

Zero Net Land Degradation: A New Sustainable Development Goal for Rio+ 20

**A report prepared for the Secretariat
of the United Nations Convention to combat Desertification**

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“...the time has come for the international community to commit itself to a land degradation neutral world by setting sustainable development goals on land use, with targets towards achieving zero net land degradation.” Africa Consensus Statement to Rio+20”, Addis Ababa, 25 October 2011

“Over the last four decades, human endeavour has unleashed unprecedented economic growth in the pursuit of higher living standards. While the world’s population has increased by over 3 billion people since 1970, the size of the world economy has more than tripled. While this growth has pulled millions out of poverty, it has been unevenly distributed and incurred significant cost to the environment. Natural assets have been and continue to be depleted, with the services they deliver already compromised by environmental pollution. Providing for a further 2 billion people by 2050 and improving the living standards for all will challenge our ability to manage and restore those natural assets on which all life depends. Failure to do so will have serious consequences, especially for the poor, and ultimately undermine the growth and human development of future generations.” From Executive Summary, OECD Environmental Outlook to 2050: the Consequences of Inaction, March 2012. (OECD 2012a)

Executive Summary

This report suggests that a new and explicit goal of sustainable development to be agreed as a result of Rio+20 should be the reduction of the rate of land degradation to achieve land degradation neutrality, which we refer to as “Zero Net Land Degradation” or ZNLD. Such a goal is urgently required in order to save the world’s lands from further degradation processes and thus to meet the nutritional, economic, social and cultural needs of current and future generations, as well as to complement global initiatives to address climate change and biological diversity losses. The objective of this report is to explain and justify the need for setting a ZNLD target, and to suggest ways in which it can be achieved. To this end, a tentative roadmap is included as part of the recommendations of the report.

The principal driver of human-caused land degradation and desertification is unsustainable exploitation of land productivity by pastoral, farming and agro-pastoral land uses. By restoring already degraded land, the net rate of loss of productive land can be reduced to zero. If the annual rate of restoration over time equals the annual rate of land becoming degraded, *zero net land degradation* will be achieved. The fundamental aim of ZNLD is thus that the area of global productive land will remain stable with enhanced and sustained production. Promoting the ZNLD target would help to secure the currently available productive land for the use of present and future generations.

Land degradation and its subset of desertification are defined in the box below. In this report they are collectively referred to as “LDD”. They constitute a persistent decline in the provision of all services that land would otherwise provide, including food provision. Around 20% of global land area is presumably already degraded (i.e. LDD-affected), as expressed by a persistent reduction of land productivity as well as in the provision of other land ecosystem services. These processes adversely affect food security, water security, climate security, biodiversity, and

many ecosystem services, as well as associated recreational, heritage and cultural values. Global peace and political stability are threatened when basic needs of food and water are not adequately met because of LDD.

This report urges that land that is already degraded should be restored, and then be sustainably managed under a strict, legally and ethically based regime, with the aim of achieving ZNLD. The need to use previously unused land for agriculture and pastoralism is thereby reduced. However, to the extent that new land must be brought into production, the report urges that it should be also subject to a regime of strict sustainable land management (SLM).

Over the 20 years since the 1992 Rio Conference on Environment and Development, several long-term outcome-oriented targets for achieving sustainable development have been set. These targets include the reduction of biodiversity losses, mitigation and adaptation to climate change, and alleviation of poverty under the Millennium Development Goals (MDGs). Since LDD substantially contributes to each of these, setting a globally agreed, measurable target focusing on LDD is a logical and urgent step. Clearly, setting targets for addressing climate change, biodiversity loss and poverty without taking into account LDD can have only limited success. Coordination with other global programs will strengthen joint activities, advance their objectives and missions, and further its own goals.

As land degradation processes reduce the rate of carbon sequestration and increases greenhouse gas (GHG) emissions, it is less likely that GHG reduction targets will be attained. Further, because land forms the infrastructure of plant and animal habitats, its degradation hampers the attainment of the biodiversity goals. Finally, since land degradation means loss of productivity and hence reduced food provision, global food security targets will be missed if LDD is not addressed. Setting a 2030 ZNLD target represents a new and challenging goal which can only be met with new and challenging programmes.

This report recommends that the primary mechanism for achieving ZNLD on a global scale is the preparation and negotiation of a Protocol on Zero Net Land Degradation to the Convention to Combat Desertification. Such a Protocol is intended to operationalize ZNLD in much the same way as the Kyoto Protocol is intended to operationalize the Framework Convention on Climate Change in achieving the stabilization of GHG concentrations in the atmosphere. The Protocol would also facilitate development of policies, guidelines and mechanisms for implementation of ZNLD at national level, as well as the provision of guidelines and models for national and sub-national legislation.

The creation of an Intergovernmental Panel on Land and Soil (IPLS) as a global authority on scientific and technical knowledge is also recommended. It will be designed to provide the land stakeholders with credible and policy-relevant scientific information, which will enable policy makers to make science-based decisions with respect to LDD. Under the IPLS's advice, the Conferences of the Parties would negotiate and set achievable and verifiable targets for ZNLD.

Finally, the report includes a tentative roadmap for the attainment of ZNLD by the target year of 2030.

Key definitions for the purposes of this report

Land degradation: under the UNCCD "land degradation" means reduction or loss, in arid, semi-arid and dry sub-humid areas, of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns, such as:

- (i) soil erosion caused by wind and/or water;
- (ii) deterioration of the physical, chemical and biological or economic properties of soil; and
- (iii) long-term loss of natural vegetation;

Land degradation implies a persistent reduction of land productivity (Adeel et al., 2005). This reduction is expressed in declining provision of the land's biological products, including forage, food, fibre, timber, etc.

Desertification: under the UNCCD "desertification" means land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. The report adopts this definition but treats it as a particular form and a sub-set of land degradation which generally occurs in lands under dry climates, called drylands.

Green water: precipitation that naturally infiltrates into the soil and leaves the drainage basin through evapotranspiration into the atmosphere (OECD 2012a).

Land restoration: Reversing land degradation processes by conversion to restorative land uses, adoption of recommended management practices and amendments (i.e. any material added to a soil to improve its processes and properties) to enhance land resilience and restoration of soil functions and ecosystem services.

Sustainable Land Management (SLM): A knowledge-based combination of technologies, policies and practices that integrate land, water, biodiversity, and environmental concerns (including input and output externalities) to meet rising food and fibre demands while sustaining ecosystem services and livelihoods (World Bank, 2006).

Water security: The sustainable use and protection of water systems against floods and drought, sustainable development and use of water resources, and safeguarding of (access to) water functions and services for humans and the environment (Schultz and Uhlenbrook, 2007).

Zero Net Land Degradation (ZNLND): **Zero Net Land Degradation** means the achievement of a state of land degradation neutrality. Achieving it involves a combination of reducing the rate of further degradation of land, and offsetting newly occurring degradation by restoring the productivity and the provision of other ecosystem services of currently degraded lands.

Abbreviations

CBD: Convention on Biological Diversity
COP: Conference of Parties
CRIC: Committee for Review of the Implementation of the Convention
CST: Committee on Science and Technology
FAO: Food and Agriculture Organization of the United Nations
GHG: Greenhouse gas
GIS: Geographic Information System
IAASTD: International Assessment of Agricultural Knowledge, Science and Technology for Development
IPCC: Intergovernmental Panel on Climate Change
IPLS: intergovernmental Panel on Land and Soil
LDC: Less developed country
LDD: Land degradation and desertification
MDG: Millennium Development Goal
NGO: Nongovernment Organization
OECD: Organisation of Economic Cooperation and Development
SLM: Sustainable Land Management
SOM: Soil organic matter
PES: Payment for Ecosystem Services
UNCCD: United Nations Convention
UNDP: United Nations Development Program
UNEP: United Nations Environment Program
UNFCCC: United Nations Framework Convention on Climate Change
UNU: United Nations University
WHO: World Health Organization
WOCAT: World Overview of Conservation Approaches and Technologies
ZNLD: Zero Net Land Degradation

Key words: *Food security, climate change, water scarcity, soil erosion, salinization, soil carbon, vegetation cover, ecosystem services, gender issues, legal instrument, soil policy, land degradation, desertification, soil organic matter, poverty*

1.0 The Problem of Land Degradation and Desertification

1.1 What are land degradation and desertification?

Land Degradation, and its sub-set of desertification (LDD), constitutes a persistent decline in the provision of all services that land otherwise provides, especially that of food provision. Given the extremely slow pace of soil formation, once the physical, biological and chemical properties of soils begin to deteriorate, their natural regeneration rate is practically unattainable. Globally, large expanses of land are in various stages of degradation, and are expanding as land formerly unused for agriculture and pastoralism is subjected to anthropogenic degradation processes, exacerbated by natural climate events, mostly droughts. The world's productive land is finite, and the global area of productive land decreases with every new episode of degradation. Clausing (2011, referring to Magdoff and van Es 2009 and IAASTD 2009) observes that detailed estimates about global soil degradation vary (see Section 1.5), but that "a figure of 10–12 million km² of total degraded land, i.e. 20 to 25% of all used land being degraded to at least some degree, has been mentioned repeatedly". A higher estimate of 35 million km² has been reported by Bai et. al. (2008).

1.2 What is the extent of existing degradation and where does it occur?

"Land degradation" and its sub-set of "desertification" are of global concern, since they result in a diminished capacity of the Earth to provide food to the world at large. Declines in agricultural production often have social, economic and policy drivers, over and above the biophysical drivers which impact the land. This has motivated scientists to monitor land and soil characteristics, which serve as indicators of productivity. However, different studies have used different indicators and measurement methods, which have led to conflicting and different opinions on the extent of LDD. Thus, it is not surprising that five global assessments over the last four decades resulted in degradation estimates ranging from 15% to 63% of global land and 4% to 74% of its subset of global drylands (Safriel, 2007). One study suggests that LDD is a much greater threat in drylands than in non-dryland (Adeel et al., 2005). Such diverse estimates are indicative of the need for developing a credible data base.

Most 20th century research understandably addressed the extent of cumulative degradation. The development of regular and accessible time series of earth monitoring from space has enabled a more accurate assessment of the current rates of LDD. A recent study at the global scale addressed reduction of biological productivity at large, rather than singling out reduction in terms of economic value alone (Bai et al., 2008). An analysis of time series of remote sensing images between 1981 and 2003 reveals a persistently declining productivity throughout this period of over 20% of the global land on which 1.5 billion people reside. This mainly occurred in Africa south of the Equator, especially in South-East Asia and south China, north-central Australia, the South American pampas and swathes of the Siberian and North American taiga. While as much as quarter of global land may be already degraded, LDD continues with some vigour, and currently non-degraded lands remain vulnerable. If those vulnerable lands become degraded by human activities and anthropogenic climate change, they will in due course also adversely affect the available range of ecosystem services and the lives and livelihood of people.

1.3 What causes land degradation, and why?

Land productivity is exploited for biological products of economic value by pastoral, farming and agro-pastoral land users. The most important of these products is food. There are currently 1.3 billion pastoral, farming and agro-pastoral land users (19% of the world's population) who produce food for themselves as well as for the other 5.7 billion people on earth (FAOSTAT, 2012).

Land users are often not satisfied with the natural production rate, especially where and when it is inherently low, as is the case for drylands. Historically, by forcing the land to produce more than its natural capacity allows, initial successes are often followed by protracted failures, with inevitable decline of productivity. Pastoralists cause this by increasing stocking rates so that forage consumption is faster than the regeneration of vegetation. Vegetation removal aggravates land's vulnerability to erosion, thus depleting soil productivity. Similarly, farmers seeking crop yields beyond the land's natural capacity, use mechanical tillage, supplemental irrigation and harvesting practices with heavy machinery and residue removal that gradually weaken the renewability of soil resources. Both pastoralism and cultivation often fail to balance the demand of primary productivity and the natural supply provided by the ecosystems. Inappropriate uses of land for agricultural production, particularly on steep slopes and near watercourses as well as soil mismanagement and ineffective soil conservation techniques result in reduced food production as well as the loss of naturally regulating ecosystem services, thus severely impacting the physical and cultural well-being of all dependants on these services.

Thus while their activities generate a sustained provision of food and other products, in many areas of the world these practices result in various degrees of LDD. By definition, this means that the land is being used unsustainably in the long term.

The reasons that people engage in activities that cause LDD are many and varied. They include pressure to increase productivity of land for generating food for both subsistence and commercial interests, as well as for forestry and a range of other purposes. Cultural factors also operate: unsustainable land management practices built up over generations have often become part of the cultural fabric of traditional pastoral and farming communities.

Land degradation in the form of desertification affects significant tracts of drylands to some degree (Reynolds et al., 2007), with some impacts on food and water security as well as forests. Drylands cover 41% of earth's land surface and are home to approximately 38% (2.7 billion) of the current global population of 7 billion. The principal characteristics of soils of dryland regions are coarse texture, low soil organic matter (SOM) content, low water and nutrient retention capacities, low inherent soil fertility, and low soil resilience, which jointly make drylands vulnerable to LDD.

Most lands, however, can produce biological products of economic value at an average constant rate as long as the renewability of the natural resources required for the production process is not compromised. The downward spiral of LDD should be reversed and productivity enhanced by pursuing SLM. Without the introduction of regulatory, planning and zoning frameworks which

govern people's unsustainable land uses, and without effective controls and sanctions to force changes in behaviour, and without awareness towards stewardship and ethics, there is little to stop such activities from continuing to cause LDD, and the downward spiral becomes more difficult to reverse.

1.4 Food security, water security and LDD

There is a close link between food insecurity and LDD, both reinforce each other. While the global land area affected by LDD is increasing, food security and water security have also become significant issues in recent years, and are highlighted as part of the attainment of the MDGs. The FAO Committee on Food Security estimates that “more than a billion people, one in every seven human beings, may be suffering from food insecurity (FAO 2012). A good deal of effort has gone into improving caloric intake and nutrition, especially for children, in the attempt to meet MDG of alleviating hunger ((see Scaling Up Nutrition Road Map (2010) and Scaling Up Nutrition (2012))

Food security is attained “when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life” (World Food Summit 1996; FAO 2012). It includes food availability, food access, food quality, food safety and use. A large proportion of affected people are located in regions prone to LDD. A close link exists between food security of human and that of livestock raised for food production (e.g. dairy products and meat).

The concept of food security can also involve water security. This refers to “the sustainable use and protection of water systems against floods and drought, sustainable development and use of water resources, and safeguarding of and access to water functions and services for humans and the environment” (Schultz and Uhlenbrook, 2007). The number of water-insecure countries may increase to 30 by 2030 (Rosegrant, 1997; Webb and Iskandarani, 1998; WHO, 1998). The per capita availability of fresh water resources is particularly limited in regions prone to LDD.

1.5 Gender and LDD

Part of the debate concerning food and water security relates to the differing roles of women and men in pastoralism and agricultural work. While these differences are of significance in all regions, they are particularly important in drylands. In drylands, if land degradation and consequent decreasing productivity forces men to travel away for alternative employment there is added pressure placed on women in taking over men's roles in addition to the burden to sustain their families that they already carry. It is also recognized that women in dryland areas are the primary custodians of indigenous knowledge systems and have a deep understanding of their natural environment, knowing the best trees for fuel, medicinally useful plants, water sources and the best conditions for growing local crops (UNEP 2012). The preamble to the Convention to Combat Desertification specifically recognizes the important role played by women in regions affected by desertification and/or drought. The “Draft advocacy policy framework on gender” prepared by the UNCCD (UNCCD 2012) also recognises that the integration of gender issues within the implementation of UNCCD should be encouraged by the proposed policies on gender mainstreaming (UNCCD 2012). Clearly the empowerment of women farmers and their participation in the sustainable use of soils requires wider recognition, including in national legislation on soil (Hannam and Boer 2004).

1.6 Criteria of risk to be used for avoiding further degradation

Some key biophysical parameters to assess the adverse impact of human-caused LDD on ecosystem services and the environment are hydrologic balance, soil quality, net primary production, and vegetation cover. The hydrologic balance, a key determinant of water security, is influenced by land use and management. Soil quality, the basis of food security, is influenced by SOM and clay contents as they impact structure and elemental cycling and transformations. Net primary production and vegetation cover are determined by the hydrologic balance, soil quality, micro and meso climate and related anthropogenic perturbations. These parameters must be monitored credibly and periodically to assess the direction and magnitude of LDD.

Soils of high fertility are finite in areal extent in dryland regions. The downward LDD spiral is set in motion and accelerated by depletion of SOM content, reduction in soil structure, crusting, compaction, surface runoff, and accelerated erosion by water and wind. These processes reduce soils capacity to hold water and nutrients, and are aggravated and strongly driven by extractive farming practices. These include removal of crop residues, excessive tillage, and little or no application of manure and fertilizers, and excessive and uncontrolled grazing on poorly managed grazing lands. To reduce LDD and to stop its downward spiral, agricultural land use should ideally be progressively restricted to semi-arid and dry sub-humid regions, those of higher rainfall, and on relatively fertile soils compared to those of arid and hyper-arid areas. The fact that relatively fertile soils and regions with high rainfall are scarce or rare in many regions due to their climate and soil constraints makes LDD a serious threat to humanity and its wellbeing.

1.7 What are the consequences of business as usual?

If scientific predictions are correct in relation to the contraction of agricultural land caused by LDD, it is inevitable in many countries that poverty rates would increase and food security would decline. In the worst case scenarios, famine and widespread starvation would result. Long-term inappropriate forestry practices, especially in tropical countries where unsustainable logging of native forests takes place, and the continued use of fire to clear forests will lower productivity of forests on which the livelihood of their users depend, and hence further aggravate poverty. Declining productivity would lead to economic and political unrest and destruction of the social and cultural fabric of society in many more countries. Global peace could also be threatened because of food and water insecurity.

The report *OECD Environmental Outlook to 2050* notes that without new policies: “To feed a growing population with changing dietary preferences, agricultural land is projected to expand globally in the next decade to match the increase in food demand, but at a diminishing rate. A substantial increase in competition for scarce land is expected in the coming decades” (OECD 2012b). The following sub-sections elaborate on specific ominous outcomes resulting from Business As Usual with respect to LDD.

1.7.1 MDGs and Sustainable Development Goals

There are three MDGs directly relevant to the setting of targets for ZNLD:

MDG 1 is entitled “Eradicate extreme poverty and hunger”. Target 1.A aims to “Halve, between 1990 and 2015, the proportion of people who suffer from hunger”, and Target 1.C aims to

“Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day” (UN, 2010).

MDG 3 is entitled “Promote gender equality and empower women”. While the targets under this do not specifically focus on women in pastoralism and agriculture, their role in these activities is acknowledged in statements from UNDP (which administers the MDGs), recognising that rural women in developing countries have the primary responsibility for cultivating crops, raising livestock, collecting water and firewood, and caring for families.” (Clark 2012).

MDG 7 is entitled “Ensuring Environmental Sustainability”. Target 7.A aims to “Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.” In accord with the goals of ZNLD, the promotion of sustainable land management would advance MDG 7.

Target 7.B of MDG 7 aims to “Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss”. Given that the 2010 target for a significant reduction in the rate loss of biodiversity was not achieved, and recognizing soil as the fundamental basis for terrestrial biodiversity, programs substantially arresting LDD would, both directly and indirectly, contribute to reducing the rate of biodiversity loss.

MDG 8 is entitled “Develop a Global Partnership for Development”. Its Target 8.B addresses the special needs of least developed countries (LDCs). Many of the LDCs suffer from the worst LDD.

Target 8.F aims “In cooperation with the private sector, make available benefits of new technologies, especially information and communications.

It is argued here that setting and achieving ZNLD targets, crucial in themselves, will also contribute the achievement of the MDG targets. ZNLD programs of action, designed and prepared on a cooperative basis could address the needs of all LDD-affected countries, regions and sub-regions in terms of providing funding and capacity building to introduce agricultural practices geared towards reducing land degradation while advancing food security and ecosystem services. As existing programs have not been effective, there is an urgent need for a paradigm shift in addressing LDD.

1.7.2 Migration, environmental refugees, poverty and social and political unrest

Human-induced LDD as well as the effects of climate change have forced large numbers of people to move from degraded land to other land within the country (sometimes referred to as internally displaced persons), or to cross borders in order to resettle in other countries. Three different types of environmental refugees have been identified. They include those displaced temporarily due to local disruption such as an avalanche or earthquake; those who migrate because environmental degradation has undermined their livelihood or poses unacceptable risks to health; and those who resettle because LDD has resulted in loss of land or because of other permanent and untenable changes in the habitat (Jacobson, 1988). There are vastly increasing numbers of environmental refugees resulting from many causes, desertification included (Brown 2009). While factors other than LDD, such as political and religious/ethnic animosity play a role in some of these migrations, the fundamental issue remains that the sheer pressure of poverty and loss of livelihood, often caused by LDD and the scarcity of non-degraded productive land, necessitates mass migration, and will do so into the foreseeable future. Furthermore, migration itself has created enormous hardships - more poverty, loss of identity, culture, access to

ecosystem services and in some cases, loss of life. It has also created major political upheavals and marginalisation, and imposed economic and social stress in the refugees' host countries while also creating more pressure on their lands. In those regions where mass migration is directly linked to unabated LDD, the setting of ZNLD targets is especially urgent.

1.7.3 Climate and the effects of climate change

Global warming and other climate change events exacerbate land degradation through increased dryness, extreme events such as severe storms and floods and increased frequency and intensity of droughts. This intensified LDD depletes soil organic carbon storage resulting in increases in greenhouse gases in the atmosphere. Also, the LDD-linked reduced productivity impairs atmospheric carbon fixation into deposited organic matter. These two processes combined - increased emissions and reduced sequestration further exacerbate climate change. This feedback between LDD and climate change can be devastating, and underlines the importance of effectively addressing LDD (Lal et al., 2012).

Given these ominous interlinkages of LDD and climate change, the UNCCD aims to address LDD and drought in climate change negotiations and UNFCCC implementation processes, pursuant to Article 8 of the UNCCD, to coordinate with other conventions. Similarly, the 2012 Conference of the Parties to the Climate Change Convention (UNFCCC COP 18) will address the issue of agricultural soils and climate change (IICA 2012).

1.7.4 Biodiversity

The major service of land and soil to people is the provision of food, and other ecosystem services required to sustain this provision. Interacting micro-organisms, plant and animal species, namely biodiversity, are closely engaged in the provision of all services (Safriel and Adeel, 2005). However, human impact reduces the land's plant cover with its rich biodiversity, which, among other benefits, provides for soil conservation. The eroded topsoil blows or washes away along with its biodiversity, whose recovery on the denuded land is impaired. This biodiversity loss means failure of plant nutrient recycling, soil conservation, soil moisture regulation, local climate amelioration, pest control, pollination, and ecosystem's resilience and stability. These combined lead to LDD, as well as to loss of many ecosystem services of significance at the local, regional and global scales. By introducing a comprehensive programme for achievement of ZNLD targets, the CBD's 2020 Aichi Biodiversity targets of "*ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded*" (Target 14), and "*the rate of natural habitats degradation and fragmentation is significantly reduced*" (Target 5, CBD, 2012), are more likely to be reached.

1.7.5 Forests

Forests ecosystems and cultivated ecosystems cover (in the year 2000) 30% and 24% of global land, respectively, but at earlier times more land was forested, and less land was cultivated. For example, in the last three centuries, global forest area has been reduced by approximately 40% (Shvidenko et al. 2005), much of which was converted to agricultural land. A further 10–20% of forest land (and grassland) is projected to be converted between 2000 and 2050, primarily for agriculture, mostly in dryland areas (Casman and Wood, 2005).

Forests provide ecosystem services that support both cultivated and natural ecosystems. Most important is water regulation services - around three quarters of the world's accessible freshwater comes from forested catchments, and much of this water is used for irrigating croplands, especially in drylands. The carbon sequestration services provided by forests (which contain about 20 % of the world's terrestrial organic carbon stocks, and their biomass constitutes a large proportion of terrestrial biomass) is critical for maintaining climatic conditions that support land productivity. Forests also regulate floods, which otherwise would have eroded fertile soil of croplands and rangelands. Further, forests provide habitats for species that pollinate and regulate pests of croplands and rangelands.

In a business as usual scenario, LDD of croplands and rangelands would drive expanding agricultural land at the expense of forests. This would make the projections of forest loss come true, such that the dwindling forests would not be able to provide critical services for supporting the productivity of expanding areas of cultivation, thus leading to their degradation. Thus, under business as usual, and at a global scale, LDD is expected to reduce forest cover, which would loop back to further increase LDD.

2.0 The Zero Net Land Degradation Target

2.1 What is Zero Net Land Degradation?

This report suggests that a new and explicit goal of sustainable development to be agreed at the Rio+20 Conference should be the reduction of the rate of land degradation to achieve land degradation neutrality, which is referred to as “Zero Net Land Degradation” or ZNLD. Zero Net Land Degradation means the achievement of a state of land degradation neutrality. Achieving it involves a combination of reducing the rate of further degradation of land and offsetting newly occurring degradation by restoring the productivity and other ecosystem services of currently degraded lands. The ZNLD is best achieved by the introduction and promotion of SLM practices on a global basis. In effect, this means reducing land degradation globally to negligible levels while also restoring the quality and productivity of degraded lands.

The UNCCD's submission to Rio + 20 states:

Rio+20 will provide a rare opportunity to redefine what we mean by economic success and growth, and to draft a roadmap for the short- and long-term future. The economy must go green in many respects, also through enhancing land management practices. [The] message for Rio+20 is clear: There exists no other option in the long run – the world has to become land-degradation-neutral. The international community must set itself a development goal which calls for sustainable land use for all and by all in agriculture, forestry, energy, with two main targets: Target 1: Zero net land degradation by 2030; Target 2: Zero net forest degradation by 2030 (UNCCD, 2011a).

The objective of this report is to explain and justify the need for setting a Zero Net Land Degradation target, and to suggest ways in which it can be achieved. To this end, a tentative roadmap is included as part of the recommendations of the report.

2.2 The rationale for the ZNLD target

Setting a 2030 target of ZNLD seems ambitious, yet it is achievable. Its rationale is based on solid observations of the current state of global LDD. First, time-series of satellite images backed by ground truthing have detected areas where previously non-degraded land has recently become degraded. It is clear that globally, land is currently experiencing a positive rate of degradation. Furthermore, since the known drivers of degradation are still in place (see sections 1.3 to 1.6 above), and are projected to persist (Adeel et al., 2005), the expansion of the area of LDD is projected to continue (Adeel et al., 2005) such that the area of additional degraded land will continue to accumulate (Lepers et al., 2005). Nevertheless, the fact that much of the land which is being continuously used for protracted periods does not become degraded means that practices for using lands sustainably are available; hence the positive rate of LDD can be slowed down.

Second, even though the precise spatial dimension of the area of LDD is not agreed on (Wessels, 2009), it is undisputed that degradation prevails in many areas (Safriel and Adeel, 2005). Here again, a number of well-studied cases, in both drylands (Fatonji et al., 2006) and non-drylands (Macedo et al., 2008) demonstrate that degraded soil can be rehabilitated and land productivity can be restored. These two observations combined suggest that the prevailing positive rate of LDD can be technically offset and even exceeded by a positive rate of restoring degraded land. Hence, while completely halting LDD by 2030 may be difficult in some areas, setting a target of ZNLD by 2030 is realistic if some of the degraded lands can be restored through market and non-market incentives.

Thus, ZNLD can be achieved by reducing the rate of degradation and restoring already degraded land such that the global area of productive land would remain stable, by ensuring that the rate of restoration offsets the rate of LDD. In other words, operationalizing ZNLD would be expected to maintain the current area of globally productive land and thus the currently prevailing levels of global land productivity. Achieving this would be a significant success. Furthermore, it could even be hailed as a great success, if restoration levels increased at a faster rate than that of degradation of ecosystem services. Eventually, once the rate of global degradation reaches zero, intensified rates of restoration would nullify degradation, thus replacing a world of neutral land degradation with one of no degradation processes and no degraded land – an ultimate expression of sustainable land productivity at a global scale. However, the projection of continuing growth of global food demand along with population growth means that achieving a 2030 ZNLD will be even more challenging, as it implies intensifying the yields from currently used lands without degrading these lands, and/or without expanding the agriculture frontier to lands that are not subject to agriculture and pastoralism (i.e., forests, savannahs, grassland, semi-deserts and deserts).

This report argues that a 2030 ZNLD target can only be achieved by a widespread agreement on a globally coordinated regional and national development and implementation of restoration and SLM programme, backed by a protocol on ZNLD to be elaborated under the UNCCD. This report recommends such a protocol, already suggested in the UNCCD submission to Rio+20 (UNCCD 2011b); see also further below.

3. How can ZNLD be achieved?

3.1 Building on CBD, UNFCCC and poverty alleviation targets

The international community has already agreed to set several long-term outcome-oriented targets for achieving sustainable development, through reducing biodiversity losses, mitigating climate change and alleviating poverty. The CBD 2010 Biodiversity Target, to “achieve by 2010 a significant reduction of the current rate of biodiversity loss” which is also reflected in Target 7.B of MDG 7 (“Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss”, see above) - has been missed (UN, 2010). As a result, the CBD has set the “2020 Aichi Biodiversity Target”. Rather than simply sticking to the 2010 target indicators that addressed assets - the size of areas receiving legal protection and the number of species at the endangerment status - the 2020 target indicators address processes, such as the links between loss of biodiversity and drivers of LDD, leading to loss of ecosystem resilience, and loss of ecosystem services, and their impact on human well-being, as well as the contribution of biodiversity conservation “to climate change mitigation and adaptation and combating desertification”.

UNFCCC COP15 addressed emissions by setting the “2-°C Target” to be achieved through halving emissions relative to 1990 by year 2050. The indicators to be monitored are GHG emissions rates and forest area changes as the result of afforestation offsetting deforestation. However, the combined pledged emissions to date would not contribute to achieving this target; On the contrary, based on these pledges, warming is likely to exceed 3°C by 2100 (Rogelj et al., 2010). Attaining ZNLD has the potential to further contribute to reducing atmospheric GHG concentrations, thus expediting achievement of the 2-°C climate target through arresting further degradation and sequestering carbon in soils and vegetation by restoring already degraded land.

However, while current programmes for addressing LDD can assist with the biodiversity, climate change and poverty targets, it is proposed that a globally agreed, quantitative sustainable development target for the achievement of ZNLD is required to further enhance the management framework. Setting such a global target can help shape expectations and create the conditions for all stakeholders to assess progress and take appropriate action in addressing LDD. The ZNLD target would also expedite achieving the other targets already in place. Lessons learned from the operation of these targets can also assist in effectively operationalizing the 2030 ZNLD target and regional and national ZNLD targets.

3.2 Setting ZNLD Targets

If the continuing loss of productive land can be offset by restoring already-degraded land, so that the annual rate of restoration equals the annual degradation rate, then ZNLD is attained and the area of global productive land will remain stable. Reaching ZNLD targets nationally, regionally and eventually globally would secure the continuing availability of productive land for the use of present and future generations. Two mechanisms can arrest the continuing decline in land productivity. One is to manage currently non-degraded productive lands in ways that prevent or minimize LDD, thus controlling further loss. The other is to restore already degraded land. These are onerous but feasible tasks, which can be achieved through the implementation of strict sustainable land management regimes.

The modalities of setting an overall ZNLD global target for the year 2030, together with regional and national targets will need to be specified through scientific studies and the development of policy, underpinned by appropriate legal mechanisms coupled with awareness creating programs for stewardship of land resources. These will need to be backed by the suggested ZNLD Protocol. The targets will need to be negotiated over a period of time with individual countries and, where appropriate, regional intergovernmental environmental programmes. These tasks fall within the mandate of the Committee for the Review of the Implementation of the Convention (CRIC) working in collaboration with the Committee on Science and Technology (CST) and relevant experts in science and law. Setting these targets may encounter a number of objections on political and economic grounds, and it will be the work of these bodies to generate the documentation to justify the overall 2030 ZNLD target and the regional and national targets. These scientific and policy development processes are part of the tentative roadmap elaborated in the final section of this report.

3.3 Arresting further degradation

3.3.1 Sustainable Land Management:

The SLM is defined as a knowledge-based combination of technologies, policies and practices that integrate land, water, biodiversity, and environmental concerns (including input and output externalities) to meet rising food and fibre demands while sustaining ecosystem services and livelihoods (U.N. 1987; Wood and Dumanski, 1994; World Bank, 2006). In the context of ZNLD, the SLM options are defined as those land use and soil/vegetation management practices which create a positive carbon, water, and elemental/nutrient balance in the used land, enhance net primary production, mitigate climate change by absorbing atmospheric CO₂ and sequestering it in biomass and soil. In drylands, an important SLM technology is the one that produces stable agronomic yield even in bad, mainly drought, years rather than the best yield only in good years. In addition, SLM must enhance resilience, which can be jeopardized with a myopic focus on maximizing production in the short term.

While the principles and practices of SLM are known and widely recognized, LDD continues to be a major global threat. Therefore, SLM techniques are either not being adopted, or have not been as effective as perceived. The problem of slow adoption of SLM can be addressed through the implementation of the strategy of ZNLD because SLM is also a key to achieving the goals of UNCCD, and its sister conventions (UNFCCC and CBD, see also, Dudley et al., 2009).

3.3.2 Avoiding degradation of non-degraded lands

With harsh climate and fragile soils, new LDD is driven by human activities which disturb the delicate but dynamic equilibrium between soils, water, vegetation, and climate. The major measure to reduce LDD in drylands is to recognize that their productivity is inherently low, and most efforts to increase it, if carried out carelessly, will bring about degradation. Thus, rather than bringing new land under managed ecosystems, productivity must be enhanced from land already devoted to agricultural production.

Drylands, by their nature, are water and plant nutrient resource-limited. Therefore, the goal in achieving ZNLD in drylands is to pursue three aims for sustainability enhancing resilience, and reversing the downward spiral from LDD back to restoration. These aims can be achieved through: (i) improving the supply of soil water in the root zone and also increase water productivity (ii) enhancing soil quality with reference to plant available water and nutrient retention capacities, and (iii) creating positive ecosystem C and nutrient budgets. Decreasing water losses by runoff and evaporation is critical to enhancing and sustaining productivity. Thus, the importance of water harvesting and recycling to minimize risks of agronomic drought by increasing the storage of green water cannot be over-emphasized. However, it is also important to recognise the inter-related socio-economic aspects (UNCCD and UNU 2012 Chapter 28.4), including land tenure and rights, gender issues, access to market and credit, social equity, and institutional support.

While enhancing productivity from land already under production through land restoration, laws and policies and educational programs must also be in place to protect/preserve natural ecosystems against unauthorized cutting of firewood, grazing, etc. Protection and enhancement of vegetation cover are essential to erosion control. Afforestation of denuded lands with adaptable species is essential to conserving soil and water and strengthening nutrient cycling. In addition to trees, some grasses are also highly adapted to dryland conditions. Establishment of trees, grasses and other adaptable species can be facilitated through payments to land managers for ecosystem services they promote and conserve, such as carbon sequestration, water quality improvement and biodiversity enhancement (see Payments for ecosystem services 3.4.4, below). Value addition of farm produce, through local and community based industrial innovations, can create another income stream and also advance the MDG of alleviating poverty while minimizing the risks of post-harvest losses and volatility of the market.

3.4 Restoration/rehabilitation options

3.4.1 Success Stories

There are several promising examples of success cases with reference to SLM options (Schwilch et al., 2011) which can be applied to achieve ZNLD. The World Overview of Conservation Approaches and Technologies (WOCAT) has been operational since 1992 as a global network of SLM specialists. It has a focus on improving the knowledge base on the global application of SLM and reducing LDD. The focus of WOCAT is on local solutions to global problems, which can significantly contribute to achieving ZNLD (see for example Liniger and Critchley 2007).

3.4.2 Criteria and thresholds

Achieving ZNLD using the above WOCAT and other established approaches requires establishment of monitoring and reporting mechanisms and the establishment of credible databases on the current rates of LDD by different processes (e.g., erosion, salinization, depletion of soil organic matter and nutrient pools, reduction in green water capacity, and provision of crops and other products of economic value). Thus, it is important to establish critical limits or threshold levels of soil properties, “green water” supply, vegetation cover, carbon stocks, hydrologic balance and nutrient budgets, etc. beyond which productivity and other ecosystem

services are severely jeopardized. Pre-established threshold levels are needed for assessing the extent and severity of LDD and the effectiveness of restoration measures.

3.4.3 Community-based and traditional approaches

In many regions there is an increasing realization that local communities have an important role to play in environment management. The use of customary SLM practices, both in forested areas and in agricultural and pastoral regions, officially supported by government programmes and by local community participation, as well as regulatory frameworks, have the potential to reduce the causes and effects of LDD processes, and therefore contribute to ZNLD. Lessons can be learned from jurisdictions that have engaged in various community-based activities for SLM as well as water management. Local natural resources conservation groups such as the land care movement in Australia (Landcare, 2012); <http://www.landcareonline.com.au/>) are one such example which could be adapted for other LDD-affected countries.

3.4.4 Payments for ecosystem services

Payment for ecosystem services (PES) is an economic, market-based approach for sustainable management of ecosystem services. Since LDD is expressed by declined economic productivity, which is caused by, but also linked with, degradation of a suite of most other ecosystem services, PES can be an appropriate tool engaged in preventing degradation of non-degraded land, and even more effective in supporting restoration of already degraded land. Though in use since the wake of the American Dust Bowl (paying farmers to avoid farming on land with high degradation risk) (Burke et al., 1995), the PES instrument is still in its infancy, especially in its application to address LDD though it is rapidly developing in theory and practice. The market-based tool can be used either as: (1) economic incentives, or (2) as performance payments. The latter can be made conditional on achieving a well-defined action or outcome.

The flow of ecosystem services often crosses boundaries at various scales, from farm to district, national, regional and global. Therefore, beneficiaries of ecosystem services are often located away from the ecosystem that provides the services. These services are therefore of a status of "public goods". However, if their provision is intentionally amplified by the owner of the providing ecosystem, then a scheme of PES can be established, in which the beneficiaries pay to the owner/user of the providing ecosystem, a payment that *at least* compensates the cost for the provider. Depending on governance and the social system structures, the payments can be provided by individuals, communities, local government, national governments or even international institutions. The emerging carbon trading system is an example of a payment for ecosystem services scheme, in cases when the service is sequestration of carbon by ecosystems, or reduced emissions through arresting LDD.

Land users can benefit from PES schemes for doing something or for not doing. A farmer that adopts certain SLM practices for reducing the risk of LDD is not eligible for payment for ecosystem services. But if the farmer maintains vegetation cover beyond the requirements of the farm but for promoting rainfall penetration to the aquifer that is used by farmers miles away, yet this maintenance of vegetation cover has a cost, the farmer may be entitled for PES from the beneficiaries of the water, and also from beneficiaries at the global level, for the added C sequestration. Since this maintenance of vegetation cover also reduces LDD risks, the PES

scheme also promotes reducing the LDD rate. Payment for ecosystem services can be also used for *not* carrying out specific activities. Farmers can reduce pesticides use, thus reducing pollinators' mortality and hence promoting pollinator biodiversity but bear the cost of increased pest damage, i.e. there is no added cost, but there is a production loss. Hence the PES scheme would provide these farmers with another income stream and incentives to promote adoption of land restorative measures (though this approach for compensations is controversial, (see Farley and Costanza, 2008).

Payment for ecosystem services can be also used to restore abandoned degraded lands once the degradation driver is identified and the PES scheme is constructed to include these drivers. PES can be most effective in restoring degraded lands by paying land users for managing these lands not for restoring their productivity of economic value, but for restoring the natural ecosystems that preceded the cultivated ones. Such ecosystem reconstruction would sustain provision of ecosystem services to people at the local, the national, regional or even global scale. These would pay the land owners for restoring the natural productivity of their land, which would support provision of regulating and cultural services that are otherwise in short supply, but of need to their beneficiaries. Similarly, farmers that degrade their land will be paid for not deserting their land for encroaching upon non-cultivated productive land, and for restoring the productivity of their degraded land. The PES scheme would therefore compensate them for the cost of restoration, which is higher than the cost of cultivating previously unused land. PES may therefore constitute a powerful tool for both reducing degradation and restoring already degraded land, i.e., for attaining ZNLD.

4.0 What needs to be done?

4.1 Developing implementation mechanisms and instruments

Since what cannot be credibly measured cannot be adequately managed (Edwards Deming, 1900-1993), ZNLD cannot be realized without establishing monitoring mechanisms and setting milestones. This will provide policy and decision makers with credible information on the extent and severity of LDD, and on whether the adopted recommended strategies have been effective.

The monitoring mechanisms must be based on integrative geospatial approaches because land characteristics are spatially featured (heterogeneous) and complex (human and environmental dimensions). Thus, for supporting the policy and legislative processes for achieving ZNLD the geographic information science and technologies (e.g., geographic information system (GIS)), and remote sensing techniques can play an important role in a ZNLD mechanism (Buenemann et al., 2011).

Setting milestones with reference to baseline is essential to assessing the impact and the progress being made. For achieving ZNLD, the milestones can be established on national or eco-regional (biome) bases. Milestones can be set for specific rates of change over specified periods (i.e., the 10 year strategic plan) in several, different but relevant attributes. These can include specific LDD processes such as erosion by water and wind, salinization, vegetation/land cover, and the decline in net primary production; the increase in proportion of the land with the desired vegetation/canopy cover (e.g., 25%) or reduction in area prone to wind or water erosion, and salinization, The advice developed by the Committee on Science and Technology (UNCCD

2011 Decision 19/COP.10) on how best to measure progress on strategic objectives 1, 2, and 3 of the 10-year strategic plan and framework to enhance the implementation of the Convention (e.g. an indicator of success such as the proportion of the population in affected areas living above the poverty line) should be taken into account in this context, and are included in the suggested roadmap for the achievement of ZNLD.

4.2 Legal and policy instruments

The technical processes for ZNLD set out above, to be properly implemented, needs to be backed by national policy and legislative instruments. In many countries, national and sub-national legislation addressing LDD, where it exists, is generally aimed at mitigation of soil erosion and soil degradation and methods to conserve soil resources. Land restoration and soil conservation law, and, in some cases, law relating to LDD, are managed by a variety of national institutional systems that have the administrative authority over land and soil. (Hannam and Boer, 2002; Boer and Hannam, 2008). At the national level, soil conservation applies to a body of law enacted by a legislature, e.g., an act, decree, regulation or other formal legal instrument that is legally enforceable, and can include agreements or covenants between government and private landowners which are expressed to be legally binding. The instruments can cover the areas of soil conservation, carbon sequestration, soil security, soil protection, water conservation and land rehabilitation, land tenure and other human dimensions issues. They are generally characterized by provisions to mitigate and manage soil erosion and soil degradation and methods to conserve soil resources. Soil conservation law is managed by a variety of national institutional systems that have the administrative authority over soil. Much of this law is inadequate to deal with the increasing demands placed on land and soils from agriculture and pastoralism (Hannam and Boer, 2002; Hannam and Boer 2004), which needs to be addressed.

If the UNCCD Conference of the Parties were to further engage with the concept of ZNLD, with a view to implementing it globally, a protocol aimed at achieving ZNLD could be developed. Such a protocol would be the primary driving mechanism for ZNLD as a whole and could incorporate the setting of ZNLD national targets by individual countries, for example as a percentage of arable land in their jurisdiction or regions within their jurisdiction. The national targets would feed into the overall 2030 ZNLD target.

A ZNLD protocol could also contain provisions to promote stronger synergies derived from joint implementation of the UNCCD and the CBD, the UNFCCC, and addressing the MDGs. In relation to the CBD, the protocol could recognize the fact that land, and in particular soil, supports a vital part of terrestrial biodiversity. In relation to the UNFCCC, the protocol could recognize, among other things that, in addition to the vegetation, soil contains a high percentage of terrestrial C stocks, and that land degradation processes should be reversed or at least put into neutral for this particular reason. In relation to MDGs, ZNLD could address its Target 8.5 by encouraging the private sector to design and develop new machinery and other technologies which would promote the reduction of LDD of agricultural and pastoral activities. Similar synergism exists for other MDG targets (see sections 1.8.1).

4.3 Role of private sector, farmer organizations and non-government organizations

Non-state actors, including companies and non-government organizations (NGOs) can play a major role in promoting ZNLD. In particular, corporations engaged in large-scale agricultural and pastoral activities could be encouraged to employ on-the-ground techniques and the development of new agricultural machinery designed to promote ZNLD. Such activities would, among other things, send the right market signals to corporate customers that the business was engaging in sustainable “green” practices, as part of its corporate social responsibility. Farmers’ cooperatives and national and sub-national farmers associations could be encouraged to utilize SLM practices to achieve ZNLD. In addition, conservation organizations at both the national and local level could engage in capacity building and technology transfer (where appropriate) with farmers and local farming communities through the conduct of workshops and the preparation of literature promoting ZNLD. Discussion of traditional farming knowledge could also become a valuable part of such endeavours. The private sector and civil society could use the ZNLD concept for implementing land restoration and SLM options which have not been accomplished under the business as usual scenario. Two examples where private sector may be involved are: (1) The Global Partnership on Forest and Landscape Restoration, and (2) The Bonn Challenge – a global effort to restore 150 million hectares of lost forests and degraded lands by 2020 – launched in September 2011 (CBD 2011). The private sector and NGOs may also be actively involved in educational programs which enhance awareness about LDD and encourage stewardship of the finite and fragile resources on moral and ethical basis. In this regards, even the religious and cultural organizations could play a very constructive role.

4.4 Establishing a science-policy interface: Intergovernmental Panel on Land and Soil

The seriousness of the effects of LDD demands the same degree of attention from the scientific and policy community as the issue of the effects of climate change demands under the UNFCCC and loss of biological diversity under the CBD at regional, national and international levels. Similar to the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) that support, *inter alia*, policy-making of the UNFCCC and the CBD, respectively, this report suggests that an Intergovernmental Panel on Land and Soil be established, through a UN-backed negotiation. Such science-policy interface would support land-related policy making, and especially implementing the ZNLD objectives. Such a body has been discussed over a number of years, most recently at COP 10 (“Measures to enable the United Nations Convention to Combat Desertification to become a global authority on scientific and technical knowledge pertaining to desertification/land degradation and mitigation of the effects of drought” ((see Decision 20/COP.10 (UNCCD 2012), and Gnacadja and Stringer, 2012)).

4.5 BioCarbon and other existing funds

The BioCarbon Fund of the World Bank and other initiatives (e.g., The Green Carbon Fund of the UNFCCC) are useful to scale up the provision of long-term financing for developing countries. These market-based approaches could be used to strengthen synergism among on-going programs and develop an integrated approach to implementing ZNLD. Such a cooperative approach of integrating with existing funds could further the goals of ZNLD by supporting programs and projects aimed at large and small scale to reduce the rate of LDD, through the

development of regional and national legal and policy instruments, outreach programs, extension services and capacity building.

5.0 Expected outcomes, cost of inaction vs. cost of ZNLD

Whilst it is difficult to predict the cost of inaction, as opposed to the cost of introducing programs for ZNLD, the annual economic cost of LDD on a global basis is clearly unacceptable (Nkonya et al., 2011). The introduction of large-scale and long-term programs for the achievement of ZNLD would be hundreds of millions of dollars if those programs were to be adequately carried out. However, *not* to strongly promote ZNLD would, in the long term likely to be more costly than the costs of promoting it. In addition, countries with high populations and low agricultural productivity due to LDD, combined with reduced availability of arable land will accelerate the rate of purchase of large tracts of agricultural land from other countries (now known as land grabbing). This would further exacerbate LDD and its resulting civil strife and political unrest in the host countries, which are often developing countries whose domestic agricultural base may be barely adequate to supply sufficient nutrition to their own citizens,

The OECD report Environmental Outlook to 2050: The Consequences of Inaction (OECD 2012) states, in relation to a wide range of environmental issues: *“The costs and consequences of inaction are colossal, both in economic and human terms. These projections highlight the urgent need for new thinking. Failing that, the erosion of our natural environmental capital will increase the risk of irreversible changes that could jeopardise two centuries of rising living standards. The present era is already witnessing the catastrophic collapse of some fisheries from overfishing, and severe water shortages damaging agriculture. However, these enormous environmental challenges cannot be addressed in isolation. They must be managed in the context of other global challenges, such as food and energy security, climate security and poverty alleviation”*.

While a detailed consideration of the economic aspects of ZNLD are beyond the scope of this report, this statement reflects the need to urgently adopt a ZNLD target in terms of the economic costs of inaction on LDD, particularly in light of the push for a Green Economy within the Rio+20 process.

6.0 Conclusions

There is a wealth of available knowledge on SLM, measuring and monitoring approaches, and policies etc. which is awaiting implementation in regions affected by LDD. Regional problems of LDD need to be effectively addressed by land managers, technicians, researchers, policy makers and local communities of the regions affected. Because local communities understand social, cultural, ethnic, political and environmental factors, LDD can only be addressed by their close participation and cooperation. Community and policy makers must be prepared and motivated, responsive to societal/community needs, and passionate about human wellbeing, land ethics and stewardship. Furthermore, LDD is a global issue and can only be addressed in a global context rather than in isolated or disjointed initiatives. Building bridges across nations through a common global agenda is critical to addressing LDD. The increasing global population, exacerbating risks of LDD, decreasing per capita agricultural land area, and increasing scarcity

of renewable fresh water supply necessitate the implementation of ZNLD program at local, regional, national and international levels.

The conceptual basis of this report is the severity of global issues confronting humanity in the 21st century:

- the current world population of 7 billion is increasing at the rate of 75 million/yr and projected to reach 9.2 billion by 2050,
- the number of food insecure people of 1 in 7 is increasing in developing countries of Asia and Africa,
- the rate of emission of GHGs is increasing due to fossil fuel combustion, deforestation, land use conversion to agro-pastoral systems, and LDD,
- the per capita availability of fresh water is decreasing,
- the rate of biodiversity loss is increasing, and
- the risks of political instability and civil strife are increasing.

These problems will be exacerbated by the continuing processes of LDD. It is clear that achieving ZNLD is essential to human wellbeing, and the time to act is now. The recommendations below suggest legal, policy and institutional changes aimed at facilitating ZNLD on a global scale.

7.0 Recommendations

7.1 Protocol to the UNCCD on Zero Net Land Degradation

Achieving ZNLD on global scale requires a primary driving mechanism. It is recommended that a legal instrument, entitled the Protocol on Zero Net Land Degradation, be negotiated under the Convention to Combat Desertification. Such a mechanism was also suggested in the UNCCD submission to Rio+20 (UNCCD 2011b). The provisions of the Protocol should, among other things, facilitate:

- (i) The development and implementation of policies for ZNLD which promote SLM through an interactive program with the Framework Convention on Climate Change and the Convention on Biological Diversity;
- (ii) The incorporation of emerging economic instruments, such as PES (i.e. carbon sequestration, water conservation) to be used in preventing degradation of non-degraded land, as well as supporting restoration of already degraded land;
- (iii) The creation of an Intergovernmental Panel on Land and Soil, an authority on scientific and technical knowledge, as well as policy support regarding LDD and the attainment of ZNLD; the mode of operation of the Panel should be similar to that of the Intergovernmental Panel on Climate Change and Intergovernmental Science-Policy of Biodiversity and Ecosystem Services;
- (iv) A strengthened role for the UNCCD's Committee on Science and Technology
- (v) The negotiation and setting of achievable and verifiable targets for ZNLD at Conferences of the Parties to the UNCCD under advice from the Committee on Science and Technology in cooperation with other initiatives such as the Global Soil Partnership of FAO, Rome, and the Global Soil Week/Global Soil Forum of IASS, Potsdam, Germany;

- (vi) The development of policies, guidelines and mechanisms for implementation ZNLD at national and regional levels;
- (vii) The provision of legal guidelines and models for national and sub-national policies to promote ZNLD; and
- (viii) Promotion of educational programs to enhance awareness about LDD and encourage participation of communities in land restoration on the basis of religious, cultural, moral and ethical basis.

7.2 The need for national legislation to implement the Convention and promote ZNLD

All countries should be encouraged to review their national and where appropriate, sub-national legislation in order to assess its adequacy in terms of the obligations under the Convention, in particular, pursuant to Article 5(e) of the Convention, and, in due course, its adequacy as a basis for meeting ZNLD targets under the proposed ZNLD Protocol.

7.3 Strengthening the Scientific Basis of Implementing ZNLD

Specific actions are required to provide the scientific basis of ZNLD with regards to the following:

- (i) The establishment of a global data base, and a protocol for measuring and monitoring on the extent and severity of LDD and its social, economic and policy impacts, at local, national regional and global levels;
- (ii) The identification of global LDD Hot Spots: (e.g., in the Sahel, Central Asia, Central America);
- (iii) The generation of pilot projects: in cooperation with key global institutions such as the FAO and its ‘World Overview of Conservation Approaches and Technologies’ among others ;
- (iv) Increasing awareness of and provide training on implementation of ZNLD ;and
- (v) Promotion of ZNLD actions by encouraging community involvement.

7.4 A roadmap for achieving Zero Net Land Degradation

The following is suggested as a tentative road map to be followed for the achievement of ZNLD by 2030:

A.2012-2013

1. Establish a process to facilitate preparation of a draft Protocol to the UNCCD on ZNLD.
2. Develop a Task Force to create data center on LDD in cooperation with other organizations, establish protocol for measurement and monitoring, and provide scientific basis for LDD and ZNLD.
3. Establish benchmark sites for implementation of SLM in regions among Global Hot Spots of LDD, and assess the impact of land restoration in terms of food security, poverty, and ecosystem services.

4. Create educational programs at the benchmark sites to enhance awareness about LDD and involve communities ,policy makers and NGOs in arresting LDD and restoring degraded lands
5. Make the ZNLD implementation a theme of third Scientific Conference of the UNCCD.
6. Conduct a scientific and policy global workshop focused on ZNLD and SLM under the auspices of the Committee on Science and Technology. This workshop would review the 10-year Strategic Plan and Framework to Enhance the Implementation of the Convention, with a view to introducing SLM as a global policy, and discuss the negotiating text for the proposed Protocol to the UNCCD on ZNLD produced through the process established under 1, above

B.2014:

7. Publish comprehensive report on the basis of workshop papers and findings, appending a draft of the proposed Protocol
8. Finalize draft protocol and publish to all governments and civil society organizations
9. Conduct negotiation meetings on the draft Protocol
10. Submit draft Protocol to the UNCCD on ZNLD to the Conference of the Parties to the UNCCD for adoption and opening for signature

C.2015-2020

11. The new Intergovernmental Panel on Land and Soil to develop technical guidelines to the Protocol on scientific, educational and legal issues to involve governments and communities in establishing long-term action programmes, pursuant to Article 5(e) of the Convention,
12. Further develop national, regional and sub-regional action programmes pursuant to Articles 9 to 14 of the Convention to include capacity-building on ZNLD and SLM;
13. Annual reviews of progress by the Committee for the Review of the Implementation of the Convention in conjunction with the Committee on Science and Technology on the ZNLD Target and report to UNCCD Secretariat.

D.2020

14. Conduct global review of progress on ZNLD Target, and adjust program and directions and strategies as necessary

E.2020-2030:

15. Annual review of progress on the ZNLD Target and report to UNCCD.
16. Conduct global review of progress on ZNLD and Sustainable Land Management, and adjust policy directions and strategies as necessary.

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