive? The reasons may be listed as follows:

1) It is an inherent law of nature. In an area with less than 300mm in annual precipitation, the native vegetation is a herbaceous population made up of bushes, shrubs or thickets, for example. The rainfall and accumulated heat needed for the sound growth of a tree are unavailable so that the planted trees cannot survive. If they can eke out a living in the harsh natural setting, they are unable to free themselves from a state of malnutrition, or, as the local people put it, each tree has the air of “a small doddering grandpa.”

2) Further decimation of the humidity in the topsoil. The strong evapotranspiration in an arid or semi-arid area (always reaching 7-10 times the amount of the annual precipitation) would have made the topsoil more scorched and dehydrated if the grassy canopy of the herbal vegetation had not covered the latter. The water consumption of arboreal trees is much higher than that of shrubs or herbaceous plants. So a strategy of afforestation would aggravate the drought instead of reducing

it. We always discover few, if any, herbal outgrowths beneath a man-made forest in a grassland. This is the reason responsible for this phenomenon.



Photo by Jiang Gaoming

Figure 2. Dearth of trees (Rhus typhina, a potential invasive species from the US) planted in Ningxia Autonomous Region where it is a typical arid area with rainfall less than 110 m.

3) The past efforts in our tree-planting drives in arid or semi-arid areas wound up as failures. Let's take Xilingol League in Inner Mongolia as an example. In the past 53 years, since the founding of the People's Republic of China in 1949, the achieved accomplishment in this aspect is that the forest coverage rate is still less than 1% for the whole League, including nearly half of the coverage being primary forests (such as those elm forests in the Hunshandak Sands). So we are to ask: where are the trees that we have planted each year? The actual consequence is that they have died away. Viewed from the perspective of nature, this is the response of a natural law and hence the reaction is normal; if evaluated from the angle of our behavior, this is a large-scale and massive waste of manpower, and the move delays the precious time for the restoration of native vegetation. So, this is abnormal.

4) The trees themselves cannot stem the movement of sandstorms. In an early spring when sandstorms are rampant, we observed in our on-the-spot survey that the sand dunes are still flowing as usual in a poplar forest. Out of the forest, the visibility distance is less than five meters, while in tracts of a grassland satisfactorily covered by bushes, shrubs or grassy layers, the visibility distance is more than 200 meters. From this fact, we may see what a poor effect a forest can make when a sandstorm occurs! Even in the 1% of the afforested tract on the grassland, it is far from being invulnerable: about 99% of the tract's soils are loosened. So, a forest's capacity of soil fixation is much less than that of grassland or land protected by bushes. The cost spent by us in the afforestation, however, is much higher than that spent for restoration of a grassland's native vegetation.

Why is airplane seeding an irrational measure?

1) The topsoil on grassland contains a great number of seeds and other diverse vegetative forms, but they lack the chances for germination and sound growth. Airplane seeding may therefore be regarded as unnecessary for rehabilitation of the native vegetation. The main challenge of grasslands comes from the grazing pressure, followed by aridity.

2) The operation of airplane seeding always brings in many alien species of forage grass, including some poisonous species such as *Sophora alopecuroides* which is easily mixed into the seeds of *Hedysarum fruticosum* var. *mongolicum* and makes its way into high-yielding grasslands. Most herbal species are not indigenous but expand their distributive scope by taking advantage of human forces. In a short time, the hazardous consequences are possibly beyond our sight, but their harmful influence might eventually be felt in ecological balance and bio-diversity protection.

3) The practice is not economically justifiable. According to our surveys, an Inner Mongolian banner spent a total of 810,000 yuan for an airplane seeding operation on a tract of wasteland up to 330 hectares, leading to an increase in grass coverage as high as 30%. On average, for every 10% increase, about 81 yuan per mu (15 mu = 1 hectare) is spent. This spending does not include various kinds of waste in the unsuccessful seeding cases. In sharp contrast, our experiment on a sheep-rearing enclosure spent 160,000 yuan on a tract of sandy grassland up to 2,670 hectares in surface area, leading to 100% grass coverage and 30% of the native vegetation being restored on originally movable sand dunes. On average, the spending for raising 10% of the grass coverage is 26 yuan per mu. In addition, the restored vegetation has not been blended by alien species and all forage grass is from a superior species of the grass family. So, both economically and ecologically, the practice of airplane seeding is not worthwhile, even unproductive and in some cases, it impairs our efforts in the rehabilitation of the depleted eco-system.

3. Scientific Findings

Successful examples from abroad

Britain is the earliest country of industrialization in the world and it is the earliest country to taste the bitter fruit of ecological devastation. Up until now, it has revived the deserted wasteland caused by mining (mainly coal mining) historically into thriving ecosystems, and through further planning programs, it will transform them into world-renowned scenic spots in the countryside. One of the experiences of its success lies in the ecological revival of taking advantage of natural processes (Bradshaw, 2000). Such an approach might simply be understood as "a man-made encirclement." That is to say, going on the premise that no soil erosion occurs, various vegetative forms (such as seeds, spores, fruits, germinated roots or germinated buds etc.) might settle there to reproduce in a way free from any external interference. According to their experiences, on a clear-cut stand, the malpractice of planting a solitary species on a natural meadow must be avoided. This is an artificial invasion on to natural ecosystems and it is definitely detrimental to the revival of a grassy ecosystem (such as the mutilation of water circulation in an ecosystem).

Successful stories in China

There are many successful examples to demonstrate the ecosystem revival due to natural forces. During the eight years from 1991 to 1999, for instance, 4,356 native resident households were removed from the mountainous areas of Yanqing County in a northern suburb of the Beijing Municipality, reducing the local population in these areas from 60,000 to 30,000. Thus, the population pressure on the woodland in the

County was greatly mitigated. At present, the forest coverage of the County goes up from 30% to more than 70%. One of the restrictive factors to hamper the afforestation effort lies in the local peasants who used to collect firewood from 1.3 hectares of the mountain slope per capita on average. Another example is in Hong Kong, where there is a hilly district.

Another example is a 670-hectare heartland under biosphere protection in Saihan Wula in Bairin Right Banner under the jurisdiction of Chifeng City, Inner Mongolia. After the removal of some 100 fixed residential centers of the nomadic herdsman, the barren sandy wasteland changed its originally desolate state of damaged vegetation in the first year, achieving an overall ecological rehabilitation. All of these examples prove that the ecological revival, with the aid of natural forces, should be the most immediate, economic and effective approach with the least amount of risk.

When we spend a large sum of money to stem the degenerative process in a grassy ecosystem, we concentrate our efforts only on treating the symptoms, but not on the scourge itself. In addition, efforts to control desertification will not be successful without consideration of the destructive factors in the decayed ecosystem, without the participation of the local community or while disregarding their immediate benefits. Instead, the consequence will be the delay of time for a comprehensive control of the scourge. As known to us, governance by doing nothing that goes against nature is in conformity with “the logos” of nature. We must remain highly vigilant over the so-called project for “ecological revival,” which is actually doing the opposite - “ecological destruction”, although people may not realize what is happening.

Our case study

From 2000 to 2005, we carried out a grassland restoration demonstration project within the Hunshandake Sandland (43°11'42"-43°56'47"N, 116°08'15"-116°42'39"E). The study area (Bayinhushu) covers 7,300 ha, with a population of 322 people belonging to 72 households. An area of 2,670 ha was fenced for restoration experimentation.



Photo by Jiang Gaoming

Figure 3. Establishing a high biomass forage field in a small land for the animals thus enable the larger part of the grassland can be self-restored.

The results showed that, without grazing, the previously degraded grassland could recover rapidly through natural processes in 5 years (Jiang *et al*, 2006). The herbal plants gained an all-round restoration in the first year (with an herbal coverage up to 100%) and the height of grass growth reached more than 80cm. The rewarding output in the second year was really stunning: the grass height was up to 1.43 meters and fresh forage harvest scored a record 79.5 tons per hectare while the natural germination rate of two-year-old elm seedlings was 321 saplings per square meter. The degenerated vegetation obtained a full restoration on par with that of the 1960s. In the aspect of vegetation succession, the taxonomic structure was turned from a medley of inferior grassy species. It is impossible for any human force to nurture such a development pattern for the rehabilitation of a depleted grassy eco-system. At first, the venue allocated to us had been a desolate and saliferous sand land deserted by nearby herdsman.

In the course of restoring the downgraded sandy grasslands, a model of “nurturing the land by the land itself” was developed by us. The approach essentially concentrated on raising the land use efficiency on a few amounts of land resources with the aid of up-to-date high-tech means, so as to improve the material conditions and quality of life of local inhabitants. In this way, a greater amount of land resources are laid idle to recuperate and nurture themselves under the grooming of nature. Thus, the downgraded ecosystems are rejuvenated on the vast pastureland (Jiang 2001; 2003). The approach is both simple and effective, i.e., in a few places where the supply of water, electricity, fertilizers, transportation access and agronomic techniques are available, demonstration districts are built up and their production and lifestyle have to be reshaped accordingly. The rest of the vast degenerated land resources are to be closed to livestock grazing and fuel gathering to facilitate the natural revival of the native vegetation, and the next step is to upgrade them into natural reserves under administrative protection (Peng *et al*, 2004). The ratio of the two portions might be set to 1:100. The reason for such a low ratio is that, at present, a depleted ecosystem has very low productivity. For example, the fresh biomass production rate for a degenerated meadow is 450-1500 kg per hectare. After a technical treatment, the figure might rise to 90 000 kg per hectare.

The key to the approach of “nurturing the land by the land itself” lies in the “nurturing.” And this means: 1) soil erosion must be prevented; 2) the soil salinization caused by underground water has to be eliminated (if these two processes are not ensured, the “nurturing itself will be disfigured into the making of a man-made wasteland”), and 3) the soil must be fattened by manure or fertilizers so that it can support sustainable exploitation. In line with the current scientific level, it is quite possible for us to achieve the above-listed three steps. The true meaning of the approach on a large-scale acreage is embodied in letting a grassy ecosystem take rest and build up its strength as well as allowing vegetation succession free of human interference. Its returns are both enormous and rewarding. Taking our experimental plot as an example. The annual harvest of dried hay is 10 000 tons. At the price of 0.4 yuan for one kilogram of the hay, the income from this single item is roughly more than four million yuan, while the actual input is 160 000 yuan for building fences of the enclosure, plus less than 10 000 yuan for security fees.

In the re-settlement of the herdsman, the key lies in financial support. This problem seems to be more important so we must deeply probe the related policies. For example, the degenerated grasslands in the Alxa Banner of Inner Mongolia, which have been degraded more than 80%, is home to about 15 000 households of native herdsman, amounting to around 62 000 inhabitants. If the latter's livelihood is completely left to the approach, the spending would be 150 million yuan per year (averaging 10 000 yuan for each household). Of course, this will quite likely be regarded as the worst thing to do by some people. Reversibly, however, the Banner has a land area up to 270 000 square kilometers, equivalent to that of three Jiangsu

Provinces in eastern China. The expenditure on it is worthwhile as it is a sensitive prairie “noted for its ecological fragility and it exerts direct impacts on the Yellow River mainstream, Hexi Corridor, Yinchuan Plain, Hetao Plain and the whole land mass of northwest China, northern China or even south of the Yangtze River will be influenced by it.” So, the spending is worthwhile. If we didn’t feel regret in putting in as much as 100 million yuan for the implementation of so-called ecological construction projects in the past, today we should not be so stingy at such a critical juncture.



Photo by Jiang Gaoming

Figure 4. Local people in the Hunshandake Sandland are happy in harvesting their own forage, before the demonstration project each family had to buy forage at a cost of more than 10000 Yuan (1280 USD).

As for the resettlement of the native herdsmen, our expectation is to spend a large sum of money on 1% of the land resources and on the economic prosperity of the residential communities. By helping them form an industrial chain, an intensive trade and ordering-sheet operation of animal husbandry will come into being, involving forage grass plantation, superb strain cultivation, livestock-rearing in fenced enclosures, mechanized procedures for forage harvesting, storage, transport, milking, beef-and-mutton production, re-transport, urban consumption of meat, etc. If the local herdsmen benefit, the massive “ecological exodus” might be avoided. Scientifically, it would not be difficult to achieve a thriving ecosystem on a small stretch of land. The hardship lies in turning out products with high values. For example, a large amount of top-quality forage grown by the CAS scientists in the Zhenglan Banner under the Xilingol League in Inner Mongolia is prevented from reaching market.

Therefore, various preferential treatments such as the funds for ecological restoration (including those projects for sand dune fixation and afforestation), disaster relief, the allotment for ecological remedies, social donations and funds granted by the national, regional and local authorities have to be oriented towards the ecologically depleted areas in order to boost urban development in small cities and towns (Jiang et al, 2003). They may be used to solve various practical issues in water supply, electricity, telecommunications networks, transport systems, educational infrastructure and

improvement of the quality of life of local residents, leading to less devastation of the environment. The current state of the herding areas is that there is a lot of money for returning the reclaimed farmlands into the forest vegetation, but little for natural grass restoration. Such an eccentric policy must be corrected in time; otherwise, the grassland depletion will be aggravated on a larger scale. By transforming the existing pattern of inter-related interests and the functions of land use, the local residents can take the initiative in participation in the ecological restoration, and in this way they will turn themselves from the “looter” of nature into the protector of the ecological setting. Here lies the key to the success of our efforts.

4. Influencing Policy

General propaganda

Although we scientists have already found the correct methodology in restoring the degraded ecosystems, it is not so easy to make the decision makers accept our proposals. It is much more difficult dealing with people than with the nature. Sometimes, decision makers have no idea what scientist have found; they even might not know who is doing the correct things. Therefore, another task for us is trying to let more people, especially decision makers, know our stories. We began such activities with the help of the media. Since 2001, we have written some 218 science and educational articles, plus interviews in newspapers including the most influential ones like People's Daily and Guangming Daily. News agencies such as the most famous Xinhua News Agency took six important suggestions from us, three with comments by top officials. We also produced 12 series (400 minutes) of television programmes, which already appeared on CCTV, BTV, and the Phoenix (Hong Kong). Some of our points further appeared in international news agencies such as the New York Times, Chicago Tribune News, and NOVA Powderhouse Productions. Twenty magazine papers plus two books have been published, one book awaiting publication, all using the materials we have found through our experiments.

We have traveled to universities and schools to give lectures about our new perspectives on grassland restoration. We have given lectures at eleven universities and colleges, including Tsing Hua University and Peking University, the two most famous universities in China. Some thirty high schools like the 8th Middle School of Beijing, Remin University Attached High School etc., were also educated using our original materials. Most importantly, we have also given lectures to officials through training courses. More than 150 lectures have been given to officials from Beijing, Inner Mongolia, Shanxi, Shandong, Tibet etc., in a total of 25 provinces. We have even lobbied at international workshops conducted in Mongolia, Korea, Paris, Egypt, Iran, Tunisia, Syria, and so on (for a total of 11 countries).

Field demonstration to top officials

Nevertheless, our general popularized papers would have nothing to do with policies if we failed to show our top officials what we have demonstrated in the field. Fortunately, this was tested successfully, as our demonstration project has finally attracted interest from top officials. Mr. Zeng Peiyan, Vice-President of the State Council (2002), Mr Lu Yongxiang, President of CAS (2002), Mr Wang Shucheng, Minister of the Ministry of Water Resources (2003), Ms Wuyun Qimuge, President of Inner Mongolia (2003), Mr Peng Peiyuan, Vice-Chairperson of National People's Congress (NPC) (2004), Mr Yang Bangjie, Vice-Chairman of Central Zhigong Party (2005), and numerous middle-level officials from China, have visited our demonstration sites in Xiligol League of Inner Mongolia. Some officials, after they have visited our scientific projects, showed great concern for the restoration of the grasslands; some even gave orders on the spot. From this, we conclude that the combination of science and policy is the key to successful achievement of grassland restoration and combating desertification.



Photo by Bai Yongfei

Figure 5. Scientists from the Institute of Botany of Chinese Academy of Sciences are explaining their scientific findings to Mr Wu Yunqimuge, the President of Inner Mongolia.

Policy changes

We are happy to know that after great efforts from scientists, journalists, the general public and officials from different levels, the Central Government of China finally changed the policies on the restoration of degraded grasslands. For example, since 2006, the 60 billion yuan project for combating desertification would be managed by the State Development and Information Committee (formerly it was governed by the State Forestry Administration). This means that not only trees will be used, but that many other species will be included using the wisest approaches. Our model based in the Hunshandake Sandland was considered by Mr Hui Liangyu, the Vice-Premier of the State Council on June 26, 2006. The Ministry of Agriculture of PRC set up a huge project in Inner Mongolia, Xinjiang, Ningxia, Qinghai, Tibet province, to naturally restore the degraded grassland (27.4 billion yuan, from 2002 to 2007). This is a great change, since before the year 2000, there was no voice against planting trees in the steppe, and few restoration works that cared for the people living in degraded lands in arid or semi-arid regions.

5. Conclusions

Before any of the projects fighting against desertification in grasslands can work properly, we must release the forces of nature to restore the degraded lands. Then, the people living in these areas should be well looked after. Tree planting in the steppe should be prevented, especially the planting of single tree species such as *Populus* spp. Ecological services, rather than the direct utilization of land with lower productivities, should be stressed in areas such as desert, sandland, steppe and so on. Shifting of land use function should be further considered, such as breeding

animals in farm areas while farming chicken in the steppe. However, these points of view have to be popularized before policy is changed.

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Sub-Saharan Africa Challenge Programme

Assétou Kanouté

Sub-Saharan Africa Challenge Program

Introduction

The New Partnership for Africa's Development (NEPAD) established by Africa's leaders in 2001, has set itself the goal of increasing agricultural output by 6% per year for the next 20 years. Africa is a continent rich in natural resources. Its ecological zones range from forest to Sahara desert. Africa also has diversified socio-cultural features and a young population. Agriculture is the backbone of the economy in Africa. In the early seventies, Asia, Latin America and Africa had the same status in agriculture. But thirty years later, China and India export food, while in Africa, agriculture still has not emerged. However, it is estimated that a 1% increase in staple crop yield in Africa can lift 2 million people out of poverty (Thirtle, et al., 2003).

This poses a tremendous challenge for agricultural research and development institutions, policy makers, and Africa's farmers. A series of consultations identified 3 main issues as the most significant constraints to reviving African agriculture:

- failures of agricultural markets;
- inappropriate policies; and
- natural resource degradation.

Addressing these constraints in isolation will not solve the problem. Although the traditional approach to agricultural research and development has brought significant advances in the countryside, its fragmented and reductionist nature makes it ineffective in dealing with increasingly complex challenges. A new paradigm is called for that can foster synergies among disciplines and institutions, along with a renewed commitment for change at all levels, from farmers to national and international policy makers. The proposed Sub-Saharan Africa Challenge Programme (SSA CP), headed by the Forum for Agricultural Research in Africa (FARA) is one of the 4 challenge programmes of CGIAR. It is based on a paradigm entitled Integrated Agricultural Research for Development (IAR4D). This paper describes how the approach of IAR4D responds to existing lessons, and how new knowledge management needs to contribute to improved policies for combating desertification.

The Approach of Integrated Agricultural Research for Development (IAR4D)

The mission of the Sub-Saharan African Challenge Programme (SSA CP) is to add value and enhance the impact of ongoing agricultural research and development in Africa and to transform the way that sectors and institutions approach agricultural research. Its goal is to improve rural livelihoods, increase food security and sustainable natural resources management (NRM).

The SSA CP has four objectives:

- to develop technologies for sustainably intensifying subsistence-oriented farming systems;
- to develop smallholder production systems that are compatible with sound natural resource management;
- to improve the accessibility and efficiency of markets for small farmers and pastoral products; and

- to catalyze the formulation and adoption of policies that will encourage innovation to improve the livelihood of smallholders and pastoralists.

The IAR4D approach draws on successful experiences in Africa with Integrated Natural Resource Management (INRM), which takes a systems approach to managing interactions between soils, water, pests and human interventions in agriculture. However, IAR4D goes beyond INRM to also encompass the domains of policies and markets and the effects that these have on the productivity, profitability and sustainability of agriculture. An essential component of such a paradigm shift is an institutional innovation process in which more integrative research for development would be undertaken simultaneously with implementing action-oriented and participatory methods to solve current problems, including non-conductive government policies.

In the past, agricultural research has had little impact on poverty due to a vicious circle of degradation of natural resources. This was because the success of agricultural research was primarily oriented towards achieving increases in productivity. We now realize that agricultural research should be judged on a wider set of development criteria such as poverty reduction, sustainable resource use, food security, and others. In light of this, IAR4D has evolved from the lessons of many approaches from Farming Systems Research to Rapid Approach of Agricultural Knowledge Systems to a Sustainable Livelihood approach. IAR4D is characterized by the endeavor to address the inherent complexity of issues interrelated with many factors outside of the traditional field of agricultural research, per se.

IAR4D is based on the integration of different disciplinary perspectives and analysis/action at different organizational levels (enterprises, farm, community, district, nation). It focuses on the identification of development strategies that integrate technological, institutional and policy options, and the evaluation of potential outcomes based on a range of criteria.

The following conditions are necessary in order to facilitate the IAR4D approach:

- a coalition of stakeholders around a shared research and development challenge or agreed-upon entry point;
- partnership among these stakeholders based on mutual trust and ownership of the process, with commitments and clearly-defined roles and responsibilities;
- inclusion in partnership;
- effective facilitation and coordination of the joint processes of research and learning;
- willingness to learn from other stakeholders, and an effective and participatory mechanism to monitor and evaluate this learning;
- effective dissemination (scaling up/out) of successful experiences to other regions/areas with similar challenges, and to institutional managers of the stakeholders involved.

The IAR4D Paradigm Shift

The adoption of IAR4D implies:

- a change in mentality;
- a different way of looking at the world of research;
- a change in the way we think and analyse situations; and,
- interacting with others.

These paradigm shifts include a shift from knowledge generation as a means and as an end; a transition from research to action, and a reorientation from a focus on technology to a focus on people.

A number of conceptual shifts in the formulation and scope of agricultural research projects are also required. These include a shift from emphasis solely placed on reductionist analysis (understanding of the parts) to a systemic analysis (understanding the relationship between the parts). Shifting away from initiatives aimed solely at improving the efficiency of the system towards initiatives that concern themselves first with determining the nature of the system and desirable outcomes is also required. And finally, a shift in approaches to be undertaken within agricultural research needs to take place: from teaching to learning, from being taught to learning how to learn, and from individual to social learning.

These paradigm shifts are not easy, especially for mid-career professionals who find many of their actions being questioned. They often require a lot of uncomfortable confrontation: both with oneself and with others. They involve a change from working individually to working with others. The shift from teaching to learning is particularly difficult to make.

Building the capacity for IAR4D requires more than just a change in people or improving individual knowledge and skills. It involves institutional change, changes in the way that research is organized and managed, and changes in how research interacts with other rural services and policy makers. But it is not easy to change mindsets and individual abilities through action when the institutional environment (job descriptions, incentives, power relations) is not conducive or may even discourage such action. Nor is it easy to change institutions where there are managers and staff with "traditional" mindsets. Both of these aspects need to be tackled simultaneously, if IAR4D is to become institutionalized as a new way of doing business. A broad range of stakeholders is involved in implementing and facilitating IAR4D actors, and these stakeholders therefore need to be included in capacity building programmes.

How does IAR4D Respond to Existing Lessons, and how does New Knowledge Management Need to Contribute to Improved Policies for Combating Desertification?

We have learned from experiences in the past that desertification is a not a simple matter. It is a complex process, and there are no simple solutions to address it. While in the past, we thought that science and technologies or modern knowledge alone would be enough to solve the problem of food security, poverty and degradation of NRM in Africa, this proved not to be the case. We then learned that local knowledge as well as science and technology is needed. Local knowledge has been mainly dependent on science and technology. We need to find a way to support more independence at the local level. This is one of the aims of IAR4D.

We also used to believe that one or two actors or institutions or sectors would be able to solve the problem of desertification or food security, poverty and degradation of natural resources. That is also not the case. We need multiple actors, institutions and sectors. When it came to formulating policies, we used to think that this was the business of government alone. Based on the perspectives and priorities of our policy makers, current policies have tended to pay more attention to urban issues than to the rural poor because policy makers do not have access to high quality information or data on rural areas. In light of this, the IAR4D approach will use information collected in rural areas to help decision makers to develop appropriate policies that can benefit farmers. IAR4D will thus encourage the adoption of innovations that sustainably and equitably improve agricultural livelihoods of Sub-Saharan Africa.

A smallholder-led transformation of African development is both technically and economically feasible, but this will not happen where there are constraining policies. The direct involvement of community-based and farmers organisations in IAR4D will create channels for them to have more influence on policy makers. IAR4D involves institutional change: change in the way research is organized and managed, and changes in how research interacts with other rural services and policy makers.

Conclusions and Recommendations

Sub-Saharan Africa today has a great intellectual capital and a great local community with considerable knowledge to solve the problem of desertification. Since it has been recognized that neither local knowledge nor modern knowledge alone will solve the problem of desertification, which is a complex issue, there is a need for converging both knowledges (traditional and modern) to combat desertification. Strong and positive partnership with the local community is essential to contribute to combating desertification. The effective participation of the local community in policy research and formulation is therefore necessary to combat desertification. The driving force of any partnership with local communities must be based on complementarity. Combating desertification can only be achieved when there is a sustained improvement in the African people's welfare through diligent application of knowledge to solve specific problems. The development of appropriate policy processes, based on rigorous data collection and analysis, dynamic planning, effective monitoring and evaluation systems and learning on desertification, supports the adaptation and revision of plans to fit changing circumstances

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Traditional Knowledge World Bank for Safeguarding Ecosystems

Pietro Laureano

Ipogea

Introduction

Traditional knowledge are ancient techniques and practices of a territory passed on through the generations and used for water harvesting, soil management, use and protection of natural areas, rural architecture and for organising urban centres. They are the historical knowledge of humanity that allowed building architecture and landscapes with a universal value protected by UNESCO in the category of cultural landscapes. An appropriate use of natural resources such as water, soil and energy is made possible by using traditional knowledge that establishes the harmony of architecture with the environment, the symbiosis of the techniques of organisation of space with the traditions, social habits, spiritual values and the fusion between practical aspects and beauty.

Today, traditional knowledge is in danger and its disappearance would not only cause the loss of people's capability to keep and pass on the artistic and natural heritage, but also of an extraordinary source of knowledge and cultural diversity from which appropriate innovative solutions can be derived today and in the future.

UNESCO launched a global programme for inventory assigned to IPOGEA – Research Centre on Traditional and Local Knowledge. The project gathers and protects historical knowledge and promotes and certifies innovative practices based on the modern re-proposal of tradition as well. The main targets are the firms, the natural areas and the historical centres which will be assigned quality trademarks and acknowledgements of international excellence in production or use of good practices and innovative solutions. Each technology, proposition and experience achieved will provide a spin-off on an international scale and each good practice will contribute to safeguarding the whole planet.

1. Water Harvesting Techniques in the Mediterranean Arid Zones

Three sides of the Mediterranean Basin are connected with areas where humankind had to cope with dryland areas; its isles are completely lacking in underground or ground water where complex civilizations developed and even in its more northern areas it undergoes a changing and catastrophic environment. Therefore, most of the traditional techniques relative to the water organization for water harvesting, conservation and diversion are widespread as well as the systems of slope protection and the creation of soil, that have different characteristics according to the environment. In southern Italy and in Spain there are also systems like, for example, underground drainage tunnels that are common in oasis towns, in North Africa and in the Eastern World that have been handed down by Islamic civilization or by more ancient civilizations.

The several water-saving techniques used by the *Nabatean agriculture* (the condensation caves and pits, the stone arrangement for rainfall harvesting, the underground dams) are not only widespread in the Negev desert, but also in the whole Mediterranean area. In Petra (Jordan) they present their urban ecosystem synthesis but they can be also found in Tunisia, Libya and southern Italy, and in particular in the isles thanks to the influence of prehistoric or widespread traditions imported by current exchanges. The techniques of *Andalusian agriculture* in Spain

are widely represented because of the influence of the Islamic civilization. In the isle of Ibiza there is a similar irrigation practice called *feixes* designed according to an ingenious hydraulic organization. The fields are divided into long and narrow rectangular plots by means of a network of canals having the twofold function of draining the water in excess, thus collecting and saving it, and of irrigating the fields during drought seasons. In fact, if these works were not carried out it would be a swampy area in some seasons and arid or flooded by seawater in other seasons. In this way, it is possible to carry out a self-regulating process which allows to practice intensive cultivations of both marshlands and arid lands. Open canals are about one metre deep and flow at a lower level than the plots of land, thus keeping them dry. The land excavated for building the canals is used to raise the level of the cultivated land. During hot seasons when the land undergoes high evaporation, the plots absorb the necessary quantity of moisture directly from the subsoil and from the walls of the canals by osmosis and capillarity. The process is then fostered by further underground canalizations excavated in the plots. These underground canals are built with porous stones and pine-tree branches covered with a layer of *Posidonia* algae collected along the coast. This method ensures good running water pipings and, at the same time, it allows to obtain a certain level of permeability in order to give the land the quantity of water necessary to keep it humid. Therefore, the irrigation is carried out from the subsoil directly to the plant roots. This technique enables to save water that would be lost because of evaporation by using open irrigation methods.

Traditional techniques can be found not only on the southern Mediterranean shores and in southern areas of Europe, but also in northern France and even in the Swiss mountains, where specific geomorphologic conditions cause aridity. This situation depends on the position of the mountain slopes compared with the direction of the dominant winds, which release all their moisture as they rise up the sides. Once they have reached the top, they lash against the slopes below with high pressure dry wind currents that dissolve the clouds. This is the phenomenon of the foothill deserts that in Switzerland creates dry, arid conditions in the valleys. On the contrary, in the region of Valais and the province of Sion there are green pastures and plentiful vineyards. The landscape is not the result of natural conditions, but rather of a skilful use of a traditional local technique called *bisse*. This consists of a series of channels made of wood or carved out of the rock, which extend up into the mountains as far as the sources of the brooks and the perennial glaciers, running for many kilometres. They slope very gently down the steep edges, remaining at a high altitude to convey the water along above the natural course of the bed river and use the force of gravity alone to irrigate distant valleys. Otherwise, they would completely lack water. This system is supported by social cohesion, by water boards and companies similar to those that manage Andalusian agriculture or the Saharan drainage tunnels. Just as in northern Africa and in Spain, this system generates a particular landscape where the location of the settlements is determined by the layout and the outlets of the *bisses*.

The most widespread system that can be defined as one of the typical features of the Mediterranean area is the terracing which can be found from the Middle East to Greece and from Italy to Portugal. Terracing associated with olive and wine growing actually contributes to shaping the landscape. The slopes and hills in the northern Mediterranean have stood up to erosion over time and their present shape is the result of that long-lasting titanic action. Along with the dry stone walls, the stone barrows (*specchie*) and the tholos constructions (*trulli*), terracing is typical of the Apulian region in the south of Italy. Here, the terraced slopes of Amalfi and in the north of Italy, the Cinque Terre in Liguria, create fascinating and traditional urban ecosystems. In Sardinia and in the isle of Ibiza there are systems of fields surrounded by dry stone walls called *tanka*, which is a term deriving from an ancient Mediterranean toponym.

The majority of the ancient Mediterranean sites follows the layout of the terracing and the water systems network. These sites adopt the techniques of rainfall harvesting, protected vegetable gardens, the use of organic waste for the creation of humus, the methods of passive architecture and of climate control for food storage and for energy saving as well as the practices of recycling productive and food residues. The aesthetic qualities, the beauty of natural materials, the comfort of architecture and spaces, the organic relationship with the landscape that these ancient towns boast are especially due to the intrinsic qualities of traditional techniques and to the search for symbiosis and harmony intrinsic to local knowledge. The survival of the poor archaic societies of the whole Mediterranean areas depends on the accurate and economical management of natural resources. The close link between traditional farming techniques and settlements make the traditional historic centres a fundamental element for environmental safeguard. In the Mediterranean area, which is characterized by intensive historical settlements, each part of the environment is not only the result of natural process, but rather represents a cultural landscape where historical centres are the crystallization of knowledge appropriate to the correct environmental management and maintenance.

2. Ancient Water Techniques for a Sustainable Future

Using traditional knowledge does not mean to reapply directly the techniques of the past, but rather to understand the logic of this model of knowledge. It allowed societies, in the past, to manage ecosystems in balance, to carry out outstanding technical, artistic and architectonic work which are universally admired and has always been able to renew and adapt itself. Traditional knowledge is a dynamic system able to incorporate innovation subjected to the test of the long-term and thus achieves local and environmental sustainability.

The Traditional Knowledge World Bank promotes traditional knowledge as advanced innovative knowledge appropriate to elaborate a new technological paradigm based on the progressive values of tradition: the capability of enhancing a society's internal resources and managing them at a local level; the versatility and the interpenetration of technical, ethical and aesthetic values; the production, not per se, but for the long-term benefit of the community. Activities are based on the principle according to which each has to enable another without leaving behind waste; energy use is based on cycles in constant renewal; the purpose, including economic interest, is to protect the ecosystems, the cultural complexity and diversity and all living beings. The project aims to prefigure a new model of development and a technological dimension connected with historical memory.

Traditional knowledge consists of practical (instrumental) and normative knowledge concerning the ecological, socio-economic and cultural environment. Traditional knowledge originates from people and is transmitted to people by recognizable and experienced actors. It is systemic (inter-sectorial and holistic), experimental (empirical and practical), handed down from generation to generation and culturally enhanced. Such a kind of knowledge supports diversity and enhances and reproduces local resources.

Traditional knowledge is to be considered as part of an extensive system which hands down and accumulates shared knowledge whose proficiency and evolution is appreciable over long and very long periods.

The functioning principle of the traditional systems is based on a strong cohesion between society, culture and the economy. Their efficacy depends on the interaction between several factors which should be carefully considered: aesthetic and ethical values complete the interaction between environmental, productive, technological and social aspects.

Traditional techniques, therefore, cannot be reduced to a list of mere isolated technical solutions able to solve a specific problem. To catch the full meaning and importance of traditional techniques, they must always be highly contextualised, not only into the local environmental situation, but to a precise historical moment and the complex social construction which originated them.

The understanding of the logic of traditional techniques' use and of their success in terms of environmental sustainability and efficacy over long periods is fundamental not only to safeguard a vast cultural heritage, but as a new paradigm on which the modern re-proposition of traditional techniques must be founded.

As a matter of fact, using traditional knowledge today means to re-interpret the logic as innovative advanced knowledge. Its values allowed societies, in the past, to manage ecosystems in balance, to carry out technical, artistic and architectonic works universally accepted.

Traditional knowledge is a dynamic system able to incorporate innovation subjected to the test of the long-term and the local and environmental sustainability.

2.1. Innovative use of ancient water techniques in agriculture

Prehistoric traditional techniques, which were used to build the Italian agricultural landscape, are today re-proposed in agriculture as the best practices to replenish soils, save water and combat hydrogeological instability and desertification.

The technique of the *drainage ditches* spread in the Apulia district of Daunia 6,000 years ago, when Neolithic communities built more than 3,000 villages surrounded by trenches in the shape of a crescent. The ditches met environmental needs by draining water and drying some areas to be tilled during the humid season and by working as drinking troughs for cattle, humus collection and water reserves during the dry season.

After this practice was replaced by mechanized agriculture, these places are today suffering terrible inundations in winter and extreme droughts in summer. On the Ethiopian highlands, on the slopes of the Rift Valley ridges, there are many villages where multipurpose ditches systems are still used to store and manage water resources, gather sewage and produce fertilizers.

The *atmospheric water condensed* inside caves or mounds of stones and the dry limestone walls are used by all the ancient societies in arid areas. Today, authentic *aerial wells*, *atmospheric condensers* producing water from vapour, are used in the desert. They produce water from atmospheric moisture according to the principles and resources of very ancient techniques.

The practice of setting *cistern-jars* full of water or calcareous masses close to the plants to provide irrigation is today re-proposed with innovative techniques which enable to overcome constraints in ancient systems through modern drop irrigation. These traditional innovative techniques are used, for example, during the processes of reforestation of arid areas, thus allowing each single shrub to be supplied with the quantity of water it needs during the phases of growing as long as the plant will get independent vegetative power. Within the framework of this family of techniques, a big company elaborated an enzymatically degradable product called *dry water* which, set into the soil close to the roots, progressively transforms into the necessary water supply.

The *drainage tunnels* are underground tunnels spread over arid areas since 3,000 years ago, and which are still working today in the Sahara Desert, in China and in

Iran to supply the oases with water resources. They allow to absorb the right quantity of water for the replenishment of the environment itself. This solution could be re-proposed, also in Italy, as an alternative to the excavation of wells which lowers the groundwater and deeply perforates the soil, thus causing pollution and salinisation on the surface.

In the Sahara Desert, people are experimenting with the use of techniques to relieve hard excavation work by introducing small machines planned for this purpose. This innovative category includes the whole of *mechanical adapted tools* which range from mini-tractors for the excavation of lunettes for water harvesting to new machines for sustainable agriculture.

The re-proposition in this field of ancient techniques enables to get important successes to combat erosion and soil degradation. In southern Italy, there is successful experimentation with practices such as the *grassing* and *sowing on "hard soil"*. The first consists in making the grass grow under the orchards and in the olive groves, thus it forms a protective cover to avoid ploughing which causes erosion. The second consists in sowing wheat over unploughed soils. This technique enables to protect soils, to reduce costs and to have better results than by ploughing. This practice is most advantageous during drought periods because ears of wheat grow less high and need a lesser quantity of water and chemical fertilizers.

2.2. Innovative use of ancient water techniques in urban settlement and architecture

Several innovative techniques coming from tradition are being experimented with in urban fields. The building of most of the ancient centres followed the layout of the terracing and the water systems network. As a matter of fact, the rainwater harvesting techniques, the areas with the walled gardens, the use of organic remains for the production of humus, the passive architecture methods and climate control for food conservation and for energy saving, and the practices of recycling production and food residues have been integrated and perpetuated in the very structure of the ancient centres. This category includes all innovative techniques in the *photovoltaic*, *sun warming*, *water catchment*, *composting* and *waste recycling* fields. In some advanced contexts e.g. in Tokyo, a number of industries are now proposing by law the *roofed-garden* technique in new houses where the vegetable covering grows on the terrace of the modern buildings, which brings to mind the hanging-gardens in Babylonia. This keeps optimal climatic conditions inside the houses, harvests water and becomes an area for entertainment and contemplation. The micro-solutions for city quarters and houses represent a large innovative sector in the waste recycling field. Several *mini-compost machines* to be placed inside the gardens or in common areas of the quarters have been realized to directly absorb organic waste and supply the gardens with humus. A *water compost machine* is a device set beneath the toilet bowl, which directly transforms waste into compost. *Biomass mini-reactors* which transform waste into kitchen gases as well as greater plants for heating the whole house have been also realized. Also, small and large-scale solutions for sewage water have been found. In Germany, modern houses have been equipped with a *vertical marsh*, a device which reproduces the processes of water decantation and filtration still existing naturally in marshlands. The process is reproduced along the wall of the building in glass interspaces where sewage waters seep into, infiltrate and constantly recycle themselves by gravity. In Calcutta, an innovative traditional technique used on a very large scale solved the serious problem of used waters. Sewage waters, traditionally re-used in rice fields, are today turned into a resource for irrigating and fertilising rice fields by using proper innovative *systems of sewage water's filtration and sterilization*.

A very large series of *products, materials* and know-how necessary to a high-quality *architecture* form a further innovative sector. The aesthetic components that we appreciate in ancient towns, the beauty of the natural materials, the comfort of the buildings and spaces, the organic relationship with the landscape are due to the intrinsic qualities of the traditional techniques and to the search for the symbiosis and the harmony embedded in the local practices. In this field, experiences of firms re-proposing market materials and processes derived from tradition, such as lime, natural clay and pozzolana, both for rehabilitation and new constructions, are now largely spread.

2.3. Production and landscape

Local knowledge is a propulsory and economic factor in different production sectors. Situations in which tradition persists, and its role in society and economy is consolidated and stabilised, can be proved specifically in the more technologically advanced countries and sectors. The values of tradition, manufacturing practices and the craftsmen's skills are the basis on which is founded the great added value of productions of enormous economic importance for many modern countries.

In particular, the *typical food production* such as oil, cheese and wine, safeguards both the aesthetic and the environmental quality of the landscape, since the old production systems are possible thanks to the maintenance of traditional techniques of soil management. In this same field, the growing dissemination of organically controlled agricultural productions and meats shows even more interest in traditional techniques of husbandry and breeding.

These considerations are true even in other sectors ranging from *quality articles* and *haute couture* to real estate and the building market. The most refined production houses are proud to list the traditional techniques they use in their manufacturing methods and the success of so many companies is actually due to the capacity to incorporate tradition into their processes or to be located in traditional environments or historical town centres.

In the regions of Valais in Switzerland, in the Loire Valley in France and in Tuscany in Italy, the maintenance of traditional techniques in agriculture has ensured the stability of high quality landscapes. The major difficulties and burdens due to the use of more expensive labour techniques can be overcome thanks to the great value of the product that can be obtained with these techniques, and in these cases, the wines.

In Valais, the water catchment systems from the sources of springs and from glaciers which, through little surface canals called *bisse*, allow mountain slopes to be irrigated by gravity on a higher level than the stream's natural course. A similar technique is proposed today in Tibet, with innovative methods to *protect glaciers* which are in danger because of global warming. In the Loire Valley, the traditional technique of the *cave-dwellings* and of the excavation of subterranean caves is maintained in order to preserve each single metre of surface area, precious for high-quality wine production, and in order to organise wine cellars with a perfect microclimate for the production of that product. In Tuscany, wine production provides the economic resources necessary to preserve from destructive transformations one of the most wonderful agrarian landscapes, consolidated and affirmed over the centuries.

Thus, it is wrong to consider traditional knowledge as marginal compared to the great economic and technological processes under way. Even from a quantitative point of view, their use still supports most of humankind which is distributed throughout the less industrialized countries. Paradoxically, in these places where traditional techniques are still used in a massive way, these are considered by the modernist

thought as a phenomenon of backwardness, whereas, in advanced countries, they create an image of desirability and provide added value.

What we recognize as tradition is not a static and immutable condition, but a dynamic system which evolved by making innovative aspects so much an integral part of itself that it sometimes becomes difficult to interpret. For instance, nowadays, everyone considers the Mediterranean traditional space as one which cannot be separated from olive and tomato cultivation; however, both of them were introduced, the olive in ancient times and the tomato after the 16th century. It is commonly thought that American native peoples are associated with the use of horses. However, the latter arrived on the continent only after the Europeans' arrival. American nomadic people used them immediately and, during the period of colonisation of the American Far West, the horse was already an indissoluble component of the local tradition.

Medieval historical houses persisted in Europe thanks to the fact that this architecture was restored and adapted with the hygienic facilities required for modern life. The more this is done with respect for tradition and authenticity, the more it requires advanced innovative and appropriate capacities and creates added value as well as economic effects.

The same consideration is true for entire historical centres and rural landscapes, which are doomed to perish and be abandoned when they are unable to incorporate the innovations they need in order to function.

In Liguria, where in the Cinque Terre region there is one of the largest systems of *terraced slopes* in the Mediterranean, this traditional practice that protects the soils, catches and channels the waters, has been perpetuated through innovative agricultural mechanization. Agricultural work on terraces is hard due to tiring transport systems which are operational only on foot. Traditionally there were techniques of transport by means of sledges drawn up the hill by ropes. Already at the beginning of the century these were substituted with mechanical funicular systems on rails. The same technique is re-proposed today with appropriate *monorail* systems that enable the ascent of the slope without disturbing the landscape or the ecosystem.

In Botswana, the *motswelo* is a traditional form of cooperative and bank, which usually gathers together between 15 and 20 people who join the group voluntarily and bring what they can provide: money, produce of the land, or work. Thanks to this ancient system, it is possible to save money and to obtain interest-free loans and funds to start important activities. For instance, it is possible to organize the production and the sale of traditional beer, the cultivation of new lands or the restoration of villages. Production and trade are considered as the equivalent of money deposits. All the profits are given, in turn, to the members of the *motswelo* who use them to fund one of their activities or other social needs such as feasts, marriages or the purchase of a house. These practices are today reproduced by the experience of *Ethical Banks* and micro-loans which are an innovative means to recover traditional social habits.

In Burkina Faso, *zai* is a particular traditional technique able to regenerate highly degraded soils. The soil is dug with holes that fill up with water in the humid season and are used as dump-sites for rubbish and manure in the dry season. This practice attracts termites that digest rubbish, thus its absorption by the plants' roots. Furthermore, the tunnels dug by the termites increase the soil's porosity. Seeds are then sown in the holes, giving very high crop yields. Innovative practices which promote original forms of symbiosis between humankind and animals or micro-organisms are today re-proposed to rehabilitate degraded soils or soils made suitable for human living in extreme areas. In the Balearic Islands, *feixes* are a traditional system of agricultural organization according to which the plant roots are irrigated

directly from underground without wasting water. The tilled fields are separated by superficial drainage channels into which water flows. From these, a network of channels made of porous materials and covered with a layer of seaweed branches out under the cultivations. Thus, channels release the quantity of water to the tilled soil according to seasonal and climatic needs. The technique is re-proposed in hydroponic cultivations and for planning space stations.

2.4. The Competitiveness of the past

Thus, we must speak about an on-going construction of tradition. To guarantee its future does not mean to reduce or inhibit capacities of innovation, though this idea has been over time subjected to critiques and biases, and weakened by the lack of communication and exchange of successful experiences as well.

With emigration and the dramatic transfer from traditional habitats into new urban agglomerations, the rapid abandonment of the agricultural sector by large segments of the population, and the superficial suggestion of the absolute superiority of modern technology, the process of conservation and dissemination of knowledge is interrupted and lost. On the contrary, the good welfare conditions of people favour social cohesion, confidence within cultural identity and enable the safeguarding of traditional systems through the guarantee of a high remuneration of the work necessary to maintain them. It explains the apparent paradox of those rich countries which were able to maintain high levels of traditional techniques, and succeeded in paying for the necessary efforts with a great increase in product value. Thus, we can state that tradition is a feature of 'successful modernity', capable of gaining benefits and values from it. To re-propose tradition by resuming its historical relationship with people's innovative and creative power is decisive to safeguarding landscape and achieving *sustainable futures*.

3. The International Centre for Traditional Knowledge

The interest in Traditional Knowledge has been expressed by the United Nations and by other international organisms during all the main conferences on sustainable development. Making an inventory and organizing the protection and dissemination of this knowledge has emerged as a necessity.

Concerning the activities of the United Nations Convention to Combat Desertification, Italy has received the mandate of organizing the Italian Centre for Local and Traditional Knowledge that has the following duties:

1. To make an inventory of Traditional Knowledge and of its innovative use in case studies on specific countries.
2. To study the possibilities for dissemination of Traditional Knowledge.
3. To study the parameters and the indicators for Traditional Knowledge loss and elaborate methods to combat such loss.
4. To select the successful practices and create a system of incentives for the implementation and dissemination of Traditional Knowledge and innovative technology deriving from traditional know-how.
5. To consider the methods for the protection of Traditional Knowledge rights that can be implemented by persons, communities, disseminators and traditional technique innovators.
6. To discuss the promotion of traditional techniques through each country's Focal Points and provide a guideline for the adoption of a national safeguard and dissemination strategies.

The Italian Ministry of Environment, the UNCCD, UNESCO and the Region of Tuscany have arranged an agreement for the creation of the International Centre for

Traditional Knowledge. It will be located in a prestigious Renaissance villa in Florence and, managed by IPOGEA, and it will start the activity of the Traditional Knowledge World Bank. Important aspects of this project are already being implemented: specifically, the phases relative to the database and network organization and the study of the traditional techniques in specific areas. Thanks to UNESCO's contribution, a prototype system, available on the web (www.tkwb.org), was developed and presented during the UNCCD Nairobi Conference in October 2005. It is possible to consult a dynamic questionnaire based on the Iconographic classification System of Traditional and Innovative Techniques (SITTI) which constitutes a guideline for the recognition and notification of new knowledge.

The information (texts, graphics, photographs) is placed, through geo-reference, in a Geographical World Map System. Thanks to its study and classification activities, the Traditional Knowledge World Bank protects the rights of local communities who hold knowledge. It fosters the recognition of communities' property rights and it protects them juridically at an international level. The Traditional Knowledge World Bank is not only a database but also an economic actor. Companies that reintroduce traditional techniques in innovative ways or who look for appropriate solutions will be selected. The TKWB connects the demand for particular techniques for intervention on valuable sites, urban ecosystems and protected areas with the companies who work in these sectors. Valuable sites gain international recognition by adopting the protocols for the use of the appropriate techniques. Companies that are certified by the TKWB provide the technologies. A long-term protection of the sites is consequently guaranteed since it will not be possible to insert destructive processes, technologies or materials. Therefore, a network of companies oriented towards sustainability will be implemented. For companies, old city centres, and parks to seize this challenge means confronting processes, cognitions and capabilities that will be increasingly requested at an international level, anticipating necessary solutions for sustainable development and gaining attractiveness for cultural tourism and a useful image for the international success of its products.

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SESSION 6:

INTERLINKAGES BETWEEN
DESERTIFICATION, CLIMATE
CHANGE AND OTHER
GLOBAL ENVIRONMENTAL
ISSUES

Synergies at the International Level: The Challenges of Bridging the Environment-Development Divide in the UNCCD

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Introduction

What is desertification? According to Agenda 21 and the United Nations Convention to Combat Desertification (UNCCD), desertification is defined as “land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities” (United Nations, 1992, p. 98). While this technical definition sets the stage for the first so-called “sustainable development” convention, it actually has generated more questions than answers. The fact that “human activities” are included in the definition opens the door to both the scientific and anthropogenic causes of desertification and has also reflected the many challenges in implementing the UNCCD. Is desertification an “environmental” problem? Is it an “economic development” problem? Is it a “social development” problem? Or is it a “sustainable development” problem, providing everyone agrees what sustainable development actually implies.

The UNCCD was adopted in 1994 in Paris as the third of the so-called “Rio Conventions” and the first treaty negotiated in response to the United Nations Conference on Sustainable Development. The UNCCD introduced an innovative approach to combating desertification that focused on both natural and socioeconomic processes and popular participation. Its dual focus on poverty and environmental degradation embodies the concept of sustainable development and many hoped that the Convention could bridge the environment-development divide. Nevertheless, this divide continues to loom large and implementation continues to be a major challenge. With this in mind, this paper will examine the challenge of bridging the environment-development divide and the difficulties that the Convention has faced in creating synergies with other treaties. I will first examine the challenge of determining who has responsibility for combating desertification within this environment-development matrix and then look at how this has an impact on the development of synergies between multilateral environmental agreements (MEAs).

Desertification has not received as much international attention as other global environmental problems such as climate change, ozone depletion, and loss of biological diversity. This is largely because, for many years, the international community viewed desertification as a *national* problem primarily facing countries in the Sudano-Saharan region of Africa. However, according to the Millennium Ecosystem Assessment (MA), drylands cover approximately 41 percent of the global landmass, comprise 44 percent of the world’s cultivated lands and are home to a third of the world’s population, or 2 billion people. Approximately 10-20% of the world’s drylands – or 10 to 20 million square kilometers are degraded (MA, 2005). The most tangible impact of desertification, in addition to widespread poverty, is the annual loss of 5-6 million hectares of agriculturally productive lands as a result of the various processes of land degradation around the world (United Nations Environment Programme 2003). Desertification leads to the forced movement of people because their life-support system has deteriorated. It leads to a reduction in the world’s food producing potential, the destruction of vegetation, and the diminution of many plants and animal populations.

The Convention states that “desertification is caused by complex interactions among physical, biological, political, social, cultural and economic factors” and that “desertification and drought affect sustainable development through their interrelationships with important social problems such as poverty, poor health and nutrition, lack of food security, and those arising from migration, displacement of persons and demographic dynamics” (UNEP 1995, 4). In other words, it is both caused by and affects humans and the environment. Thus, the challenge both during the 13 months of negotiations and during the first decade of implementation has been to recognize these interrelationships and ensure that the Convention addressed sustainable development concerns while not losing sight of the Convention’s mandate to combat desertification in those countries experiencing serious drought and/or desertification, particularly in Africa.

This challenge is further complicated by the fact that sustainable development is very much a concept whose definition and implementation are still debated. Sustainable development, in theory, suggests that it is possible to achieve sound environmental management “without putting a brake on human aspirations for economic and social improvement” (Redclift 1987, 33). The World Commission on Environment and Development defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development 1987, 43). Some definitions emphasize the “sustainable” component of the concept and stress the protection and conservation of living and nonliving resources. Other definitions focus on the “development” component, targeting an influx of financial resources and changes in technology as a way to enhance growth and development. Still others argue that sustainable development is itself a contradictory term and that the focus should be on redistributing wealth (Miller 1995).

The UNCCD represents one of the first tests in operationalizing the term “sustainable development” at the international level and herein lies the problem. Who is responsible for implementing sustainable development? At the political level, some governments view desertification and the UNCCD as a development issue and others see it as an environment issue. Most governments do not have a “Ministry of Sustainable Development”, and thus responsibility for addressing desertification is spread across ministries for environment, development, development cooperation, and agriculture, to name a few. As a result, there is sometimes a disconnect between officials dealing with desertification and those dealing with other “environmental” issues like biodiversity, climate change, wetlands and forests. Questions about the focus and scope of the UNCCD have affected implementation on the ground, as well as the provision of funding support and stronger commitments from the Organisation for Economic Co-operation and Development (OECD) countries. Furthermore, the inclusion of both the environmental and socioeconomic aspects in the definition of desertification has made it more difficult to measure progress through scientific indicators or other quantitative or qualitative measures, which is how the success of other instruments of environmental governance are measured. This affects the development of synergies between the environmental Conventions. This paper will examine these problems and will conclude with suggestions for bridging this divide and, therefore, increasing the efficacy of interlinkages and cooperation/coordination between different environmental regimes in a way that could enhance the effectiveness of the UN Convention to Combat Desertification.

Synergies and Interlinkages

With the proliferation of multilateral environmental agreements (MEAs) at the global and regional levels, there has been an increasing call for increasing the collaboration between MEAs, particularly between the three “Rio Conventions”: the Convention on Biological Diversity (CBD), the UN Framework Convention on Climate Change

(UNFCCC) and the UNCCD. A number of elements of the texts of the three Conventions imply interlinkages with the objectives of the other Conventions. In the case of the UNCCD, encouragement to coordinate activities among the three Conventions is built into the text of the Convention itself (Article 8.1). In addition, the three Conventions share a number of cross-sectoral themes, such as those relating to research and monitoring, information exchange, technology transfer, capacity building, financial resources, and public awareness. The rationale for collaboration among the Conventions stems from the interlinkages between the issues that they address. Climate change can be an important driver of desertification and biodiversity loss. Ecosystem dynamics can impact the earth's carbon, energy and water cycles and therefore affect climate. Furthermore, measures undertaken under one Convention to address climate change (including mitigation and adaptation activities), to combat desertification and land degradation, or for the conservation and sustainable use of biodiversity, might have consequences for the objectives of the other Conventions (UNFCCC 2004).

The UNCCD Secretariat has identified a number of activities that it has undertaken with the goal of promoting synergies. A few of them are highlighted here. The Secretariat of the CBD, in close collaboration with the Secretariats of the UNCCD and the UNFCCC and in consultation with the Secretariat of the Global Environment Facility (GEF), convened a Regional Workshop for Africa on Synergies in Implementing the Programmes of Work on Dry and Subhumid Lands and Agricultural Biodiversity (Gaborone, Botswana, 13-14 September 2004). Government experts attending the workshop identified the constraints and lessons learned in order to maximize synergies between the Conventions; they discussed proposals for the integration of harmonized strategies of the CBD and the UNCCD into national development programmes and developed project concept notes, in order to maximize the synergy between biodiversity-related conventions while addressing national priorities (UNCCD 2005, 5).

The UNCCD and the CBD have established a Joint Work Programme (JWP) on the biological diversity of dry and sub-humid lands. The two main activities under this work programme include the compilation of national reports, National Biodiversity Strategy and Actions Plans (CBD), National Adaptation Programmes of Action (UNFCCC) and National Action Programmes (UNCCD), information on the status and trends of biodiversity in dry and sub-humid lands; and to develop criteria to facilitate the identification of lands of particular value and/or under threat (UNCCD 2005, 5).

The UNFCCC Secretariat organized a workshop aimed at examining synergy among the Rio Conventions, in cooperation with the Secretariats of the other two Conventions (Espoo, Finland, July 2003). Participants included national focal points from all three Conventions. The workshop identified a number of options for cooperation on exchange of information, technology transfer, education and outreach, research and systematic observation, capacity building, reporting and climate change impacts and adaptation. The workshop also examined the interlinkages between biodiversity and climate change and in this context highlighted other options, e.g. the use of the CBD's ecosystem approach as a framework for activities contributing to the objectives of the three Rio Conventions (UNCCD 2005, 6).

At the request of country parties, the Secretariat has continued the process of testing pilot initiatives for integrating the climate change dimension, in particular as it relates to carbon sequestration activities, in UNCCD sustainable development projects through afforestation and reforestation schemes. The Secretariat has also entered into consultations with possible donors and recipient countries in order to facilitate this process (UNCCD 2005, 6).

The Secretariats of the UNCCD and CBD, in cooperation with the UNFCCC Secretariat, organized a workshop on forests and forest ecosystems (Viterbo, Italy, April 2004), which has been identified as an area where synergistic actions could be particularly effective. The specific objectives of the Viterbo workshop relate directly to the interactions among the target group of focal points of the three Rio Conventions and other participants. The workshop encouraged participants to identify options for the implementation of specific synergy actions at the local level, relating to forests and forest ecosystems and their use and conservation, derived from the mandates and commitments under each of the Rio Conventions. The workshop contributed to the identification of synergistic processes between sectoral policies relating to forests, as well as between organizations dealing with forests. The workshop also provided an opportunity for an exchange of views among different focal points, agencies and ongoing international processes and partnerships such as United Nations Forum on Forests (UNFF) and the Collaborative Partnership on Forests (CPF) (UNCCD 2005, 8).

The UNCCD Secretariat has also signed a Memorandum of Understanding with the Convention on Migratory Species, participated in a Joint Approach on Forests: an Initiative for Low Forest Cover Countries, and collaborated with the International Tropical Timber Organization on forest fire impacts on ecosystem changes in Peru. Plans for better synergies with the Ramsar Convention and increased cooperation with the other Conventions appear to be in the planning stages.

Another initiative was the establishment of the Joint Liaison Group (JLG) between the Rio Conventions. Established in 2001, the purpose of this group comprising the officers of the subsidiary bodies, the Executive Secretaries of the three Conventions and members of the Secretariats, is to improve the exchange of information, explore opportunities for synergistic activities and to increase coordination among the three Conventions and their Secretariats, for the benefit of their respective parties. Activities of the JLG include exchanging information on recent developments in the Convention processes, the identification and exchange of experts, the establishment of a joint calendar of events relevant to the three Conventions, and the secondment of Secretariat staff among the Conventions (Hoffmann 2003, 23).¹

Challenges in the Development of Synergies

In spite of these initiatives, and the fact that the Conferences of the Parties of all three Rio Conventions and other MEAs have recognized the need for improved coordination, in practice, synergies are also needed at the national level, where Convention implementation is often the responsibility of a specific institution or ministry and a national focal point. However, these national focal points for the different Conventions frequently work separately. Competition at the national level among ministries and government agencies serving as focal points to different international organizations duplicate requests for technical assistance and funds for projects with similar objectives implemented by separate national and international agencies (Briceño 1999, 12). Given that the responsibility for each Convention doesn't necessarily fall to the same institution and focal point of a country, coordination and collaboration are also needed at the national level (Hoffmann 2003, 23).

The dispersion of national focal points across government ministries and agencies results from the complex nature of environmental issues. It is also affected by constitutional constraints, the administrative organization of governments and the

¹ For more details about the work of the Joint Liaison Group, see UNFCCC (2004). "Options for Enhanced Cooperation among the Three Rio Conventions," FCCC/SBSTA/2004/INF.19 (2 November). [Internet: <http://unfccc.int/resource/docs/2004/sbsta/inf19.pdf>].

availability of skilled and trained professional staff in the respective agencies and ministries. When focal points are scattered across or within ministries that do not have open and frequent lines of communication, coordination problems may arise that compromise the efficiency and effectiveness of policy implementation. Problems may develop when lines of communication are broken between or among the ministries assigned to negotiate an MEA and the ministry or ministries overseeing national implementation. Ministries of Foreign Affairs, for instance, are often accused of not involving national focal points during international negotiations of environmental plans (Boyer and Velasquez 2003).

A review of the African national focal points for the three Rio Conventions illustrates this point. Of the 53 African countries, only 21 list the same ministry as its focal point for all three Conventions (See Table 1). Of course, in many cases different divisions of the ministries are responsible for different Conventions, but they are housed in the same ministry. The CBD also has eight different types of focal points divided by issue, not to mention the list for the Cartagena Protocol. In some cases, especially with the focal points for the Biological Diversity Convention, two or more officials from different ministries or offices are listed as the focal points. In the other 32 countries, often the focal points for two Conventions are the same, but the third one is different. For example, in seven countries, the national meteorological service houses the focal point for the UNFCCC, but not the other two Conventions. Just looking at the UNCCD focal points alone, ministries include agriculture, environment, forests, and rural development. Of 25 OECD countries, however, 19 maintain UNCCD focal points in ministries of foreign affairs (environment or development departments within the ministry) or ministries of development cooperation, which is quite different from the focal points in Africa. The five who maintain focal points in agriculture or environment ministries are those who suffer from desertification.

The list of focal points reflects the argument that part of the problem is that the Rio Conventions have created competing ways of addressing facets of the same problem. From an ecosystem perspective, a separation between combating desertification and the conservation of biological diversity or adaptation to climate change makes little sense: a community is seldom faced with only one dimension of environmental degradation. Notwithstanding this reality, each Convention has processes and mechanisms that require distinct planning and monitoring frameworks. For example, it is not rare for a country to be required to develop a National Biodiversity Action Plan, a UNCCD National Action Programme, a UNFCCC National Adaptation Plan of Action, a Soil Fertility Action Plan and a Forestry Plan in order to receive financial assistance. As a result, even the best attempts at synergies are often uncoordinated and duplicate: programmes and the actors involved in them are multiplying with no clear direction and few initiatives generate benefits on the ground (Bassett and Talafré 2003, 134).

On the donor side, the picture is no better. There is still an enduring distinction between development and sustainable development: environmental issues are seldom at the top of the development cooperation agenda. As a result, most aid agencies have yet to find ways to effectively integrate MEAs into their programmes. According to Bassett and Talafré (2003, 135), there are several reasons why this may be the case, including competing priorities on the development agenda (education and health priorities or emergencies) or the fact that it would require a shift in thinking and in the way development agencies do business. There is often a fragmented and specialized approach in dealing with interconnected issues which requires interconnected solutions. Multilateral and bilateral agencies consistently approve funds for projects and activities that are, to a large extent, not only short-term oriented, but are not required to coordinate their efforts with similar initiatives (Briceño 1999, 11).

The missing link on both sides of the environment-development gap is political will. Donors have to be willing to translate MEAs into action and to fulfill their commitments. Donors cannot claim to be responsive to country-driven priorities and select where and how these priorities should be expressed. In some developing countries, the responsibility for combating land degradation and the implementation of the UNCCD is placed under the highest political authority. In these countries, the NAP is a centerpiece of national policy and issues related to land degradation are recognized in national development plans, Poverty Reduction Strategy Papers (PRSPs) and other similar processes. In those cases, land degradation issues have greater chances of making it onto the bilateral development cooperation agenda. But those cases are few and far between (Bassett and Talafré 2003, 135).

Donor and recipient governments alike are often plagued by short-sighted political objectives of officials who expect results in the short-term because they need to show results by the end of the year or term in office. This leads to sub-optimal results. Equally, the demands for quick results made by governing bodies do not allow sufficient time to work on developing synergies (Briceño 1999, 11).

Finally, the roles and responsibilities of the Convention Secretariats vary. Even though these Conventions emerged from a common process, the United Nations Conference on Environment and Development in 1992, and share a common set of principles and approaches, these Conventions have several different institutional elements, which have not facilitated the development of synergies and coordination among them. These different institutional elements include: administrative arrangements (the UNCCD and UNFCCC are institutionally linked to the UN Secretariat while the CBD is administered by UNEP); arrangements for the financial mechanism (while all three share the Global Environment Facility, the UNCCD also has the Global Mechanism administered by the International Fund for Agriculture Development (IFAD); interrelationships with specialized agencies (UNCCD and UNFCCC, but not CBD, are strongly supported by the World Meteorological Organization, while the UNCCD and CBD, but not UNFCCC are strongly supported by the Food and Agriculture Organization (FAO); and the diverse geographical location of Secretariats (UNCCD and UNFCCC in Bonn, and CBD in Montreal) have been an obstacle to better coordination (Briceño 1999).

The UNCCD Secretariat has a mandate for scientific and in-country related work; the UNFCCC and CBD Secretariats aim to facilitate the Convention process, leaving the GEF, UNEP and UNDP to support capacity-building initiatives in countries. In the context of the UNFCCC, scientific questions are dealt with mainly by the Intergovernmental Panel on Climate Change (IPCC) as well as its own Subsidiary Body for Scientific and Technological Advice (SBSTA), whereas the UNCCD relies on its own Committee on Science and Technology and its ad hoc panels, and the CBD relies on its Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) and related ad hoc technical expert groups to assess scientific literature and provide advice (Hoffmann 2003, 23).

Moving Forward

In theory, synergy between MEAs and, in particular the Rio Conventions, is a logical and meaningful undertaking and should be easy to accomplish. In reality, the different mandates, functions and implementation approaches of the different MEAs create considerable challenges at both the national and international levels (Hoffmann 2003, 23). These challenges are now being addressed, but much needs to be done to improve cooperation and coordination among the Conventions. While the following recommendations are not going to solve all of the problems in both improving UNCCD implementation and the forging of stronger synergies with other MEAs, they may prove to be a useful starting point.

1. *Improve synergies at the national level.* Not only do synergies among Conventions need to be improved at the national level, but synergies between economic development, social development and environmental protection need to be developed and improved at the national level. A useful step would be to better coordinate the focal points of the various environmental Conventions, along with those responsible for related development priorities. Since more official development assistance comes into countries with a “development” rather than an “environmental” tag, greater operationalization of “sustainable development” is needed in the process of improving coordination between the different ministries (development planning, foreign affairs, environment, agriculture, health, science and technology, land management, and energy, to name a few) and coordination between MEA implementation and related development planning.

2. *Improve synergies among donors and recipients.* During the negotiation of the UNCCD, many pointed out that sufficient funds were available to combat desertification and mitigate the effects of drought, but that there was no coordination and accountability in the distribution, use and nature of the projects being funded. Donor countries have their funding priorities and recipient countries have theirs. This problem has been incredibly difficult to resolve. However, if there is a greater focus on funding for “sustainable development” projects – ones that encompass both MEA implementation and economic and social development projects – the flow of financial resources, technology, and capacity building may go further towards implementing change on the ground. In a case like the UNCCD where some view it as a development Convention and some as an environment Convention, this could really go a long way in bridging the divide.

3. *Improve synergies in reporting requirements.* One of the most called for synergies has been streamlining the reporting requirements for the different MEAs. Countries are spending more time and money on completing national reports than they are on actually implementing Conventions on the ground. In cases where one Convention is given higher priority than another – or when economic development has primacy over MEA implementation – this could be the death knell for implementation. Therefore, if the Secretariats, Conferences of the Parties and subsidiary bodies could agree separately and jointly, it might be possible to find ways to decrease the number of reporting requirements by finding similar issues across different MEAs where one coordinated report might suffice.

4. *Improve synergies among scientific and technical bodies.* The different MEAs, particularly the Rio Conventions, have different scientific and technical bodies, although there is some degree of overlap among them. It might be worthwhile to bring the synergies discussion to the scientific and technical level to explore ways in which there can be greater cooperation between the bodies as well as between the ministries whose officials attend scientific and technical meetings of the various MEAs. Cooperation at this level has the potential to increase scientific and technical synergies, as well as synergies in reporting requirements, and can facilitate the move towards greater synergies at the political level.

The UNCCD can push the synergies discussions and activities forward because of its unique position as a truly sustainable development Convention. Not only does it contain the substance of the Millennium Development Goals on issues such as food security, nutrition and health, it also addresses achieving environmental sustainability. Some argue that the low level of attention paid to the UNCCD is related to its lack of concrete measures of achievement and the fact that environmental agreements, in general, are considered to be of low political priority. However, by bridging the environment-development divide and spreading awareness of just what it means for the UNCCD to be a “sustainable development” convention – both an economic and

social development convention and an environmental convention, may generate more serious efforts towards the Convention's implementation and financing (Bassett and Talafré 2003, 139). Forging greater synergies with both environmental Conventions and development initiatives, like the MDGs and national development planning – at both the national and international levels – may also help in this regard. Unfortunately, developing synergies between Convention Secretariats is not enough.

Donors and developing countries must mobilize their own political capital to address land degradation. As noted above, political will is the first required ingredient for success. In order to attain political will (but perhaps sacrificing the political visibility of the Convention itself), parties should invest resources and efforts into mainstreaming land degradation into development planning and into the implementation of related MEAs, such as the climate change and biodiversity Conventions, the work of the UNFF and ITTO, and perhaps the Ramsar Convention. Another tool would be to systematically demonstrate the economic benefits of combating land degradation (and the costs of inaction), so that decision makers can be convinced of increasing their investments. In the end, letting go of a narrow application of the Convention and focusing more on synergies may be the key to its success.

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Table 1: Focal Points for the Rio Conventions.

Country	UNCCD Focal Point	UNFCCC	CBD
Algeria	Ministère de l'Agriculture	Ministère de l'Aménagement du territoire et de l'environnement	Ministère de l'Enseignement supérieur et de la recherche scientifique/ Ministère de l'Aménagement du territoire et de l'environnement/Ministère des Affaires étrangères
Angola	Ministry of Urban Affairs and Environment	Ministry of Environment	Ministry of Urbanism and Environment
Benin	Ministère de l'Environnement, de l'habitat et de l'urbanisme	Ministère de l'environnement et de la protection de la nature	Ministère de l'environnement, de l'habitat et de l'urbanisme
Botswana	Ministry of Environment, Wildlife and Tourism	Department of Meteorological Services/Ministry of Environment, Wildlife and Tourism	Ministry of Environment, Wildlife and Tourism
Burkina Faso	Ministère de l'Environnement et du cadre de vie	Ministère de l'Environnement et du cadre de vie	Ministère de l'Environnement et du cadre de vie
Burundi	Ministère de l'Aménagement du territoire et de l'environnement	Institut géographique du Burundi (IGEBU)	Institut national pour l'environnement et la conservation de la nature
Cameroon	Ministère de l'Environnement et de la protection de la nature	Ministère de l'environnement et de la protection de la	Ministère de l'Environnement et de la protection de la nature

		nature	
Cape Verde	Ministère de l'Agriculture et des pêches		Ministério do Ambiente, Agricultura e Pescas
Central African Republic	Ministère de l'Environnement et du développement durable et de l'économie sociale	Ministère des Eaux, forêts, chasse et pêche chargé de l'environnement	Ministère des Eaux, forêts, chasse et pêche chargé de l'environnement
Chad	Ministère de l'Environnement et de l'eau	Ministère de l'Environnement et de l'eau	Ministère de l'Environnement et de l'eau
Comoros	Ministère du Développement rural, de la pêche, de l'artisanat et de l'environnement	Ministère de l'Agriculture, de la pêche, de l'industrie, de l'artisanat et de l'environnement	Ministère de l'Agriculture, de la pêche, de l'industrie, de l'artisanat et de l'environnement
Congo	Ministère de l'Industrie minière et de l'environnement	Ministère de l'Economie forestière et de l'environnement	Ministère de l'Economie forestière et de l'environnement
Cote d'Ivoire	Ministère de l'Environnement et du cadre de vie	National Polytechnic Institute	Ministère d'État, de l'environnement
Democratic Republic of the Congo	Ministère des Affaires foncières de l'environnement et du tourisme	Ministère des Affaires foncières de l'environnement et du tourisme/Ministère de l'Environnement, conservation de la nature, eaux et forêts	Ministère de l'Environnement, de la conservation de la nature, des eaux et des forêts
Djibouti	Ministère de l'Agriculture, de l'élevage et de la mer	Ministère de l'Habitat, de l'urbanisme, de l'environnement et de l'aménagement du territoire	Ministère de l'Habitat, de l'urbanisme, de l'environnement et de l'aménagement du territoire
Egypt	Ministry of Agriculture and Land Reclamation	Egyptian Environmental Affairs Agency	Egyptian Environmental Affairs Agency
Equatorial Guinea	Ministerio de Pesca y Medio Ambiente	Ministerio de Pesca y Medio Ambiente	Ministerio de Bosques, Pesca y Medio Ambiente
Eritrea	Ministry of Agriculture	Ministry of Land, Water and Environment	Ministry of Land, Water and Environment

Ethiopia	Environmental Protection Authority	National Meteorological Services Agency	Environmental Protection Authority/Institute of Biodiversity Conservation
Gabon	Ministère de l'Environnement et de la protection de la nature, de la recherche et de la technologie	Ministère de l'Environnement, de la protection de la nature, de la recherche et de la technologie	Ministère de l'Economie forestière, des eaux, de la pêche chargé de l'environnement et de la protection de la nature
Gambia	Ministry of Fisheries, Natural Resources and the Environment	Department of State for Fisheries and Water Resources	Department of Parks and Wildlife Management/Dept of State for the Presidency, Fisheries and Natural Resources
Ghana	Environmental Protection Agency	Ministry of Local Government, Rural Development and Environment	Ministry of Environment and Science
Guinea	Direction nationale des eaux et forêts	Direction nationale de la prévention et de la lutte contre les pollutions et nuisances	Ministère de l'Environnement
Guinea-Bissau	Ministère de l'Agriculture, forêts, chasse et élevage	Ministère des ressources naturelles et de l'environnement	Ministère des ressources naturelles et de l'environnement
Kenya	Ministry of Environment and Natural Resources	Forest Department Headquarters	Permanent Mission of Kenya to UNEP
Lesotho	Ministry of Tourism, Environment and Culture	Meteorological Services	Ministry of Tourism, Environment and Culture
Liberia	Environmental Protection Agency	Environmental Protection Agency	Environmental Protection Agency
Libyan Arab Jamahiriya	Secretariat of Agriculture	Environment General Authority	Environment General Authority
Madagascar	Ministère de l'Environnement, des eaux et forêts	Ministère de l'Environnement, des eaux et forêts	Ministère de l'Environnement, des eaux et forêts/Service d'appui à la gestion de l'environnement

Malawi	Department of Forestry	Department of Environmental Affairs	Department of Environmental Affairs
Mali	Ministère de l'Environnement	Direction nationale de la météorologie	Direction nationale de conservation de la nature/ Secrétariat technique permanent du Centre institutionnel de la gestion des questions environnementales
Mauritania	Ministère du Développement rural et de l'environnement	Ministère du Développement rural et de l'environnement	Ministère du Développement rural et de l'environnement
Mauritius	Ministry of Agro-industries and Fisheries	Mauritius Meteorological Services	Ministry of Foreign Affairs and Regional Cooperation/Ministry of Environment and National Development Unit/Ministry of Agriculture, Food Technology and Natural Resources
Morocco	Ministère délégué chargé des Eaux et forêts auprès du Ministère de l'Agriculture	Ministère de l'Aménagement du territoire, de l'eau et de l'environnement	Ministère de l'Aménagement du territoire, de l'eau et de l'environnement/Mission of Morocco, Geneva
Mozambique	Ministry for Coordination of Environmental Affairs	Ministerio para a Coordenacao da Accao Ambiental	Ministry for the Coordination of Environmental Affairs
Namibia	Ministry of Environment and Tourism	Ministry of Environment and Tourism	Ministry of Environment and Tourism/Namibian Biotechnology Alliance, Faculty of Science, University of Namibia
Niger	Conseil national de l'environnement pour un développement durable	Conseil national de l'environnement pour un développement durable	Conseil national de l'environnement pour un développement durable/Ministère de l'Hydraulique de l'environnement et de la lutte contre la désertification
Nigeria	Federal Ministry of Environment	Federal Ministry of Environment	Federal Ministry of Environment

Rwanda	Ministère des Terres, de l'environnement, des forêts, de l'eau et des mines	Ministère des terres, de l'environnement, des forêts, de l'eau et des mines	Rwanda Environment Management Authority/Ministry of Lands, Environment, Forestry, Water and Mines
Sao Tome and Principe	Direction de l'Aménagement du territoire et de l'environnement	National Meteorological Institute	Ministério de Agricultura, Desenvolvimento Rural e Pescas
Senegal	Ministère de l'Environnement et de la protection de la nature	Ministère de l'Environnement et de la protection de la nature	Ministère de l'Environnement et de la protection de la nature
Seychelles	Ministry of Environment	Ministry of Environment and Natural Resources	Ministry of Environment and Natural Resources/Ministry of Foreign Affairs
Sierra Leone	Ministry of Lands, Housing, Country Planning and the Environment	Meteorological Department	Ministry of Lands, Housing, Country Planning and the Environment
Somalia	Ministry of Environment		Ministry of Foreign Affairs
South Africa	Department of Environmental Affairs and Tourism	Department of Environmental Affairs and Tourism	Department of Environmental Affairs and Tourism
Sudan	Ministry of Agriculture and Forestry	Higher Council for Environment and Natural Resources	Higher Council for Environment and Natural Resources
Swaziland	Ministry of Agriculture and Cooperatives	Ministry of Public Works and Transport	Swaziland Environment Authority, Ministry of Tourism, Environment and Communications
Togo	Ministère de l'Environnement et des ressources forestières	Direction de l'environnement	Ministère de l'Environnement et des ressources forestières
Tunisia	Ministère de l'Environnement et du développement durable	Ministère de l'Environnement et du développement durable	Ministère de l'Environnement et du développement durable
Uganda	Ministry of Agriculture, Animal Industry and Fisheries	Ministry of Water and Environment	Ministry of Water, Lands and Environment/National Environment Management Authority

United Republic of Tanzania	Assistant Director of Environment, Vice President's Office		Assistant Director of Environment, Vice President's Office
Zambia	Ministry of Tourism, Environment and Natural Resources	Ministry of Foreign Affairs/Ministry of Tourism, Environment and Natural Resources	National Institute for Scientific and Industrial Research/Ministry of Tourism, Environment and Natural Resources
Zimbabwe	Ministry of Mines, Environment and Tourism	Ministry of Mines, Environment and Tourism	Ministry of Mines, Environment and Tourism

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La Lutte contre la désertification et l'adaptation à la vulnérabilité et aux changements climatiques

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Introduction

Les économies africaines sont essentiellement agricoles, une agriculture de subsistance majoritairement à caractère pluvial qui procure 90% des besoins alimentaires, contribue à environ 30 à 40% du PNB (15-70% des revenus agricoles) et constitue 70 à 80% des opportunités d'emploi avec des taux d'investissement très bas. Cette agriculture de subsistance à caractère extensive et à usage d'intrants très limité conduit à l'exploitation quasi exclusive des ressources naturelles de nature fragile du fait de l'équilibre écologique très précaire de ces milieux. La pression démographique, marquée par un accroissement situé entre 2 et 3% dans la grande majorité des pays de la zone, dépassant même 3% dans certains d'entre eux, alliée à une urbanisation mal contrôlée exacerbe la pression sur les ressources naturelles qui s'en trouvent encore plus fragilisées. Ces ressources constituent pourtant le seul capital pour la plupart des populations souvent démunies et marginalisées par les plans de développement des pays concernés (PNUD, 2006). De même, la question de l'eau s'y impose de plus en plus comme un véritable défi en ce début du XXI^e siècle. Sa raréfaction et/ou la non-maîtrise de sa gestion constituent une contrainte majeure pour le développement de la zone qui est parmi les plus vulnérables aux sécheresses fréquentes, alors que d'autres régions du continent bénéficient de ressources en eau abondantes, peu exploitées et insuffisamment mises en valeur.

Dans un tel contexte, la forte variabilité climatique qui caractérise ces zones et sa non-maîtrise augmentent la vulnérabilité des écosystèmes et des populations qui y vivent. La gravité de la sécheresse qui affligea le Sahel dans les années soixante-dix tenait de la conjonction de plusieurs facteurs dont certes l'aléa climatique lui-même, mais aussi les systèmes de production et la vulnérabilité des économies des pays (fragilité des infrastructures et des organisations économiques et sociales) (UNESCO, 2004). De nombreux experts s'accordent à dire que les changements climatiques vont avoir des conséquences dans les régions arides et semi-arides, en termes d'aggravation des irrégularités telles que les sécheresses et les fortes pluies localisées (UNITAR, ENDA, 2005) et une accentuation de l'aridité, autant d'extrêmes climatiques auxquels les économies de ces pays ne peuvent pas faire face.

Les conventions issues du processus de Rio¹ constituent une opportunité majeure pour les pays membres de l'OSS, qui les ont adoptées et ratifiées, car elles doivent leur permettre d'adapter leur stratégie de développement et de viser dorénavant une trajectoire de développement plus durable en s'appuyant sur une gestion raisonnée des ressources naturelles. Force est de constater que la réalité dans les pays n'a pas beaucoup évolué dans ce sens et que les approches demeurent sectorielles, très verticales avec, dans les processus décisionnels, peu de communications et d'échanges entre les acteurs de développement.

L'OSS, avec le soutien financier du projet CCD de la GTZ, a entrepris une étude pour appréhender les éléments de mise en synergie des actions de lutte contre la

¹ Convention des Nations Unies de Lutte Contre la Désertification (CCD), Convention cadre des Nations Unies sur les Changements Climatiques (CCC), Convention des Nations Unies pour la Diversité Biologique (CBD).

désertification et celles d'adaptation à la variabilité et aux changements climatiques qui a comporté trois principales phases :

- une revue de la littérature sur les changements climatiques et l'adaptation à ces impacts négatifs ;
- une table ronde en marge de la 8^e Session du Conseil d'administration de l'organisation tenue à Nouakchott en avril 2006 ;
- l'élaboration d'une note d'orientation qui sera notamment soumise à la prochaine session du Comité de Revue de la mise en œuvre de la CCD (CRIC) devant se tenir en Argentine en mars 2007 lors d'un événement parallèle qui sera organisé par l'OSS.

La présente communication présente les principales conclusions de cette note d'orientation.

L'Adaptation à la variabilité et aux changements climatiques

La revue de la littérature entreprise par l'OSS a surtout concerné la littérature accessible sur internet et les principaux rapports établis par le Groupe Intergouvernemental d'Experts sur l'Evolution du Climat (GIEC). Il convient cependant de souligner que l'essentiel de cette littérature est accessible uniquement en anglais, ce qui en limite fortement l'accès aux acteurs non-anglophones de l'espace OSS.

Il en ressort par ailleurs que les impacts des changements climatiques se font déjà ressentir et qu'ils le seront davantage au cours des années à venir (UNFCCC, 2002). En effet, on admet aujourd'hui qu'en moyenne, la température de la surface de la terre a augmenté de 0,3 à 0,6 °C environ depuis la fin du XIX^e siècle. Le niveau de la mer s'est élevé en moyenne également de 10 à 25 cm au cours des cent dernières années (CEA, 2006). Ces effets ne se limitent pas à la hausse des températures ou des niveaux de mer, ils se manifestent déjà par une augmentation des épisodes de sécheresse, des inondations et de tempêtes de plus en plus sévères. Bon nombre des réponses qui sont proposées sont étroitement liées aux choix et aux trajectoires de développement (OCDE, 2005).

Il existe deux grandes catégories de réponses aux changements climatiques : l'atténuation et l'adaptation (OCDE, 2005). Cependant, seule l'adaptation concerne les pays de l'OSS. En effet, l'atténuation vise à réduire les causes des changements climatiques en freinant l'augmentation des émissions de gaz à effet de serre (GES), elle concerne plus particulièrement les pays industrialisés et les économies émergentes qui émettent la plus grande part de ces gaz.

L'adaptation est définie comme un « *processus d'ajustement des systèmes écologique, social et économique à un stimulus climatique constaté ou anticipé, à ses effets et ses impacts. Il désigne un changement de procédures, de pratiques et de structures visant à limiter ou à effacer les dommages potentiels ou à tirer bénéfice des opportunités créées par les changements climatiques. Il demande des ajustements afin de réduire la vulnérabilité au changement climatique de certaines communautés, régions ou activités* » (GIEC cité par UNITAR, 2005). Cette définition introduit la notion de vulnérabilité des populations, des écosystèmes et des activités qui se conçoivent comme « *le degré auquel un système est susceptible, ou incapable de faire face à des effets adverses liés aux changements climatiques, y compris la variabilité climatique et les événements extrêmes* » (id. UNITAR, 2005).

Evaluation de la vulnérabilité des écosystèmes et des populations à la variabilité et aux changements climatiques

L'évaluation de la vulnérabilité aux changements climatiques en Afrique approfondie par la réalisation de 24 études régionales récentes, menées de 2002 à 2005 dans le cadre du projet AIACC², a mis en exergue les secteurs suivants :

- **Ressources en eau** : en Afrique, la disponibilité en eau par habitant a diminué de 75% pendant la moitié du XX^e siècle (Dieudonné, 2001). Les zones les plus vulnérables sont les régions arides et semi-arides. En Afrique de l'Ouest, on remarque des réductions très sévères des débits et des étiages des fleuves. En Afrique du Nord, l'évaluation de la vulnérabilité et de l'adaptation montre une réduction globale des rendements agricoles, même lorsque l'adaptation est considérée (Ayman, 2006).
- **Sécurité alimentaire** : de nombreuses régions africaines ont déjà connu un important déficit alimentaire aggravé par les baisses potentielles de l'humidité des sols. L'aridité, la situation du marché international, l'augmentation des températures et les fréquentes sécheresses dans les régions arides et semi-arides sont des facteurs aggravants de l'insécurité alimentaire ;
- **Ecosystèmes des zones arides et semi-arides** : localisés dans les zones marginales et soumis à des perturbations de toutes sortes (pertes irréversibles de la diversité biologique, feux de brousse, modification des habitats naturels, etc.) ;
- **Santé humaine** : l'augmentation des températures et la modification des régimes pluviométriques auront des impacts sur la santé humaine. En effet, les sécheresses et les inondations vont accroître les vecteurs de maladies, en particulier les maladies hydriques (paludisme, choléra, dengue, fièvre jaune, tiques). Les zones où les infrastructures sanitaires qui sont défavorables demeurent les plus vulnérables ;
- **Zones côtières** : l'élévation du niveau des mers, l'érosion côtière et l'inondation due aux vagues, orages et autres événements extrêmes, auront des impacts considérables sur les populations et les économies africaines, déjà fortement fragilisées par la désertification.

Adaptation à la variabilité et aux changements climatiques

La notion d'adaptation est aussi vieille que le monde. Sa perception varie d'une société à l'autre et dépend des moyens d'existence des populations et du niveau de développement du pays.

Depuis toujours, les sociétés et les économies ont développé des stratégies pour faire face aux phénomènes climatiques extrêmes. Le commerce, le stockage préventif des denrées alimentaires ou l'émigration sont des exemples de stratégies mises en place dans les sociétés pour affronter les mauvaises conditions climatiques. Cette capacité d'adaptation dépend largement du niveau de développement économique. Les moyens d'existence des populations pauvres sont souvent plus limités et plus sensibles au climat.

La plupart des pays de la zone OSS ont depuis 1997 soumis des communications nationales, la plupart entre 2001 et 2002 (13/20) ; ils y ont inclus une liste de stratégies d'adaptation possible (ex. : construction de remblais, stockage de l'eau, augmentation du drainage, remise en état des canaux, diversification, irrigation des cultures, etc.). Il convient de souligner que ces actions ne sont pas

² Assessments of Impacts and Adaptation to Climate Change (AIACC) : projet du FEM, est un réseau de 340 scientifiques, experts et étudiants, 150 institutions, 50 pays en développement et 12 pays développés.

fondamentalement différentes des actions inscrites dans les PAN/LCD pour lutter contre la désertification dans les mêmes zones.

Par ailleurs, force est de reconnaître que quelques pays seulement ont donné une description complète des mesures d'adaptation. D'autres, en revanche, n'ont ni évalué, ni chiffré le coût de leurs options d'adaptation, ni identifié en quoi leur stratégie de développement s'en trouvera modifiée.

Les pays africains ont rencontré de nombreuses difficultés lors de l'évaluation de la vulnérabilité et des mesures d'adaptation, notamment lors de l'élaboration des études techniques sur les secteurs vulnérables et les mesures d'adaptation. Les obstacles communément cités dans la mise en place de stratégie d'adaptation sont le manque de ressources, de connaissances et d'informations pertinentes et le manque d'outils pour l'intégration des risques climatiques dans les processus de planification du développement. **Aussi, les évaluations rigoureuses et intégrées basées sur une méthodologie commune, prenant en compte les dimensions scientifiques, environnementales et socio-économiques, et identifiant des stratégies d'adaptation incluant coûts et aspects institutionnels, demeurent encore un véritable défi à relever.**

A ce niveau aussi, le parallèle avec les contraintes souvent relevées dans la mise en oeuvre des PAN/LCD doit être fait pour souligner la contrainte la plus souvent citée, celle relative au manque d'informations pertinentes sur l'état des ressources naturelles, les pressions qui s'y exercent et les impacts sur leur évolution.

Il paraît, donc, que l'un des éléments essentiels est le développement des bases de connaissances sur lesquelles doit se fonder autant la lutte contre la désertification que l'adaptation à la vulnérabilité et aux changements climatiques, et dont la mise en oeuvre efficace dépend de la collecte et de la gestion de l'information et du caractère public de celle-ci. Il est nécessaire de mettre en place les systèmes d'observation et d'évaluation des ressources naturelles. Les pays doivent consentir les efforts nécessaires pour se doter des dispositifs idoines d'observation, de suivi et de surveillance des ressources naturelles et engager la réflexion sur l'accès aux données, leur partage, leur valorisation, le financement à long-terme de la collecte et du traitement de données. Le rôle d'une organisation comme l'OSS est de leur offrir un appui scientifique et technique, des outils et des méthodologies harmonisées, et une plate-forme de concertation pour permettre des échanges de données et informations et l'élaboration de synthèses diachroniques et synchroniques aux échelles régionale et sous-régionale.

C'est pourquoi l'OSS propose, sur la base de ses acquis³ en matière de surveillance environnementale, d'élaboration d'indicateurs et de repères, et de circulation de l'information, de développer des dispositifs d'observation et de suivi environnemental multi-échelles allant du niveau local et national au niveau sous-régional et régional.

L'approche proposée consiste, en un premier lieu, à réaliser un état des lieux sur les modalités actuelles et les interactions entre les différents acteurs impliqués dans la mise en oeuvre des Conventions issues du processus de Rio et autres programmes dans la région. Il s'agira ensuite de construire un réseau subcontinental utilisant les outils communs et les méthodes d'observation et de suivi environnemental. Les activités combinées de ce réseau permettront de mieux identifier et mieux suivre la vulnérabilité des écosystèmes et des populations, de prévenir la dégradation de l'environnement et de formuler des stratégies d'adaptation en les intégrant dans les programmes d'action et les politiques et les processus de développement nationaux

³ cf. La fin du concept-note en annexe, le tableau des projets de l'OSS en cours et leur apport à l'adaptation à la vulnérabilité et aux changements climatiques.

et sous-régionaux. L'approche vise la mise en corrélation des politiques sous-régionales et nationales et l'évaluation de leurs impacts sur la vulnérabilité et l'adaptation des différents acteurs, ainsi que le renforcement des capacités des institutions et des acteurs afin qu'ils puissent promouvoir une cohérence intersectorielle plus affirmée aux différentes échelles d'intervention.

Cette approche vise à développer et/ou renforcer les capacités des institutions nationales, sous-régionales et régionales africaines en matière d'évaluation de la résilience des écosystèmes et des populations aux variabilités et/ou changements climatiques et à leurs interactions avec la dégradation des ressources naturelles et la perte de diversité biologique. L'objectif est de parvenir à une vision subcontinentale partagée, construite sur le consensus de l'ensemble des acteurs. Cette approche intègre un ensemble d'activités groupées dans trois étapes :

- une analyse et un diagnostic pour aboutir à une cartographie complète de la situation actuelle ;
- la mise en place d'un Dispositif d'Observation et de Suivi Environnemental en un réseau intégré à l'échelle subcontinentale ;
- le renforcement et/ou le développement des capacités des institutions partenaires.

Ces trois étapes sont peu ou prou engagées dans le cadre de projets et d'études menés par l'OSS et dont il convient de citer principalement :

- le Projet « Identification de stratégie d'adaptation à la variabilité climatique en zones arides, semi-arides et sub-humides sèches, et valorisation des leçons tirées dans la zone d'action de l'Observatoire du Sahara et du Sahel (OSS), la zone circum-saharienne » qui, s'appuyant sur le réseau d'observatoires de surveillance écologique à long-terme, a pour objectif d'identifier les pratiques d'adaptation à la sécheresse dans les observatoires ROSELT/OSS et d'en tirer les leçons utiles pour éclairer les décideurs ;
- la mise en place de dispositif d'observation et de suivi environnemental à l'échelle nationale et régionale ;
- le Projet Système Maghrébin d'Alerte à la Sécheresse (SMAS), qui a pour objectif la mise en place d'un observatoire de la sécheresse dans les pays de l'Union du Maghreb Arabe ;
- le Projet Système Aquifère du Sahara Septentrional (SASS), dont l'objectif est de mettre en place les outils nécessaires pour la gestion concertée des ressources en eau partagées dans le cadre d'un mécanisme de concertation constitué par les trois pays impliqués.

Conclusion

Pour l'Afrique en général, et la zone circum-saharienne en particulier, l'adaptation aux changements climatiques est l'aspect le plus important du processus de l'UNFCCC. Cela est d'autant plus important que ces pays sont confrontés aux défis environnementaux divers et urgents, dont la désertification et la dégradation des terres, la détérioration des écosystèmes, les changements et les variabilités climatiques, qui exacerbent les efforts de développement et de réduction de la pauvreté. Ainsi, l'adaptation est un thème intersectoriel qui peut permettre une réelle synergie des actions et renforcer les capacités adaptatives des populations africaines les plus affectées. Il ne peut s'agir d'un nouveau programme ou plan qui vient s'ajouter à tous ceux déjà développés par les pays affectés et dont la mise en œuvre connaîtra les mêmes entraves que celles connues par tous les autres. La définition des stratégies d'adaptation à la variabilité et aux changements climatiques doit, au contraire, être un processus qui renforce, vient en appui, dynamise, valorise les

différents principes de gouvernance environnementale arrêtés par les pays et les actions envisagées dans le cadre du programme de lutte contre la désertification ou de préservation de la biodiversité, et qui ne connaissent pas encore une mise en œuvre effective.

Parmi les principales entraves communément cités, l'absence d'une information environnementale à même d'éclairer la prise de décision, la circulation et le partage de cette information pour casser le cloisonnement institutionnel et favoriser l'intégration des problématiques environnementales liées à la lutte contre la désertification, la perte de la biodiversité ou les impacts négatifs des changements climatiques dans les plans de développement économique et social sont souvent soulignés.

Pour contribuer à relever le défi de la mise en synergie des différents plans et programmes d'action environnementaux et leur intégration dans les plans de développement économique et social, l'OSS propose, avec ses pays et organisations sous-régionales membres, la mise en place de dispositifs d'observation et de suivi environnemental multi-échelles et multi-sources qui s'appuient et valorisent les systèmes existants en leur offrant l'opportunité, à travers l'élaboration de méthodologies communes et harmonisées, de communiquer ensemble et de renforcer leur action vers des objectifs communs et partagés.

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The Challenge of Global Warming: Impacts on Desertification in 21st Century Africa

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Introduction

For thirty years, since UNCOD in 1977, politics and science have directly interfaced through mechanisms aimed at assessing and combating desertification. This culminated in 1996 when the UNCCD came into force, with subsequent international, regional and national actions and programmes aimed at implementation. Many commentaries on CCD implementation, including the effective use of NAPs, regard as essential the effective integration, within programmes, of those groups and individuals directly affected by desertification (e.g. Toulmin 1995, Seeley 1998, Stringer 2004). This has seen in some quarters a changing emphasis on what counts as 'expert knowledge', to include the locally-derived expertise of farmers, land users and communities. Some NAPs have, within their consultation processes, attempted to embody these knowledges, though difficulties and power conflicts between farmers and policy makers can result (Stringer 2004).

The changing connection over the past 30 years between scientific knowledge on the one hand, and desertification politics/anti-desertification activity implementation on the other, is well documented (Thomas and Middleton 1994, Seely 1998, Corell 1999, Thomas 2003). Scientific uncertainties and paradigm shifts do not fit well within the levels of certainty that many political actions appear to demand. This is not a phenomenon that is restricted only to desertification and the global convention level, and plays out significantly today in the field of global warming impacts and the Kyoto Protocol. Modern anthropogenically-induced climate change (or global warming) and its future environmental impacts, though regarded as a certainty by much of the scientific community (e.g. IPCC 2001), has a complexity of prediction and spatial patterning that leaves sufficient doubts in place for dissenters and parties with particular interests to be able to use it in a manner to avoid commitments to actions that would contribute to reducing likely environmental and social impacts.

The politics-science nexus sits more uncomfortably, and with potentially far more drastic global implications, in the climate change arena than it ever has within desertification. However, future likely/potential climate change impacts have great significance for those regions and countries most seriously impacted by desertification, such that potential linkages and relationships between the two cannot be ignored and should not be avoided, especially at the policy level. This paper aims to highlight these issues, as they need to be considered directly and urgently by those affecting the UNCCD NAPs and RAPs. The focus in the discussion that follows is on Africa, but the issues resonate globally.

Climate Change: Impacts on Africa in the 21st Century

The economic and social costs of global warming have recently been dramatically highlighted by the Stern Review (HM Treasury 2006), with Africa identified as one of the areas to be most negatively affected. There are uncertainties with regards to the climate changes predicted by different global climate models and emissions scenarios, with the Sahel region proving to be one of the most difficult regions worldwide to model, and while there are limitations within African climate science (Washington *et al.* 2006). Despite these limitations, many regions of Africa are

predicted by most climate models to undergo very negative climate changes by the end of the 21st century, though there are some regions where positive changes may occur, with enhanced rainfall and improved crop growing conditions. The negative changes predicted include enhanced drying in association with rising temperatures and actual rainfall reductions (a very common output of climate models for southern Africa), as well as an increase in extreme climate events (droughts and periods of excessive rainfall). Extreme event increases are now widely recognised as a characteristic of periods of rapid climate transition in the past, and the 21st century, where rates and magnitudes of changes have little if any historical precedent, is no different.

Desertification affects the poorest farmers most severely. Climate change is widely considered to impact most negatively on the poorest groups of society, whether considered at the international or community level (Smit *et al.* 2001), creating major equity and justice issues (Thomas and Twyman 2005). Christian Aid (2006) has predicted that during the 21st century, 182 million African lives will be at risk due to climate change impacts. Stern notes that 12% of the current world population (800 million people) are at risk from hunger, a figure that would rise by 30 to 200 million, with a 2 to 3°C mean global temperature rise. At 3°C warming, a further 250-500 million people are at risk. Of these totals, Stern estimates that over 50% would be in Africa and western Asia - areas where crop yield declines are likely to be greatest and the dependency on rural employment and agriculture is greatest (65% of the Sub-Saharan population being employed to some degree in the rural sector: ILO, 2004). Various efforts are proposed to buffer the impacts of dangerous climate change, ranging from improving forecasting for farmers (Vogel 2000; Zeirvogel and Downing 2004) to empowering adaptation options (Smit *et al.* 2001).

One area where doubt currently remains is with regards to the possible impacts of so-called carbon fertilization, whereby higher atmospheric CO₂ concentrations improve plant growth. This is a phenomenon that some experts attribute as an explanation for the expansion of shrubby vegetation ('bush encroachment') in parts of east and southern Africa in the second half of the 20th century (Bond and Midgeley 2000). Carbon fertilization effects on key crops are now being investigated intensively, and while some crops (e.g. rice and wheat) improve yields with temperature rises of 2°C, overall decreases occur with greater temperature increases. Many studies of natural vegetation and crop responses to carbon fertilization are showing that benefits only occur when plants are not stressed by other factors, such as declining moisture levels. Overall, it is less likely that benefits will occur in many dryland areas of Africa because of future negative precipitation and net soil moisture trends.

Climate Change Impacts on Drylands: Implications for Society and Desertification

Some see desertification as contributing to global warming through the release of carbon from the soil pool to the atmosphere (Lal 2003). Carbon fertilization (discussed above) might in part negate this if vegetation growth is enhanced by it in the dryland areas where desertification occurs. These issues are complex and require effective modelling to be well understood. There is a further, deeper issue that links global warming and desertification: namely, how will climate change caused by global warming impact on environmental processes, including soil erosion, in drylands? We can start to address this question by attempting to define ways to understand predicted climate change impacts on the landscape.

How will modelled climate affect African landscapes, including drylands? There are, in fact, to date, few direct investigations of possible environmental consequences, especially in terms of landscape dynamics. This is important, however, on three counts. The first is that there is a large research effort in human adaptation to climate

change in the 21st century, but save for a few environments, such as coasts, this research rarely considers details of the environmental conditions, beyond key climate parameters, that people will actually have to adapt and respond to in the coming decades. Second is that attempts to cost the effects of global warming, and identify the drivers of these costs, such as the recent Stern Review, would benefit from data of modelled land surface changes when considering, for example, potential changes forced on agricultural systems. Third is that landscape response to climate change have marked implications for land degradation, both because climate change is embodied as a causal factor within the UNCCD's definition of desertification, and also because there are potentially marked implications for anti-desertification activities, including policy dimensions within NAPs and RAPs.

Two recent studies have attempted to directly model African landscape responses to 21st century climate change. DeWit and Stankiewicz (2006) analysed how human access to water in Africa may alter in the 21st century due to climate change. Taking the non-linear relationship between drainage density and rainfall, and using a relatively optimistic climate change scenario based on declining carbon emissions to the atmosphere, changes in drainage network density were modelled. In some regions of Africa, including presently drought-prone southern Sudan, Eritrea and in East Africa Tanzania, increases in effective precipitation modelled by 2099 lead to an increase in channel systems and thus potentially improve people's access to water. In other areas, including much of the North and southern Africa dryland regions, drainage density decreases, by, for example, 40% in Mali and 75% in the Okavango system of the northern Kalahari. If correct, human impacts could be catastrophic.

The second study, Thomas *et al.* (2005), used our knowledge of the physical processes of sand transport to create a model of how dune system dynamics relate to key ground surface and climate variables. The model was then applied to the region covered by the extensive vegetated Kalahari dune fields, and driven by climate data outputs from three GCMs, using a range of different carbon emission scenarios. Dune dynamics were modelled on a monthly basis for the whole of the 21st century, so that seasonal and year-to-year variability, as well as long-term trends, could be explored. The dune model predicts an increasing level of dune activity in the southwest Kalahari by 2040, and across the whole region, as far north as western Zimbabwe and western Zambia, after 2070. Importantly, this was regardless of the climate model used or the emissions scenarios assumed. Given our growing knowledge of how frequently and extensively these systems have been active in the past, this is not so surprising in a geomorphological context. From a social perspective, however, it is perhaps of great concern.

Discussion: Implications for Policy: Links Between Global Warming and Desertification

The two case studies above, while embodying elements of uncertainty, indicate that even without the direct impact of people on African environments, major landscape changes are predicted in many African dryland regions in the 21st century as a consequence of global warming. This form of enhanced desertification has obvious ramifications for environmental systems, societies and wellbeing. It also raises, however, issues and questions regarding national and other policies aiming to counter desertification to date. Six key issues are discussed below: impacts on anti-desertification activities; policy issues; enhancing people's ability to cope; benefits of anti-desertification activities for carbon issues; science debates; and, linking desertification and climate change programmes.

1. *Impacts on anti-desertification activities*

In the medium to long-term, anti-desertification activities, however construed, may be rendered ineffective by the onset of climate change-induced landscape changes, including the impact of high magnitude climate events.

2. *Policy issues*

Policies and NAPs should not inhibit the ability of societies to adapt to climate change. Research is showing that climate changes have already been occurring in parts of Africa, in the form of seasonal changes, changes to the timing and duration of rain events, etc. We know, from other work that we have been conducting, including the Tyndall Centre for Climate Change Research 'Adaptive' project (<http://www.geog.ox.ac.uk/research/projects/adaptive>, and Thomas *et al.* 2007) in southern Africa, that societies and households do recognise subtle climate changes and do respond effectively to the environmental changes that they bring, as long as socioeconomic frameworks permit this. Policies should not remove local initiative and adaptability: anti land degradation programmes have in some cases proved effective when utilising local knowledge, and that knowledge has benefits too in terms of climate change adaptation.

3. *Benefits of anti-desertification activities for carbon issues*

In the short term, measures to remediate land degradation could have climate change benefits, such as being linked to carbon-sequestering programmes (carbon offsetting). There may be technical issues to explore in this regard, but the win-win situation that could be created may benefit international willingness to address land degradation issues, because of the benefits to be gained in terms of climate change mitigation activities.

4. *Science debates*

Anti-desertification activities, and acceptance of desertification as a major environmental issue, were hindered during the 1980s, especially by the interfacing of scientific and political agendas and uncertainties (Thomas and Middleton 2004). Climate change debates today, and effective global action, are similarly affected, as witnessed by the problems that the Kyoto Protocol has faced. The scientific evidence of climate change as a real, rapid process in the 21st century is substantial. Doubts over detail should not be used to delay action nor to ignore the opportunity to assimilate consideration within anti-desertification agendas. There are issues regarding gaining a detailed and reliable spatial picture of future climate changes in some regions and in terms of predicted landscape changes in all regions. Neither of these can or should be used as reasons to ignore the realities of climate change impacts into the future and the possible range of effects of developing world societies.

5. *Linking desertification and climate change programmes*

Opportunities should be made and taken to assimilate climate change preparedness with anti-desertification activities. Climate change overshadows desertification as a major environmental issue, given its magnitude and all-embracing impact. Yet there are clear linkages between the two. Attempts to link the desertification convention to the Framework Convention on Climate Change have so far failed, (SBSTA 2004), suggested by some to result from insufficient inclusion of science within the CCD activities and underpinnings and also possibly because of its conflation of development and environment agendas (Granger, unpublished). However, this overshadowing is likely to grow as climate change increases as a global concern.

There is a risk that in doing so the elements of good work achieved by the UNCCD could be undone, rather than bolstered.

6. *Enhancing people's ability to cope*

There is a need to consider options that would assist populations to cope with and adapt to climate changes and variability. For example, seasonal forecasting may be important in effecting better agricultural responses to climate risks, while at the same time reducing the risk of activities that could enhance degradation (Zeirvogel and Downing 2004).

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Interactive Effects of Desertification on Global Climate Change and Food Security

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Introduction

Solar constant (1.37 KWm^{-2} , or $1.94 \text{ langley min}^{-1}$) is virtually all the energy received at the Earth, and which affects its climate. The solar constant ranges from 1.345 Wm^{-2} on 3 July to 1.435 Wm^{-2} on 3 January, a difference of about 6.7% caused by orbital eccentricity (Taylor, 2005). In addition to variation in insolation, climate is also influenced by the fraction of the solar energy absorbed by the Earth. Of the 1.37 KWm^{-2} received, the fraction reflected back into the space, called albedo, is about 30%. The albedo depends on cloud cover at the planetary scale, and the ground cover at the regional or local scale. Of the 70% received, 20% of the isolation is absorbed by the atmosphere and 50% by the Earth's surface. The incoming energy ($2 \times 10^7 \text{ W}$ or 70% of the total) must be balanced by the outgoing long-wave radiation emitted by the Earth, which keeps Earth's temperature relatively constant. Some of the outgoing radiation is absorbed by the atmosphere. Absorption by the atmosphere is caused by the presence of radiatively-active gases, which occur in very small proportion.

Such radiatively-active, or so-called, greenhouse gases (GHGs) are transparent to incoming short-wave solar radiation, but opaque to the outgoing Earth's long-wave radiation. Most important GHGs are water (H_2O) vapor, CO_2 , N_2O , CH_4 , O_3 and artificially produced chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). The reason these gases are opaque to the outgoing long-wave radiation is the symmetry of these molecules. For example, CO_2 (O-C-O) is linear and symmetrical, but can make asymmetric vibrations (e.g., stretching and bending) which create a dipole moment (Taylor, 2005). Triatomic molecules (e.g., CO_2 , H_2O , O_3) compared to homopolar diatomics (N_2 , O_2) can vibrate asymmetrically, thereby creating an oscillating dipole moment which interacts with the electromagnetic field of the radiation and facilitates absorption of the energy. Consequently, the Earth's temperature is about 33 K higher than it would have been without the presence of these radiatively-active or GHGs. The impact of CO_2 on the so-called "global warming" was first reported by a Swedish scientist, Svante Arrhenius (1859-1927). He noted that the atmospheric concentration of CO_2 would increase with the consumption of fossil fuel, which would increase Earth's temperature (Arrhenius, 1896). The term "greenhouse effect" was proposed earlier by Jean Fourier in 1827 (Taylor, 2005). Of the natural greenhouse effect, about 60% is due to H_2O vapors, 35% due to CO_2 and the remainder due to CH_4 , N_2O , O_3 and others (IPCC, 2001). In addition to concentration of GHGs, climate is also affected by aerosols (Bréon, 2006; Kaufman and Kohen, 2006). Climate change is also affecting the environment through melting of ice sheets (Curry, 2006) and by causing wild fires (Running, 2006; Westerling et al., 2006). There are numerous positive feedback mechanisms with snowball effects.

Anthropogenic Sources of Greenhouse Gases

Atmospheric concentration of several GHGs has increased due to anthropogenic activities, but especially since the onset of the Industrial Revolution, around 1750. The atmospheric concentration of CO_2 has increased by about 35% from 280 ppm around 1750 to 377 ppm in 2004, and is presently increasing at the rate of about 1.8 ppm yr^{-1} or $0.47\% \text{ yr}^{-1}$ (WMO, 2006). Concentration of CH_4 has increased by 155%

from about 700 ppb during the pre-industrial era to 1783 ppb in 2004, and is presently increasing at the rate of 3.7 ppb yr^{-1} or $0.2\% \text{ yr}^{-1}$. Similarly, the concentration of N_2O has increased by 18% from 270 ppb around 1750 to 319 ppb in 2004 and is increasing at the rate of 0.8 ppb yr^{-1} or $22\% \text{ yr}^{-1}$ (WMO, 2006).

This increase in atmospheric concentration of GHGs is an ecological footprint of human impact on Earth's ecosystems. Ecological Footprint is defined as the total area of productive land and water required to continuously produce all the resources consumed and to assimilate all the wastes produced, by a defined population, wherever the land is located (Wacknagel and Rees, 1996). Thus, emissions of GHGs from world soils and other terrestrial ecosystems, not as obvious sources of atmospheric CO_2 as are fossil fuel combustion and volcanic eruptions, constitute an ecological footprint of human impact on Earth. It is widely recognized that anthropogenic emission of CO_2 may have begun with the dawn of settled agriculture when humans began to remove the vegetation cover by slash and burn methods, and cultivated the soils by a paddle-shaped tool called an "ard". Indeed, Ruddiman (2003; 2005) hypothesized that anthropogenic emission of CO_2 began about 8,000 to 10,000 years ago with the onset of settled agriculture and that of CH_4 about 5,000 years ago, when cultivation of rice paddies and domestication of animals began. More CO_2 was emitted from deforestation/biomass burning and soil cultivation than fossil fuel combustion until the 1970s. Presently, anthropogenic sources of CO_2 include 73 Pg C yr^{-1} by fossil fuel emissions and about 1.7 Pg C yr^{-1} by deforestation and land use change. Emissions of CO_2 from soils is exacerbated by erosion, degradation and desertification.

The term "desertification" refers to the degradation of soil and vegetation in drylands. It is a phenomenon that impacts about 900 million people worldwide in more than 100 countries. About 15% of the world's population resides in drylands (Doolittle, 1997), and is affected by desertification. It leads to the loss of productive lands and exacerbates the food deficit (Lu, 2001). Between 1955 and 2000, desertification severely degraded about 1.2 billion hectares, or 11%, of the Earth's surface in Africa, Asia and elsewhere. The economic loss to desertification is estimated at \$42 billion yr^{-1} (Lu, 2001), and the situation is worsening with increase in population in these regions of harsh climate and fragile soils. Therefore, the objective of this manuscript is to describe inter-relationships between land desertification, global climate change, and food security, and to demonstrate that restoration of desertified ecosystems and control of desertification can improve the environment, restore services of desertified ecosystems, sequester C in soil and biomass, mitigate climate change, and advance global food security by improving soil quality and its biomass productivity.

Extent and Severity of Desertification

The world's drylands occupy about 6.31 Bha, or 47%, of Earth's land area. On the basis of the rainfall amount and its seasonality, the world's drylands comprise 4 distinct ecoregions. These are: (i) hyper-arid: with $< 200 \text{ mm}$ of precipitation, and occupying 1.0 Bha; (ii) arid: with $< 200 \text{ mm}$ of winter rainfall or $< 400 \text{ mm}$ of summer rainfall, and occupying 1.62 Bha; (iii) semi-arid: with 200-500 mm of winter rainfall or 400-600 mm of summer rainfall, and occupying 2.37 Bha; and (iv) dry sub-humid: with 500-700 mm of winter rainfall or 600-800 mm of summer rainfall, and occupying 1.32 Bha (UNEP, 1992; FAO, 1993; Lal, 2001).

Soils of dryland ecoregions vary widely depending on climate, parent material, terrain, and vegetation. Predominant soils include Aridisols (2.12 Bha), Entisols (2.33 Bha), Mollisols (0.80 Bha), Alfisols (0.38 Bha), Vertisols (0.21 Bha) and others 0.47 Bha (Dregne, 1976; Noin and Clark, 1997). These soils are characterized by low SOC pool, low plant available water and nutrient reserves, and poor soil structure and aggregation. Some of these soils also develop biological crusts (USGS, 2006) which

protect the soil beneath. However, disruption of the protective crust can set in motion the soil degradation process. With harsh climate, these soils are prone to crusting, compaction, surface runoff and accelerated erosion by wind and water. Soil degradation is more severe in drylands than in other biomes/ecosystems (Stewart *et al.*, 1991).

The term desertification has been defined since 1977 as “the diminution or destruction of the biological potential of land which can lead ultimately to desert-like conditions”. The functional definition of desertification, however, is land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors including climatic variations and human activities (UNCED, 1992). In this context, the term “land” refers to all ecosystems’ components, including soil, vegetation, water, crops and animals. Similarly, the term “degradation” refers to decline in quality and reduction in ecosystem services (notably, NPP, crop yields, C sequestration). The reduction in resource potential is caused by a range of degradative processes, including soil erosion by water and wind, salinization, decline in biodiversity, reduction in quantity and quality of water, disruption in cycles of C, N, P, S and other elements.

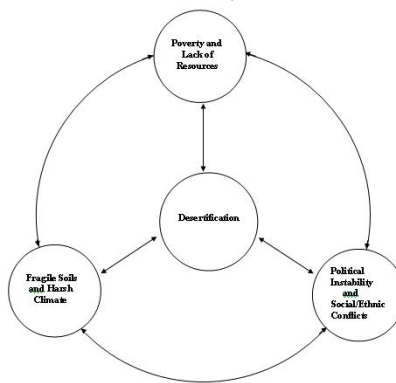


Figure 1. Interactive effects of biophysical and economic/political factors on land degradation.

Thus, desertification is a biophysical process of aridization of a region, but it is driven by a strong interaction between natural resources (soil, vegetation, water) with socio-economic and political factors (Figure 1). It is caused by land misuse and soil mismanagement. The process is set in motion by decline in soil quality caused by breakdown of its structural units or aggregates, leading to crusting and compaction, increase in runoff and erosion, depletion of SOC and nutrient reserves, decline in the amount of green water, and the overall reduction in NPP (Figure 2). Rapid increase in population is one of the causes of desertification. For example, the data in Table 2 show that the population of the North African region increased by 10 to 20 times over one century, exacerbating the problem and jeopardizing the natural resources which are already under great stress.

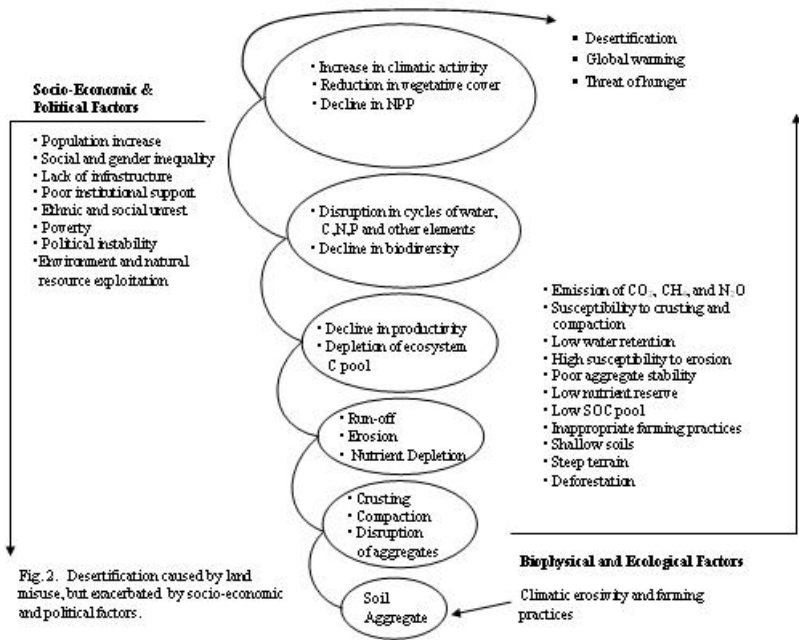


Fig. 2. Desertification caused by land misuse, but exacerbated by socio-economic and political factors.

Figure 2. Desertification caused by land misuse, but exacerbated by socio-economic and political factors.

There are no reliable statistics of the extent of land area affected by desertification, and estimates vary widely. UNEP (1991) estimated the area of degraded croplands and rangelands at 1.016 Bha, degraded rangelands (vegetation only) at 2.57 Bha, and total global land area of 5.172 Bha or 69% of the total dryland area of the world. In comparison, Oldeman and Van Lynden (1998) estimated that land area affected by desertification is 1.137 Bha. Of this, 0.489 Bha was lightly desertified, 0.509 Bha moderately desertified and 0.139 Bha severely/extremely desertified. There are also wide variations in the estimates of the rates of desertification. Annual rate of desertification is estimated at 5.83 million hectares (Mha) or 0.132% yr⁻¹ of the dryland area of the world (UNEP, 1991; Mainguet, 1991).

Desertification and Emission of Greenhouse Gases

World soils constitute the third largest global C pool consisting of two distinct components: (i) soil organic carbon (SOC) estimated at about 1550 Pg and, (ii) soil inorganic carbon (SIC) estimated at about 950 Pg (Batjes, 1996; Batjes et al., 1998). The SOC component is a highly dynamic pool, and can be a source or a sink for atmospheric CO₂, depending on land use and soil/vegetation management. Soil is a sink when the biomass-C input into the system exceeds the output, and a source when the output exceeds the input (Eq. 1 and 2):

Soil as C sink: $C_{input} > C_{output}$ (Eq. 1)
Soil as C source: $C_{input} < C_{output}$ (Eq. 2)

In managed ecosystems, especially those where predominantly extractive farming practices are used, biomass-C input into the system is less than the output. Thus, conversion of natural to agricultural ecosystems often leads to a decline in SOC pool (Lal, 2001). The magnitude of decline is exacerbated by soil degradation and land

desertification. Degraded and desertified soils are a net source of CO₂ and other GHGs (Figure 3) because of the following human-induced alterations:

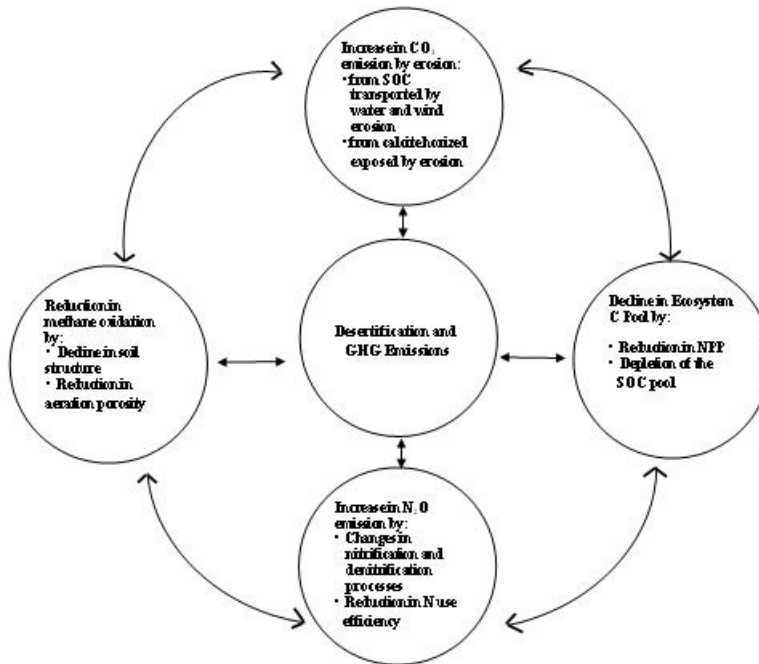


Figure 3. Desertification exacerbates the emission of greenhouse gases into the atmosphere through erosion, and other degradative processes which decrease the ecosystem C pool.

(a) Energy Budget:

The energy budget of degraded/desertified soils, with sparse or no vegetation cover, differs from that of the undergraded soils with high vegetative/canopy cover because of differences in albedo, and the fraction of energy use in transpiration versus soil evaporation. Desertified and crusted soil surface may absorb different amounts of incoming radiation than the surface of a structured, moist and less degraded soil. The data in Table 1 show the reflection factor or albedo of a range of soil surface conditions which determine the temperature regime of the soil surface. Short wave radiation is absorbed by a thin layer in case of a soil surface, but the radiation can penetrate deeper in a body of water. The reflection factor of desert at midday is only 15% compared with 16-37% for deciduous woods, 22-32% for prairies, and 16-27% for grass cover. Similarly, bare fields have lower reflection percent (12-25%) compared with prairies (22-32%). Albedo is much lower for bare soil (2-15%) than for kale (18-25%) and short-grass (22-28%) (Chang, 1968). Thus, desertified soils have more absorption, higher soil temperatures, and greater rate of decomposition of soil organic matter (SOM).

In addition to reflection or albedo of the incoming radiation, soil temperature also depends on the reaction of energy absorbed from Earth's outgoing long wave radiation. As stated before, the absorption of long wave radiation is caused by the presence of GHGs in the atmosphere.

(b) Water Budget:

There is a close interaction between the energy and water budgets. Similar to the energy budget, the water budget of an ecosystem is also influenced by anthropogenic activities as an ecological footprint (Eq. 3):

$$P = I + R + D + \Delta S + \int E dt \dots\dots\dots (\text{Eq. 3}).$$

Where P is the total annual precipitation, I is the infiltration, R is surface runoff, D is deep drainage or ground water recharge, ΔS is change in soil water storage, E is evapotranspiration and t is time. Anthropogenic perturbation of natural ecosystems may decrease I, D, and ΔS and increase R. Changes in E component of the water budget equation depend on the land use and management.

Soil degradation and land desertification affect components of the water budget. Specifically, desertification increases R and E; decreases I, ΔS and D; and reduces the overall effectiveness of P. In other words, desertification decreases the “green water” and increases the “red water”. A decrease in “green water” has a strong and long-lasting impact on the NPP and the ecosystem C pool but especially on the SOC pool. A decline in the “green water” leads to the scenario depicted in Eq. 2 whereby $C_{\text{input}} < C_{\text{output}}$.

(c) Soil Erosion and Carbon Emissions:

Soil erosion, both by water and wind, is a multi-stage process. It involves soil detachment, transport, redistribution over the landscape, and deposition. Soil detachment is caused by the kinetic energy of impacting rain drops, flowing water or blowing wind. The disruption or breakdown of aggregates exposes particulate organic material (POM) and other SOC fractions, hitherto encapsulated and physically protected within the aggregates, to microbial attack and mineralization. In addition, loss of water runoff and truncation of the surface soil rich in SOC change the moisture and temperature regimes which also accentuate mineralization. In contrast, the SOC transported to depositional sites may be buried, and partially or completely inundated. Thus, rate of mineralization at the depositional sites may be lower than that at other landscape positions. In general, 20-30% of the organic matter displaced by erosion is mineralized and emitted into the atmosphere as CO_2 . In addition, anaerobic conditions at depositional sites also cause emission of CH_4 and N_2O . Globally, erosion by water causes emission of about 1 Pg C into the atmosphere (Lal, 2003). Soil erosion on desertified lands causes emissions of 0.21 to 0.26 Pg C yr^{-1} (Lal, 2001). Thus, effective erosion control can lead to emission avoidance.

(d) Land Misuse and Soil Mismanagement:

The serious problem of desertification in regions where resource-poor farmers predominate is caused by widespread use of the extractive farming practices involving inappropriate land use and soil mismanagement. Desertification is also caused by government action and policies which cause fertility depletion and/or drastic perturbation of the fragile ecosystems. For example, developing irrigation programs in dry lands without provision for adequate drainage can cause salinization and depletion of surface water, such as in the Aral Sea Basin (Klataykov, 1991). The problem is exacerbated by a rapid increase in population, such as in Northwestern Africa (Table 2). Land tenure issues also lead to mining of soil fertility. Tenants, without long-term ownership rights, do not invest in soil restoration. Community ownership of land is a classic example of the “tragedy of the commons”.

Similar to numerous extinct civilizations which collapsed because of soil degradation and desertification (Diamond, 2005), there are numerous regions which are now at

great risk (Entelis and Suleiman, 1996; Ferguson, 1999; Swearingen and Bencherifa, 1996). The severe problem of food insecurity in Sub-Saharan Africa (Smil, 2000), perpetuated by political instability and ethnic conflicts, is exacerbated by desertification and man-made droughts.

Restoration of Desertified Lands

Desertification control is an important strategy of restoration of degraded soils and ecosystems and enhance the environment. Desertification control involves controlling erosion, conserving water in the root zone, increasing soil/ecosystem C pool, strengthening nutrient cycling mechanisms, and creating a positive nutrient balance. These can be achieved through use of conservation tillage and mulch farming techniques, adoption of INM practices, use of complex farming systems (e.g., agroforestry), and adoption of restorative land uses. Establishment of a perennial vegetative cover or afforestation is a good strategy to combat desertification. Afforestation by using the native tree species is a useful strategy (Nikiema, 2005). In China, Lu (2005) observed that establishing plantations of seabuckthorn was very effective in combating desertification (Table 3). There are a wide range of species which can adapt to harsh environments of the West African Sahel. Important among these are *Tamarix aphylla* which is tolerant to high salt concentration, and other species which can grow from the trunks and root stock and do not need to be replanted. Examples of the latter species include *Bauhinia reticulata*, *Guiera senegalensis*, *Ziziphus* spp., and *Combretum* spp. (Rinaudo, 2005; Lal, 2001).

There are 5 principle benefits of desertification control. 1) It leads to C sequestration in the terrestrial ecosystems in general but soil and trees in particular. Lal (2001) estimated that the total potential of C sequestration in drylands through the adoption of recommended management practices (RMPs) is 0.9 to 1.9 Pg C yr⁻¹ over 25 to 50 year period. 2) Restoration of degraded and desertified soils can enhance agronomic productivity and advance food security. Lal (2006) reported that increasing SOC pool in degraded/desertified soils by 1 Mg C ha⁻¹ yr⁻¹ can increase global food production by 20 - 30 million Mg yr⁻¹. 3) Afforestation and improvement in vegetative cover can enhance biodiversity both in the soil and above ground components, and of the flora and fauna. 4) Restoration of ecosystems would improve quantity and quality of water resources. 5) Trading of C credits, created through sequestration of C in soil and biota, would also be a source of income for the resource-poor farmers. Thus, desertification control could also advance the UN Millennium Development Goals of reducing hunger and poverty.

Carbon sequestration in soils and ecosystems is a common link between the three UN conventions, e.g., UNFCCC, UNFCCC and UNFCCC. In addition, it also advances global food security and achieves UN Millennium Development Goals (Figure 4). This truly is a win-win strategy.



Figure 4. Linking U.N. Millenium Development Goals and those of three framework conventions with carbon sequestration in terrestrial ecosystems.

Conclusions

Desertification is a serious global issue. This natural process is driven by socio-economic and political factors. In addition to the harsh arid climate and the fragile soils, the problem is exacerbated by anthropogenic perturbations caused by deforestation, excessive grazing, and extractive farming practices which cause fertility decline and the depletion of soil organic carbon pool. Accelerated erosion and other degradative processes enhance emission of CO₂ and other greenhouse gases (e.g., CH₄ and N₂O), reduce agronomic productivity, pollute/contaminate water resources and reduce biodiversity. Desertification control and restoration of degraded ecosystems can be achieved through conversion to a restorative land use, afforestation with appropriate species and adoption of recommended management practices. Afforestation with native tree species and creating a positive nutrient balance are conservation-effective measures. Desertification control has a potential to sequester 0.0 to 1.9 Pg C yr⁻¹, increase productivity of cropland soils by 20 to 30 million Mg food yr⁻¹, enhance farm income through trading of C credits, increase biodiversity, and advance the U.N. Millennium Development Goals. It truly is a win-win strategy.

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Tables

Table 1. Reflection factor of some land surfaces (Modified from Van Wijk and Ubing, 1966).

Land Surface	% Reflected
Dark wet clay	2-8
Dark dry clay	16
Wet sand	9
Dry sand	18
Bare fields	12-25
Wet plowed fields	5-14
Green grass	16-27
Dried grass	16-19
Wet prairie	22
Dry prairie	32
Stubble fields	15-17
Grain crops	10-25
Pine, spruce wood	10-14
Deciduous wood	16-37
Yellow leaves (fall)	33-36
Desert, mid-day	15
Desert, low solar altitude	35

Table 2. Population growth in the Maghreb region of Northwest Africa (Adapted from Swearingen and Bencherifa, 1996).

Year	Morocco	Algeria	Tunisia	Total
----- Millions -----				
1921	5.8	4.9	2.0	12.7
1937	7.3	7.3	2.7	17.3
1960	11.6	11.0	4.23	26.8
1980	19.4	18.7	6.4	44.5
1992	26.2	26.3	8.4	60.9
2000	30.0	33.0	10.0	73.0
2025	45.7	52.0	13.6	111.3
Stable pop.	59.0	81.0	18.0	158.0

Table 3. Desertification Control by Establishing Seabuckthorn spp. in China (After Lu, 2001).

Species	Adaptation Feature
<i>Hippophae</i> L.	Tolerates extreme soil temperature from -40 to +40° C
<i>H. tibetana</i> and <i>H. neurocarpa</i>	Grows in regions with annual average temperature 0° C
<i>H. rhamnoides</i> subsp. <i>turkestanica</i>	Tolerates summer temperature of 40° C
<i>H. rham</i> subsp. <i>mongolica</i>	Tolerates salt concentration of 1.1% in soil
<i>H. rhamnoides</i> subsp. <i>sinensis</i>	Adapts to harsh, poor and arid conditions

Opportunities for Synergies in Planning and Implementing Projects for Biological Diversity and Combating Desertification in Africa

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Introduction

The three United Nations Conventions that came out of the Rio Earth Summit in 1982 are the Convention on Biological Diversity (UNCBD), the Convention to Combat Desertification (UNCCD) and the Framework Convention on Climate Change (UNFCCC). The UNCBD directly focuses on biological diversity with the objectives of (i) conservation, (ii) sustainable use and (iii) equitable sharing of benefits arising from the use of biodiversity. The other two Conventions, while focusing on their specific objectives (Table 1), are also relevant to the conservation of biological diversity.

Table 1. Summary of objectives of different Conventions.

Convention	# African parties
UNCBD: www.biodiv.org Objective(s): Conservation of biodiversity, sustainable use of its components, fair and equitable sharing of benefits arising from utilisation of genetic resources.	51 as 1 June 04
CITES: www.cites.org Objective(s): Trade in species and specimens of wild plants and animals in a way that does not threaten survival of the same species.	51 as 1 June 04
CMS: www.cms.int Objective(s): Conserve terrestrial, marine and avian migratory species throughout their range.	14 as of 1 June 04
Ramsar: www.ramsar.org Objective(s): Conservation and wise use of wetland ecosystems for biodiversity as well as for human benefit.	35 as of 4 June 04
WHC: www.whc.unesco.org Objective(s): Identify and conserve the world's cultural and natural heritage for all humanity.	46 as of 1 May 04
UNFCCC: www.unfccc.int Objective(s): Stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.	51 as of 1 June 04
UNCCD: www.unccd.int Objective(s): To combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas.	49 as 1 June 04

There are other Conventions that are relevant to biodiversity conservation, its use and/or protection. These include the Convention on International Trade in Endangered Species (CITES), the World Heritage Convention (WHC), the Convention on Wetlands of International Importance Especially as Habitats for Waterfowl (Ramsar), and the Convention of Migratory Species of Wild Animals (CMS). The main objectives of these Conventions are summarised in Table 1. The objectives of the various Conventions have varying degrees of similarity and even overlap between and among the Conventions.

Each Convention has its own Secretariat charged with offering technical and organisational support to the Contracting Parties to each of the Conventions. Each Convention Secretariat has programmes of work that it carries out on instruction and on behalf of the Contracting Parties to the Convention. Also, each Contracting Party to a given Convention is obliged to identify an institution that is expected to lead that Contracting Party in meeting the obligations under each Convention as well as to receive and disseminate benefits that accrue to parties by virtue of their being party to a given Convention. A specific contact person (focal point) also has to be identified for each Convention. In a number of cases, the same institution is responsible for more than one Convention. In some cases still, the same person is the focal point for more than one Convention. In addition to focal points, some individual experts have to be nominated to serve on technical committees of the different Conventions. Each Convention has its own reporting requirements ranging from annual to biannual to once every three years.

With respect to implementation, most of the Conventions are operating for the same ecosystems, may involve the same local communities and/or the same national implementation machinery. Implementation of all these Conventions certainly requires the commitment of the same governments – a commitment which includes human and financial resources.

There have been numerous calls for synergy and cooperation between and among the Conventions¹. Prior to, during, and after the World Summit on Sustainable Development (WSSD), held in 2002, ten years after Rio, the Secretary-General of the United Nations had been stressing the need for greater cooperation and collaboration among global and regional multilateral environmental agreements (MEAs). One of the more recent calls for synergy is in Decision VII/2 of the 7th COP of the UNCBD:

*Requests the Executive Secretary, in collaboration with the secretariats of the other Rio Conventions and other biodiversity related Conventions, to further develop mechanisms for facilitating the synergistic implementation of these Conventions, especially at the national level, as described in sections III and IV of the note by the Executive Secretary on dry and sub-humid lands prepared for the eighth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (UNEP/UNCBD/SBSTTA/8/10)*².

The need for synergy in implementing the Rio Conventions has been a realisation that has been made for a long time (UNDP, 1997, www.biodiv.org). In March 1997, a meeting of experts was held in Israel³. The meeting, attended by 30 participants from 17 countries, including 7 from 6 African countries, focused on the three Conventions: UNCBD, UNCCD and UNFCCC as well as on the Forest Principles, then in draft form. That meeting aimed at exploring ways of creating synergy between and among the Conventions, especially at the national level, to foster implementation and to

¹ www.biodiv.org/

² www.unfccc.int/

³ www.unccd.int

improve the prospects of sustainable development. It had then been recognised that synergy among the Conventions ought to be an integral part of the planning and implementation of each Convention, and that synergy at the national level would be essential for the implementation of the Conventions.

Another meeting was held in West Africa from 16 to 18 September, 1997 in Burkina Faso⁴ focusing on synergy between and among three the Conventions: UNCBD, UNCCD and the Ramsar Convention on Wetlands. The meeting was attended by 12 West African Countries including Morocco. This meeting came up with three specific recommendations: (i) strong political commitment by states is a critical prerequisite for synergy in actions and mobilisation of funds for effective implementation of the three Conventions; (ii) IUCN – The World Conservation Union was mandated to create the favorable synergy by effectively integrating the socioeconomic dimension in national policies and strategies dwelling on natural resources management; and (iii) strengthening the capacities of actors involved in the implementation of the Conventions through training in the fields relevant to these three Conventions.

More recently, in April, 2004, another meeting seeking increased synergy was held in Italy⁵. The meeting focused on exploring more synergy between and among the UNCBD, UNCCD, UNFCCC and the United Nations Forum on Forests (UNFF), with particular emphasis on forest landscape restoration (FLR).

There already exist examples of synergistic implementation of some of these Conventions, e.g. UNCBD and UNCCD, UNCBD and Ramsar. The websites of these Conventions have links to other related or partner Conventions. This is especially true of the UNCBD website that has links with UNCCD, UNFCCC, CITES, CMS, WHC and Ramsar. Indeed, Secretariats of different Conventions are invited to, and attend, Conferences of Parties of other Conventions. There have been several decisions at UNCBD COPs that call for the Executive Secretary of the UNCBD to collaborate, explore possibilities for collaboration and develop joint work programmes with other Conventions or institutions (www.biodiv.org/convention/partners-workprogramme.asp). Article 8 of the UNCCD encourages joint programmes with other Conventions, particularly the UNFCCC and UNCBD.

Why has the synergy demonstrated by the Convention Secretariats not really translated into synergy in implementing the Conventions at global, regional and, especially, national levels? Why has there not been greater synergy between and among these Conventions, especially at national levels in Africa? What lessons have been learned (if any) from attempts to achieve synergy in implementation at national and local levels?

This paper highlights the need for synergy in implementing these biodiversity-related Conventions, analyses the extent of on-going synergistic implementation of the Conventions, identifies opportunities and discusses challenges for synergistic implementation of these Conventions within the context of combating desertification. Botswana will be used as a specific case study country.

1. Drylands defined⁶

Drylands are areas with low annual precipitation, prolonged periods of heat, relatively low humidity and high rates of evaporation. They include areas that are classified as semi-arid, arid and hyper-arid.

⁴ www.ramsar.org

⁵ www.cms.int

⁶ www.whc.unesco.org

Semi-arid lands are areas in which the ratio of precipitation to potential evapo-transpiration ranges from 0.2 to 0.5 with rainfall ranging from 200 to 500 mm in the winter and 300 to 600 mm in summer. Such areas are dominated by grasslands, shrubs and savannahs supporting livestock and wildlife grazing and some rain-fed cropping.

Arid lands are areas with the ratio of precipitation to potential evapo-transpiration ranging from 0.05 to 0.20; rainfall ranging from 50 to 200 mm in winter and 100-300 mm in summer; with sparse vegetation comprising woody shrubs, succulents, grasses; supporting grazing and irrigation, but no rain-fed cropping.

Hyper-arid lands are areas with the ratio of precipitation to potential evapo-transpiration less than 0.05; rainfall less than 50mm in winter and less than 100mm in summer; supporting little or no vegetation. These are the true climatic deserts.

A significant portion of Africa therefore falls within areas described as drylands according to these definitions. Whole or parts of the following countries fall into this dryland definition: Algeria, Botswana, Burkina Faso, Cameroon, Cape Verde, Chad, Central Africa Republic, Djibouti, Egypt, Eritrea, Ethiopia, Gambia, Kenya, Libya, Mali, Mauritania, Morocco, Namibia, Niger, Nigeria, Senegal, Somalia, South Africa, Sudan, Tunisia and Zimbabwe.

2. UNCBD Programme of Work on Biodiversity of Drylands⁷

The UNCBD programme of work on biodiversity of dry and sub-humid lands and agro-biodiversity was approved in 2000 at COP V of the Convention held in Nairobi, Kenya. Key activities under this work programme were identified as:

- (1) the assessment of the status and trends of biodiversity;
- (2) identifying areas of particular value and/or under threat;
- (3) indicators of dry and sub-humid lands;
- (4) building knowledge on processes that affect biodiversity;
- (5) identification of local and global benefits derived from biodiversity in dry and sub-humid lands;
- (6) identification and dissemination of best management practices;
- (7) promotion of specific measures for the conservation and sustainable use of biodiversity of dry and sub-humid lands;
- (8) promotion of responsible resource management; and,
- (9) support for sustainable livelihoods.

The first six activities were grouped as assessments, while the last activities were classified as targeted actions or responses.

A number of sub-activities under the responses include:

- (i) use and establishment of additional protected areas;
- (ii) rehabilitation and restoration of the biodiversity of degraded areas; management of invasive alien species;
- (iii) sustainable management of production systems, as well as water resources;
- (iv) complementary *in-situ* and *ex-situ* conservation measures;
- (v) economic valuation of biodiversity resources;
- (vi) promotion of adaptive technologies that enhance productivity in dry and sub-humid lands;
- (vii) sustainable use and husbandry of plant and animal biomass;

⁷ Ziedler, J and J Mulongoy (2003). The dry and sub-humid lands programme of work of the UNCBD: connecting the UNCBD with the UNUNCCD. *Reciel* 12(2):164 – 175.

- (viii) promotion of training, education and public awareness;
- (ix) information exchange;
- (x) research and development programmes; and,
- (xi) cooperation with other environment-related Conventions.

This programme of work, while focusing on biodiversity, draws on, and contributes to, programmes of work for the other Conventions, especially UNCCD, UNUNFCCC, CMS, CITES and Ramsar. Aspects of the WHC relating to natural sites may also benefit from, or contribute to, the UNCBD programme of work on biodiversity in dry and sub-humid lands. The UNCBD programme of work specifically targets land degradation and desertification as causes of biodiversity loss⁷.

Box 1. The Millennium Development Goals. Targets for 2015.

Goal 1. Eradicate extreme poverty and hunger

- Halve the proportion of people living on less than a dollar a day and those who suffer from hunger.

Goal 2. Achieve universal primary education

- Ensure that all boys and girls complete primary school.

Goal 3. Promote gender equality and empower women

- Eliminate gender disparities in primary and secondary education preferably by 2005, and at all levels by 2015.

Goal 4. Reduce child mortality

- Reduce by two thirds the mortality rate among children under five.

Goal 5. Improve maternal health

- Reduce by three-quarters the ratio of women dying in childbirth.

Goal 6. Combat HIV/AIDS, malaria and other diseases

- Halt and begin to reverse the spread of HIV/AIDS and the incidence of malaria and other major diseases.

Goal 7. Ensure environmental sustainability

- Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.
- By 2015, reduce by half the proportion of people without access to safe drinking water.
- By 2020, achieve significant improvement in the lives of at least 100 million slum dwellers.

Goal 8. Develop a global partnership for development

- Develop further an open trading and financial system that includes a commitment to good governance, development and poverty reduction – nationality and internationally.
- Address the least developed countries' special needs, and the special needs of landlocked and small island developing States.
- Deal comprehensively with developing countries' debt problems.
- Develop decent and productive work for youth.
- In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries.
- In cooperation with the private sector, make available the benefits of new technologies – especially information and communications technologies.

Source: UNDP web site: www.undp.org/mdg/

Box 2. NEPAD Objectives

- (a) To eradicate poverty.
- (b) To place African countries, both individually and collectively, on a path of sustainable growth and development.
- (c) To halt the marginalisation of Africa in the globalisation process and enhance its full and beneficial integration into the global economy.
- (d) To accelerate the empowerment of women.

Source: www.nepad.org/inbrief.html

3. Why Synergy?

“Synergy” is defined as the “interaction or cooperation of two or more agents, organisations etc to produce a new or enhanced effect compared to their separate effects”. (9th edition of the Concise Oxford Dictionary of Current English⁸. It is usually expected that the results of synergy far exceed the sum of individual effects.

Synergy in implementing the Conventions is expected to benefit countries by:

- (i) reducing actual and potential conflicts between and among Conventions;
- (ii) improving cost effectiveness by achieving the same or greater results with fewer human and/or financial resources, especially at national and local levels;
- (iii) avoiding duplication of costs and efforts that would be incurred through individual implementation of each Convention, especially at the national and local level;
- (iv) reducing the burden on local communities and national institutions that are often required to implement the different Conventions through joint implementation;
- (v) reducing the burden on reporting institutions, some of whom have to report on more than one Convention, by joint reporting to the Conferences of Parties (often comprising the same states);
- (vi) leading to better achievement of the Millennium Development Goals (MDGs), especially Goal 7 (see Box 1); and,
- (vii) contributing towards achieving the objectives of the New Partnership for Africa’s Development (NEPAD) (see Box 2).

4. Description of the Linkages Between and Among the Conventions**2.1. Convention objectives**

The objectives of these Conventions have varying degrees of similarity and overlap. The major objectives of the seven Conventions are summarised in Table 1. Table 1 also shows the website addresses for each Convention as well as the number of African states that are party to these seven Conventions.

Table 1 shows that the majority of the African states, including those that are wholly or partially drylands, are party to the UN Rio Conventions (UNCBD, UNCCD and UNFCCC) as well as CITES and the WHC. The other two Conventions are subscribed to by fewer countries, particularly the CMS, for which there are only 14 African contracting parties. Ramsar is the oldest of the seven Conventions. Some countries view the UNCBD as being all-encompassing to the extent that if a country has ratified and meets its obligations with respect to this Convention, then it will also achieve the objectives of other conventions such as Ramsar⁹.

⁸ H W Fowler and F G Fowler. (1996). Concise Oxford Dictionary of Current English. 9th ed.

⁹ J Prescott Allen (1997). Synergy among Rio Conventions – report on experts meeting held in Israel in March 1997.

From Table 1, one can also assess the relationship between these Conventions’ objectives and the objectives and activities under the UNCBD programme of work on biodiversity of drylands. Obvious links with respect to objectives can be observed between the UNCBD work programme and the UNCCD, UNFCCC, CMS, CITES and Ramsar.

In response to a question on perceived percentage of overlap between and among the objectives of the different Conventions, two convention Secretariats, Ramsar Bureau and World Heritage Convention, as well as respondents from eleven African countries (Botswana, Burkina Faso, Burundi, Egypt, Guinea Bissau, Kenya, Mozambique, Rwanda, Sierra Leone, Uganda and Zambia) gave the data summarised in Table 2 below.

Table 2. Perceived overlap between Convention objectives in percentage points.

	UNCBD	UNCCD	UNFCCC	WHC	CITES	CMS
UNCBD						
UNCCD	10 – 100					
UNFCCC	20 – 80	20 – 80				
WHC	0 – 80	0 – 30	0 – 50			
CITES	10 – 100	0 – 70	0 – 60	0 – 70		
CMS	70 – 95	0 – 40	20 -100	0 – 80	50 – 60	
Ramsar	30 – 100	0 - 60	15 – 100	60 – 80	30 - 80	40 - 90

Table 2 shows that many respondents perceive a great deal of overlap between and among the seven Conventions. Relatively low overlap was reported between WHC and UNCCD, WHC and UNFCCC and, rather surprisingly, between CMS and UNFCCC. The perception of overlap in objectives should also be expected to provide another opportunity for synergistic implementation of those conventions perceived to have similar objectives. The UNCBD, however, was perceived to have the highest amount of overlap between its objectives and those of the other six objectives. This confirms the notion that the UNCBD is perceived to be all-encompassing.

2.2. Conferences of Parties and reporting obligations

Each Convention holds a Conference of Parties at regular intervals. There may be several Conferences of Parties for different Conventions in one year. Parties to each Convention are obligated to report on activities and/or on progress related to each Convention. The frequency of this reporting varies among the Conventions.

Table 3. Conference of Parties and reporting frequencies.

Convention	Conference of Parties	Reporting
UNCBD	Every 2 years	National reports: every 4 years Thematic reports: every COP
UNCCD	Every 2 years	At every COP
UNFCCC	Annually	Annually
CITES	Every 2 years	Annual Biennial
WHC		Periodically
CMS	Every 3 years	At COPs
Ramsar	Every 3 years	At every COP

2.3. National focal institutions

Each contracting party to a Convention is obliged to identify a focal institution and a focal person responsible for a particular Convention. In several African countries, the same person is named as focal point for two or more Conventions. At the level of institutions, the same institution at the ministerial level may be responsible for as many as five of the Conventions, although there may be different departments under the same ministry. For example, in Botswana, the Ministry of Wildlife, Environment and Tourism is reported to be responsible for the UNCBD, CITES, UNCCD, UNFCCC and Ramsar¹⁰. In all countries there are ministries or agencies responsible for at least two of the seven Conventions.

In the following countries, the same ministry or agency is responsible for these five Conventions: *UNCBD, UNCCD, UNFCCC CITES and Ramsar*:

Botswana, Burkina Faso, Guinea Bissau, Mauritania, Nigeria, South Africa and Zambia.

In the countries below, the same ministry or agency is responsible for these four Conventions: *UNCBD, UNCCD, UNFCCC and CITES*:

Botswana, Burkina Faso, Cameroon, Chad, Comoros, Cote d'Ivoire, Equatorial Guinea, Madagascar, Mauritania, Nigeria and South Africa.

In the countries below, the same ministry or agency is responsible for three Conventions among the UNCBD, UNCCD, UNFCCC, CITES, WHC, CMS and Ramsar.

Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central Africa Republic, Chad, Comoros, Congo, Cote d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Gabon, Guinea-Bissau, Kenya, Libya, Lesotho, Madagascar, Mauritania, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Seychelles, South Africa, Tunisia, Togo, Zambia and Zimbabwe.

The above analysis implies that there could be a considerable burden on the ministries or government agencies responsible for more than one Convention with respect to planning, implementing and reporting on Convention activities. Bearing in mind human capacity deficiencies in many African countries, the same few experts are engaged in more than one Convention. The same few experts are thus expected to attend Conferences of Parties, prepare and present reports while performing other mundane duties at the national level as well as with respect to the Conventions. ***Synergy in implementing the Conventions can be expected to significantly ease the burden on these institutions and their staff.***

At the same time, the fact that the same government ministries or agencies are responsible for two or more of the Conventions should provide an enabling basis for synergistic implementation of those Conventions at the national level. This is definitely an opportunity that needs to be, if not it is not already, capitalized on.

2.4. Convention national reference groups

In some African countries, there are groups of experts called "reference groups" for some of the Conventions. The purpose of such reference groups is to assist the focal person and the focal institutions in meeting the obligations under the Convention. Duties may include assisting the national focal institution in (i) developing national

¹⁰ www.ramsar.org

action plans, (ii) preparing or reviewing national reports, and (iii) representing public views on matters pertaining to a particular Convention. In some countries, members of such reference groups may be nominated to attend meetings of the Conventions.

This aspect of implementing Conventions is not the same in all countries. For example, in 2004, Burundi did not have reference groups for any of the seven Conventions, while Uganda had no reference groups for the UNCBD, WHC and CITES. Burkina Faso had reference groups for the UNCBD, UNCCD and UNFCCC, whereas Guinea Bissau had reference groups for all seven Conventions. Where reference groups do exist for the different Conventions, there are varying degrees of duplication of members of such reference groups. For example, in Botswana, (Kwerepe, *pers. comm.*) it is estimated that the composition of reference groups for the UNCBD, UNCCD and Ramsar are 80% the same members. Some of the results of the survey are summarized below. In Kenya, (Bagine, *pers. comm.*) there is overlap of persons serving on the UNCBD reference and on the reference groups for UNCCD, UNFCCC, CITES, CMS, Ramsar and WHC, which ranges from 50 – 95%.

With such high levels of overlap of experts serving on reference groups for the different Conventions, synergy should not only be possible and desirable but, indeed, essential, imperative and inevitable. This is especially so given that the same ministry or government agency may be responsible for at least two or as many as five Conventions. This again offers another opportunity for synergy at the national level, at least in those countries where reference groups exist.

2.5. Synergy at the level of Convention Secretariats

Joint work planning is a necessary precursor to joint implementation in the field. A survey of the websites of the seven Conventions shows that there are on-going efforts to achieve synergy between and among the Conventions. The UNCBD is evidently leading in this aspect. At www.biodiv.org/convention/partners-websites.asp, the UNCBD links with CITES, CMS, WHC and Ramsar on a “Joint Web Site of the Biodiversity Conventions”. This joint website is featured on the websites of CITES, WHC, CMS and Ramsar. At www.biodiv.org/convention/rioconv.asp, the UNCBD links with UNCCD and UNFCCC websites, while at www.biodiv.org/convention/partners-list.asp, a comprehensive list of UNCBD partners is given. The UNCBD and the UNCCD have a Memorandum of Cooperation and have formulated a Joint Work Plan which still has to be approved by the COPs of the two Conventions¹¹. The UNCBD lists Memoranda of Cooperation or Memoranda of Understanding with other organizations, including CITES, CWS and Ramsar, at www.biodiv.org/convention/partners-memoranda.asp, and at www.biodiv.org/convention/partners-workprogramme.asp. Examples of joint work programmes involving the UNCBD and other Conventions are also given.

The UNCCD links with other networks on the website www.unccd.int/misc/otherwebs.php; however, the UNCCD “links” page does not mention CITES, WHC and CMS. The CITES website has a “useful links” page on www.cites.org/eng/resources/links.shtml. It shows “other environmental Conventions” such as the UNCBD, CMS, WHC and Ramsar. It does not mention UNCCD and UNFCCC.

Ramsar also has very comprehensive links with other Conventions and organisations. At www.ramsar.org/links_index.html, there are links to all the other six Conventions, while at www.ramsar.org/index_mou.htm, one finds links to Memoranda of Understanding and joint work between Ramsar and the UNCBD, CMS, UNCCD,

¹¹ Ziedler, J and J Mulongoy (2003). The dry and sub-humid lands programme of work of the UNCBD: connecting the UNCBD with the UN UNCCD. *Reciel* 12 (2): 164-175.

WHC plus a host of other organisations. The CMS website shows related sites at www.cms.int/links/index.htm, with links to all the other six Conventions mentioned.

The UNFCCC and WHC websites do not show much in the form of links and partnerships with other biodiversity-related Conventions. A Joint Liaison Group (JLG) was formed involving the Secretariats of the three Rio Conventions and the Ramsar Convention on Wetlands¹².

From above, it is clear that the Convention Secretariats have consciously and conscientiously been working towards achieving various levels of synergy between and among the Conventions. How much is the synergy that is demonstrated at Secretariat level reflected at the national levels of implementing Conventions?

4. Synergy at the National Level

While there is considerable evidence of synergy between the Convention Secretariats, there is less synergy evident at national levels. It is difficult to get comprehensive information with respect to synergy at the national level in African countries. There are problems in implementing Conventions in Africa – either as individual Conventions, or more so as combinations of Conventions. There is hardly any synergistic implementation of Conventions at a national level. This is rather puzzling given that the same agencies are involved in implementing several Conventions – at least two and as many as five. In some cases, the same individual is the focal point for several Conventions. There is also an overlap of people serving as reference groups for different Conventions. The Convention Secretariats have been called by contracting parties to encourage and practise synergy in implementing the Conventions. Convention Secretariats have and are taking significant steps to achieve synergy in implementing the Conventions.

Why then, do the Contracting Parties, who requested the Executive Secretary of the UNCBD to work towards synergy with Secretariats of other Conventions, not practise synergy in implementing the same Conventions at their respective national levels?

Lack of opportunities for synergy between and among the Conventions

Lack of synergy in implementing Conventions at the national level cannot be due to lack of opportunities. The discussion above shows that there is a plethora of opportunities to practice synergy, especially at the national level – same government, same government ministry or agency, same people on the ground, but limited human and financial resources.

Why would the same individual as a focal point for different Conventions urge the Secretariats to endeavour for synergy when the same individual does not practise synergy between and among the Conventions that he/she is the focal point for?

A brief survey of some African countries (Masundire, unpublished) showed that there is a great expectation for synergistic implementation of the UN environmental Conventions. This could take the form of joint sessions or of scientific and technical committees of the Conventions. The idea of holding joint Conferences of Parties of the different Conventions was not at all popular. Representatives of Convention Secretariats often attend all or parts of other Conventions' Conference of Parties.

¹² Ziedler, J and J Mulongoy (2003). The dry and sub-humid lands programme of work of the UNCBD: connecting the UNCBD with the Un UNCCD. *Reciel* 12 (2): 164-175.

2.1. Plausible reasons for lack of synergy at the national level

Capacity issues

There are relatively few trained personnel in the fields that the biodiversity-related Conventions deal with. This is partly the reason why the same individuals may be named as the focal point for several Conventions. This should be expected to enhance synergistic implementation of Conventions. Why then is there little or no synergy at the national level? Often, while the same ministry or agency may be responsible for two or more Conventions, there may be different departments or persons responsible for the different Conventions. Thus, lack of inter-departmental or inter-ministerial communication may be the major cause of lack of synergy at a national level.

Another problem with African delegations to Conventions is that often the delegations are too small. Most COPs will require parallel sessions at some point. When the delegation from a country is small, it then follows that there is no full representation at the COP. This is critical in situations where contact groups are required to negotiate specific issues relating to a Convention. A possible consequence of this is that delegations come back without full information about a particular COP and cannot therefore effectively provide feedback into the national system – where feedback systems are in place.

Financial issues

Sending small delegations to COPs, while due to lack of human capacity, may also be due to lack of financial resources to send larger delegations. However, the attendance by the same persons at different COPs may also be for financial reasons – where participants see a financial benefit in participation. Put more simply, travelling to a meeting that is outside one's country requires that one be paid for expenses in foreign or hard currency. Thus, personnel in focal institutions may view participation in Convention affairs as a source of income.

2.2. Recommendations for improved synergy at the national level

Governance issues

There is need to democratise participation in Convention activities. In many countries, there is very little civil society participation in Convention activities. In some cases where reference groups exist to serve Conventions, it would appear that members of such reference groups are made to feel privileged to be so nominated, whereas they should feel empowered to drive the process of implementing the respective Conventions. Greater involvement of an empowered civil society is likely to lead to more synergy in implementing the Conventions.

Inter-sectoral coordination

Government ministries and different departments will always exist – each with their specific mandates. However, several countries have realised the need for coordination of different ministries and/or departments, especially with respect to environmental management. Environmental issues are increasingly being seen as cross-cutting. For example, the Environmental Council of Zambia (ECZ), the Departmental of Environmental Affairs (DEA) of Botswana, and the Department of Environmental Affairs and Tourism of South Africa (DEAT) were formed to perform this function. Such institutions provide an opportunity for synergy in implementing biodiversity-related Conventions. But they need to be empowered to do so.

Funding of Convention Implementation

Financial donors at the national level could insist on funding work that will contribute to the implementation of at least two Conventions. Thus, funding bodies should be encouraged to fund projects or programmes that lead to synergistic implementation of at least two Conventions. While fostering synergy, such an approach would definitely contribute to realizing the benefits associated with synergy. Synergistic implementation of the Conventions would reduce the burden on local communities.

Integrating Convention work plans into national development planning

It is essential that Convention work plans at the national level are an integral part of national development planning. Several countries have national development plans that are updated periodically. For example, Botswana is now implementing its 9th National Development Plan (NDP9) – a six-year development plan. The same states that have approved the Conventions' work plans through the COPs should be expected to integrate these work plans into their national development plans.

2.3. Integrating Convention work plans into regional and Pan-African development planning

Regional organizations such as the Southern African Development Community (SADC) and the Economic Community of West African Countries (ECOWAS) and Pan-African bodies such as the African Union, through NEPAD, ought to integrate Convention work plans into relevant regional and pan-African plans. This is especially necessary for dealing with ecosystems that transcend national boundaries, e.g. river basins.

2.4. Application of the ecosystem approach

The ecosystem approach, described as a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way, was endorsed by parties to the UNCBD at the COP V in Nairobi, Kenya, in 2000 – the same COP that approved the work plan on biodiversity of dry and sub-humid lands.

Conclusions and Recommendations

The above discussion shows that there is definitely a need for synergy in implementing the Rio Conventions and other biodiversity-related Conventions in African countries. The reasons for the need of and the benefits that arise from synergistic implementation of the Conventions have been discussed above.

The Convention Secretariats have achieved measured success in synergistic work between and among several of the Conventions. Lack in synergy is observed mostly at national and local levels where synergy would have the greatest impact in the successful implementation of the Conventions, both individually and collectively. While in many countries the same government ministry or agency may be responsible for two or more Conventions, and in other countries the same person acts as the focal point for more than one Convention, it is still puzzling why there is little or no synergy in implementing Conventions at the national level.

Summary Report

Introduction

At its 58th session, the UN General Assembly declared 2006 the International Year of Deserts and Desertification (IYDD). In doing so, the General Assembly underlined its deep concern for the exacerbation of desertification, particularly in Africa, and noted its far-reaching implications for the implementation of the Millennium Development Goals (MDGs) which must be met by 2015. The IYDD is an opportunity to strengthen the visibility of the desertification issues on the international environmental agenda, while providing a timely reminder to the international community of the immense challenges that still lie ahead.

In this context, the United Nations University (UNU), together with a group of partner UN and international agencies jointly organized an international conference on “Desertification and the International Policy Imperative”. The conference was held from 17-19 December 2006, in Algiers, and was hosted by the Algerian Government. Previous meetings and conferences held to celebrate the IYDD called for the adoption of improved policies for combating desertification. Most notably, the 8th International Conference on Development of Drylands (February 2006) and the International Scientific Conference on Deserts and Desertification “The Future of Drylands” (June 2006) identified a series of challenges for international policy-makers. This conference focused on examining the available international experience in the formulation of policies for combating desertification and drew on a series of case studies on the implementation of these policies.

Conference Background and Context

Desertification has emerged as a major global challenge that affects human well-being and threatens to reverse the gains in human development in many parts of world. Indeed, the Millennium Ecosystem Assessment ranks desertification – land degradation in drylands as a result of climatic factors and human activities – among the world’s greatest environmental challenges, destabilizing societies by deepening poverty and creating environmental refugees who can often add stress to areas that may not be degraded. Impacts of desertification are exacerbated by political marginalization of the dryland poor, and the slow growth of health and education infrastructure.

The greatest vulnerability is ascribed to sub-Saharan and Central Asian drylands. For example, in three key regions of Africa—the Sahel, the Horn of Africa, and Southeast Africa—severe droughts occur on average once every 30 years. These droughts triple the number of people exposed to severe water scarcity at least once in every generation, leading to major food and health crises. Desertification has other strong adverse impacts on non-drylands as well. In addition to dust storms, biophysical impacts include downstream flooding, impairment of global carbon sequestration capacity, and regional and global climate change.

One may argue that the Millennium Development Goals (MDG’s), a suite of objectives globally agreed by world leaders in 2000 to be met by 2015, cannot be met without addressing the problem of desertification effectively. Fortunately, effective policies and sustainable agricultural practices can reverse the decline of drylands. Chief among these are measures that protect soils from erosion, salinization and other forms of degradation. Proper land use management policies are needed to protecting existing vegetative cover from overgrazing, over-exploitation, trampling and unsustainable irrigation practices.

These policies can be further strengthened by creating viable livelihood alternatives for drylands populations and directly linking them to national strategies to combat desertification and poverty reduction. In other words, the situation may also be

improved by reducing the stresses on dryland ecosystems. This can be achieved either through the introduction of alternative livelihoods that have less of an impact on dryland resources, or by the creation of economic opportunities in urban centers and areas outside drylands. Such an approach to creating livelihoods would benefit from the unique advantages of drylands: year-round availability of solar energy, attractive landscapes, and large wilderness areas.

On the whole, combating desertification yields multiple local and global benefits and helps mitigate biodiversity loss and human-induced global climate change. Addressing desertification is critical and essential for meeting the Millennium Development Goals successfully. Environmental management approaches for combating desertification, adapting to climate change, and conserving biodiversity are interlinked in many ways. Therefore, joint implementation of major environmental conventions can lead to increased synergy and effectiveness, benefiting dryland people.

While the conceptual awareness of these linkages is present and growing, its reflection in the design and implementation of policies has been lagging behind. This applies at all levels: formulation of international and global policies for combating desertification have been hindered by political marginalization and lack of concrete data; examples of effective national efforts to combat desertification are also few, as a result of insufficient resources and ineffective policy integration; and implementation at the local level has been hampered by lack of capacity and societal motivation.

The need for a forum in which such policy matters can be discussed in depth is paramount. Using the IYDD umbrella, the policy dialogue for desertification can be moved forward in a major way through this international conference. By providing an unbiased forum where policy approaches can be openly discussed and local case studies can be evaluated, significant breakthroughs in policy formulation may emerge.

Conference Objectives

The conference aimed primarily to facilitate a dialogue on desertification-related policy issues, and to do so in the context of global human development challenges, notably poverty reduction and threatened human security. Specifically, the conference focused on the following objectives:

- a. Identify key policy challenges for combating desertification, based on an in-depth analysis of national and international strategies;
- b. Discuss and explore avenues for mainstreaming desertification issues at various levels, leading to improved policy focus on droughts and desertification in the short term, and increased well-being of the dryland dwellers in the long term;
- c. Elaborate the role of knowledge management for sustainable land management in policy formulation, with particular attention given to scientific and traditional knowledge;
- d. Explore the interaction of national strategies to combat desertification with broader national development strategies, with a particular focus on the global challenges faced in meeting the MDG's;
- e. Evaluate synergies and interlinkages at local, national and international levels in the implementation of various multilateral environmental agreements.

Overview of Conference Programme

Over the three days of the conference, a broad spectrum of international participants including experts, researchers, government officials, policymakers, civil society participants and community representatives took part in presentations and discussions on the conference themes. At the end of the conference, the conference Session Chairs presented summaries of the discussions and recommendations put forward during the conference. A High Level Panel Discussion was then convened to bring together reflections from eminent persons on these recommendations. The conference discussions highlighted opportunities for the international community to strengthen the use of a range of knowledge and experience in the formulation and implementation of policies for combating desertification. Participants called on UNU to continue to work with other institutions and members of the international community to foster collaborations for improved knowledge management and transfer to the policy level.

Conference Opening

The opening session of the conference was chaired by H.E. Cherif Rahmani, Minister of Environment and Land Management, Algeria. Opening remarks were presented by the Rector of the United Nations University, Prof. Hans van Ginkel; the Algerian President, Abdelaziz Bouteflika; the Executive Secretary of the United Nations Convention for Combating Desertification, Hama Arba Diallo; Executive Secretary of the UNCCD, Ahmed Djogla; Executive Secretary, Sahara and Sahel Observatory, Youba Sokona; Director General, International Centre for Agricultural Research in the Dry Areas, Mahmoud Solh; the Managing Director of the Global Mechanism, Christian Mersmann. Opening remarks on behalf of other partner agencies were presented by Dr. Thomas Schaaf, UNESCO, Dr. Maryam Niamir-Fuller, UNDP and Dr. Gemma Shepherd, UNEP.

Session 1: Policy challenges in combating desertification

Chair: Dr. Maryam Niamir Fuller, UNDP, Co-Chair: Dr. Mohamed El Mourid, ICARDA

This session addressed the challenges for policies to address the interlinked issues of desertification, poverty and threats to human security. More accessible scientific research, and more holistic conceptual approaches to understanding desertification, such as the landscape approach and livelihoods analysis, are needed in order to support improved policy-making for combating desertification. At the same time, policy-makers are faced with additional challenges exacerbating natural resource degradation, such as conflicts and the creation of environmental refugees. Policies to address these concerns are also needed. Presentations and discussions emphasized the importance of community empowerment in the development of new policies, the role of southern versus northern NGO policy influence, and challenges for the maximization of benefits from the currently available development finance.

Session 2: New policy directions to mainstream desertification policies

Chair: Dr. Pamela Chasek, IISD, Co-chair: Dr. Foday Bojang, AU

This session addressed new policy directions for combating desertification, including financing and development options, drought preparedness strategies and policies to enable alternative livelihoods and development of the private sector. During the presentations and discussions, the potential roles of various stakeholders in innovative policy formulation were emphasized, ranging from pastoralists to the industrial sector. Governments should review their achievements in combating desertification, cooperate more fully with all stakeholders, and address institutional weaknesses that prevent the mainstreaming of policies for combating desertification and the harmonization of environment and development projects. South-south

exchanges, knowledge sharing and capacity development were emphasized at the international level.

Session 3: National case studies (comprising success stories and lessons learned) - Part I: National strategies

Chair: Prof. Wang Tao, Chinese Academy of Sciences, Co-chair: Friedrike Knabe, Unisfera

The national case studies presented during the first part of this session considered the involvement of a broad range of stakeholders in desertification policy formulation; the mainstreaming of attempts to combat desertification in national development strategies; and the issue of policy disconnect and contributions from isolated sectors. A variety of legislative approaches were presented, including sectoral and top-down approaches. In many cases, there is a need to educate and build capacity for long term instead of short term approaches. National policies also need to incorporate local knowledge, land tenure systems and stakeholder groups.

Part II: Monitoring and evaluation strategies

Chair: Richard Thomas, ICARDA, Co-chair: Wafa Essahli, OSS

The national case studies presented during the second part of this session focused on national efforts to monitor and evaluate land degradation and desertification. Positive examples of: mainstreaming into policy and inter-ministerial cooperation were identified. Substantial involvement of stakeholders using participatory approaches and development of information flows were also observed. Needs remain to strengthen integration with global level activities, establish knowledge management structures, harmonize tools and methods through more training, better organize stakeholders and research in relation to monitoring and evaluation systems, and develop monitoring and evaluation tools at the local level.

Session 4: Sub-regional case studies

Chair: Gemma Shepherd, UNEP, Co-Chair: Donald Gabriels, University of Ghent

Comparison of strategies at a sub-regional level enabled presenters to consider the evolutions of governance structure, remaining weaknesses, and opportunities for South-south exchange to support policy-formulation at the national level. In Africa, new regional strategies are emerging, national level strategies remain divergent and lack capacity; in other regions, there is less strategic integration. In all affected regions, there are opportunities for information exchange, learning lessons from shared experience and capacity building.

Session 5: Knowledge management for action on desertification

Chair: Sayyed Ahang Kowsar, FARS, Co-Chair: Dr. Boshra Salem, University of Alexandria

Presentations and discussions in this session set out to address gaps in scientific knowledge needed for policy-making and approaches for effective knowledge management. The need for policies to support the role of traditional knowledge and adaptive management were considered. The discussions during this session focused on how best to bridge the gap between scientific research, policymakers and practitioners. Issues of trust and communication were considered important. Solutions were anticipated to be context-specific.

Session 6: Interlinkages between desertification, climate change and other global environmental issues

Chair: Christopher Braeuel, CIDA, Co-Chair: Slimane Bedrani, CREAD

This session focused on operational linkages between global environment and development issues, international conventions and planning processes, including NAPs, NAPAs and NIPIs. Presentations and discussions highlighted contributions to food security and combating desertification achieved by climate-change and biodiversity focused initiatives, and vice-versa. The importance of knowledge networks within and between MEA stakeholder communities was emphasized. Recommendations included improvement vertical and horizontal communication between Secretariats, government institutions and civil society; improvement of analyses of the linkages between climate change, desertification and poverty; and translation of scientific and traditional knowledge into policy change.

Chairs Review of Conference Presentations and Discussions

Brief reviews of the session discussions and recommendations were presented by the session Chairs and Co-Chairs.

High Level Panel Discussion

A High Level Discussion of the conference findings was convened by Zafar Adeel, Director, United Nations University International Network on Water, Environment and Health. Commentaries were presented by Habib Ben Yahia, Secretary General, Arab Maghreb Union; David Mouat, Chair, UNCCD Group of Experts; Youba Sokona, Executive Secretary, OSS; Monique Barbut, Chief Executive Officer and Chairperson, Global Environment Facility; and Hans van Ginkel, Rector, United Nations University.

Closing Session

Closing remarks were made by Cherif Rahmani, Algeria's Minister of Land Management and Environment; Monique Barbut, Chief Executive Officer and Chairperson, Global Environment Facility; Shafqat Kakakhel, Deputy Executive Director, UNEP; Ahmed Djoghla, Executive Secretary, UNCCD; Mahmoud Solh, ICARDA; and Hans van Ginkel, Rector, United Nations University.

Conference Follow-up

Reporting on the Conference:

Wide-ranging coverage of the conference appeared in various languages, including English, French, Spanish and Portuguese in more than fourteen countries. Reports appeared in newspapers, magazines, television, radio and online news sources. A detailed report was published by the International Institute for Sustainable Development.

Scheduled Outputs:

To follow up on the conference, a number of tangible outputs are to be available as a record of its findings, and to promote the achievement of its target outcomes. These include the following:

- a. Conference website containing information on the conference activities at <http://www.inweh.unu.edu>
- b. Conference proceedings book (anticipated publication date: April 2007)

- c. Policy brief summarizing key policy and management recommendations (tentative launch date: June, 2007)
- d. Proposed academic publication through a peer-review process (publication details to be decided)

Conference Follow-up Events

- January 2007: International Workshop on GEF Land Degradation Focal Area Indicators, 8-9 January 2007, FAO Headquarters, Rome, Italy
- March 2007: Fifth session of the Committee for the Review of the Implementation of the Convention (CRIC 5), 7-22 March, 2007, Buenos Aires, Argentina
- June 2007: Launch of synthesis of conference recommendations, New York
- September 2007: International Conference on 'Soils, Society and Global Change', Reykjavik, Iceland
- September 2007: UNCCD COP 8, Madrid

Conference Programme

SUNDAY 17TH DECEMBER**OPENING REMARKS**

09:30-13:30 S.E.M. Abdelaziz Bouteflika, Président de la République de l'Algérie ; Prof. J.A. van Ginkel, Rector, UNU; M. Chérif Rahmani, Ministre de l'Aménagement du Territoire et de l'Environnement; M. Hama Arba Diallo, UNCCD; M. Ahmed Djoghlaif, UNCBD; M. Youba Sokona, OSS; M. Mahmoud Solh, ICARDA; Dr. Christian Mersmann, Global Mechanism; Dr. Thomas Schaaf, UNESCO; Dr. Maryam Niamir-Fuller, UNDP; Ms. Gemma Shepherd, UNEP.

SESSION 1: POLICY CHALLENGES IN COMBATING DESERTIFICATION

Chair: Maryam Niamir- Fuller, UNDP-GEF

Co-Chair: Mohamed El Mourid, ICARDA

14:30-14:45 Science in the Service of Combating Desertification – Results of the International Conference on 'The Future of Drylands'
Thomas Schaaf, UNESCO

14:45-15:00 Desertification and Human Security: Addressing Risks and Uncertainties
David Mouat, UNCCD GoE

15:00-15:15 Interdépendances entre désertification, pauvreté et les menaces sur la sécurité humaine
Gogo Banel Ndiaye Macina, MEPN, Senegal

15:15-15:30 Forced Migrations due to Degradation of Arid Lands: Concepts, Debate, and Policy Requirements
Janos Bogardi, UNU-EHS

15:30-15:45 Les Impératifs politiques de la lutte contre la désertification
Youba Sokona, OSS

15:45-16:00 Forum on Desertification and Civil Society
Nora Ourabah, FIPA

16:00-16:15 Policy Feedback from GEF-IYDD Events
Jos Lubbers, GEF

16:15-16:30 Panel Discussion

SESSION 2: NEW POLICY DIRECTIONS TO MAINSTREAM DESERTIFICATION POLICIES

Chair: Pamela Chasek, IISD

Co-Chair: Foday Bojang, AU

16:30-16:45 Pour des Politiques plus efficaces de lutte contre la désertification
Slimane Bédrani, CREAD

16:45-17:00 L'Efficacité de l'aide au développement et financement de la lutte contre la désertification
Youssef Brahimi, Global Mechanism

17:00-17:15 Plateforme partenariale pour l'intégration de la gestion durable des terres dans l'agenda politique international
Taoufiq Bennouna, TerrAfrica

17:15-17:30 Global Changes in Policies for Sustainable Pastoralism
Jonathan Davies, WISP

17:30-17:45 Payments for Environmental Services as a Means to Combat Desertification in WANA
Céline Dutilly-Diane, ICARDA

17:45-18:00 The Role of the Colombian Cattle Sector: Modernization through Sustainable Production to Relieve Poverty and Reduce Land Degradation
José Félix Lafaurie Rivera, FEDEGAN

18:00-18:15 Panel Discussion

MONDAY 18TH DECEMBER**SESSION 3, PART I: NATIONAL CASE STUDIES****Chair: Wang Tao, Chinese Academy of Sciences****Co-Chair: Friedrike Knabe, Unisféra**

- 09:00-09:10 Opening remarks
- 09:10-09:30 Burkina Faso: Une Etude de cas
Ouiraogo Bertrand Zida and Delphine Bernadette Ouedraogo, Ministère de l'Environnement et du Cadre de Vie
- 09:30-09:50 Lutter contre la désertification en Algérie: « De l'expérience à l'action »
Mellouhi Mohamed Seghir, Ministère de l'Agriculture et du Développement Durable
- 09:50-10:10 Policy Lessons from a Century of Soil Conservation in Iceland
Andres Arnalds, Soil Conservation Service of Iceland
- 10:10-10:30 Evolutionary Process of Mainstreaming Desertification Policy: A Namibian Case Study
Mary Seely, UNCCD CST GoE, Desert Research Foundation of Namibia
- 10:45-11:05 Combating Desertification in Argentina: From Research to Action
Elena Abraham, Instituto Argentino de Investigaciones de las Zonas Áridas
- 11:05-11:25 China: The Role of Policies in Combating Desertification
Xiaoxia Jia, CCICCD
- 11:25-12:10 Panel discussion

SESSION 3, PART II: STRATEGIES FOR MONITORING AND EVALUATION CASE STUDIES**Chair: Richard Thomas, ICARDA****Co-Chair: Wafa Essahli, OSS**

- 13:30-13:50 Maroc: Suivi-évaluation du Programme d'Action National
Mohamed Ghanam, Haut Commissariat aux Eaux et Forêts et Nabil Ben Khadra, OSS
- 13:50-14:10 South Africa: Land Degradation Assessment and Rehabilitation Programmes
Dirk Pretorius, Department of Agriculture, Directorate Land Use and Soil Management
- 14:10 -14:30 Tunisie: La politique en matière de gestion, de suivi et d'évaluation de la qualité des sols
Mohamed Ismail, Ministère du Développement Durable, Tunisie
- 14:30-14:50 Contraintes hydro-agricoles et stratégies de gestion intégrée et durable dans un contexte de désertification (Sahara Algérien)
Abderrazak Khadraoui, Agence de Bassin Hydrographique Sahara
- 14:50-15:10 Algerian Sahara: Field Surveys in Tidikelt
Iwao Kobori, UNU, Abderrahmane Benkhalifa and Ahmed El-Hadj
- 15:10-15:35 Panel discussion

SESSION 4: SUB-REGIONAL CASE STUDIES**Chair: Gemma Shepherd, UNEP****Co-Chair: Donald Gabriels, University Ghent**

- 15:50-16:10 Policies to Combat Desertification: A Perspective on the Latin American and Caribbean Region
Denis L. Avilés Irahola, Consultant, Latin American Unit of the UNCCD
- 16:10-16:30 Policies to Combat Desertification in the ESCWA Region
Boshra Salem, University of Alexandria
- 16:30-16:50 Policies Towards Combating Desertification in Africa
Madam Rosebud Kurwijila/Foday Bojang, African Union
- 16:50-17:10 Enabling policy environment to enhance uptake of natural resources management technologies in marginal drylands: Empirical evidence from Morocco and Tunisia
Mohammed El Mourid, ICARDA
- 17:10-18:00 Panel Discussion

TUESDAY 19TH DECEMBER**SESSION 5: KNOWLEDGE MANAGEMENT FOR ACTION ON DESERTIFICATION****Chair: Ahang Kowsar, FARS****Co-Chair: Boshra Salem, University of Alexandria**

- 09:00-09:15 From Knowledge to Policy Change
Maryam Niamir-Fuller, UNDP-GEF
- 09:15-09:30 The Challenges of Measuring the Impact of Desertification Interventions
David Niemeijer, Niemeijer Consult
- 09:30-09:45 Land Degradation Assessment in Drylands Project
Riccardo Biancalani, FAO
- 09:45-10:00 Knowledge Management and Policy for Combating Desertification in China
Wang Hong, PRC-GEF
- 10:00-10:15 La Recherche scientifique, un moyen de lutte contre la désertification
Dalila Nedjraoui, Université des Sciences et de la Technologie H. Boumediène
- 10:15-10:30 A New and Sustainable Approach to Policies for Restoring Grasslands in China Based on Scientific Findings
Gaoming Jiang, Chinese Academy of Sciences
- 10:45-11:00 Sub-Saharan Africa Challenge Programme
Assétou Kanouté, Sub-Saharan Africa Challenge Program
- 11:00-11:15 Traditional Knowledge for Combating Desertification in the Euro-Mediterranean
Pietro Laureano, IPOGEA
- 11:15-12:00 Panel discussion

SESSION 6: INTERLINKAGES BETWEEN DESERTIFICATION, CLIMATE CHANGE AND OTHER GLOBAL ENVIRONMENTAL ISSUES

Chair: Slimane Bedrani, CREAD

Co-Chair: Christopher Braeuel, CIDA

- 13:00-13:15 Synergies at the International Level: The Challenges of Bridging the Environment-Development Divide in the UNCCD
Pamela Chasek, IISD
- 13:15-13:30 La Lutte contre la desertification et l'adaptation aux changements climatiques
Wafa Essahli, OSS
- 13:30-13:45 The Challenge of Global Warming: Impacts on Desertification in 21st Century Africa
David Thomas, Oxford University
- 13:45-14:00 Empreinte climatique sur les hauts plateaux et la steppe en d'Algerie
Mostefa Kara, ANCC
- 14:00-14:15 Interactive Effects of Desertification on Global Climate Change and Food Security
Rattan Lal, The Ohio State University
- 14:15-14:30 Practicing Synergy in the Implementation of MEAs with Particular Reference to Desertification
Hillary Masundire, IUCN, Botswana
- 14:30-15:15 Panel Discussion

CHAIRS' REVIEW OF CONFERENCE PRESENTATIONS AND DISCUSSIONS

- 15:30-16:15 Session Chairs: 5 min each

HIGH LEVEL PANEL DISCUSSION

- 16:15-17:45 **Moderator: Zafar Adeel, UNU-INWEH**
Hans van Ginkel, UNU; Chérif Rahmani, Algeria; Dave Mouat, UNCCD GoE; Monique Barbut, GEF; Youba Sokona, OSS; Habib Ben Yahyia, UMA.

CLOSING CEREMONY

- 17:45-18:00 M. Chérif Rahmani, Ministère de l'Aménagement du Territoire et de l'Environnement ; Ms. Monique Barbut, GEF ; Prof. J. A. van Ginkel, UNU ; Mr. Shafqat Kakakhel, UNEP ; Dr. Ahmed Djoghlaif, CBD.

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Desertification and the International Policy Imperative
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The 2006 International Year of Deserts and Desertification (IYDD) was an opportunity to focus on desertification issues within the global environmental agenda. Over the course of the year, the international community reviewed the scientific, social, economic, political and cultural dimensions of efforts underway to combat desertification. This conference built on other key IYDD initiatives to highlight the policy underpinnings that are necessary to enable successful strategies in dryland communities. UN and international agencies joined forces to organize this event in a concerted effort to open the policy debate to a broad spectrum of participants, including national and local stakeholders, academics, researchers, government officials, policymakers, civil society and community representatives.

