Land and health nexus (land degradation, drought, desertification, sand and dust storms, malnutrition, health implications, zoonosis)

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➢ Nearly 78 per cent of the world’s poor – approximately 800 million people – who live in rural areas, many of whom rely on agriculture, forestry and fisheries for their survival, are particularly affected from extreme weather, drought, flooding and other disasters

• The World Health Organization (WHO) indicates that, between 2030 and 2050, climate change is expected to cause approximately 250,000 additional deaths each year from malnutrition, malaria, diarrhoea and heat stress alone.
• According to the Food and Agriculture Organization of the United Nations (FAO), climate change is causing extreme weather, drought, flooding and other disasters, depriving millions of people around the world of a livelihood. The nearly 78 per cent of the world’s poor – approximately 800 million people – who live in rural areas, many of whom rely on agriculture, forestry and fisheries for their survival, are particularly affected.
• Without urgent action, climate change impacts could push an additional 100 million people into poverty by 2030, according to the World Bank.
• More than 2 billion people are currently living in countries with high water stress. Almost twice as many could be affected by 2050.
• The United Nations Children’s Fund (UNICEF) estimates that, by 2040, one in four children – around 600 million – will be living in areas of extremely high water stress.
• Extreme weather events were one of the main causes of the internal displacement of 28 million people in 2018, according to the Internal Displacement Monitoring Centre.

SOURCE: Frequently Asked Questions on Human Rights and Climate Change Factsheet No.38

➢ Air pollution kills an estimated 7 million people every year, while climate change causes more extreme weather events, exacerbates malnutrition and fuels the spread of infectious diseases such as malaria.

The climate crisis is a health crisis. Air pollution kills an estimated 7 million people every year, while climate change causes more extreme weather events, exacerbates malnutrition and fuels the spread of infectious diseases such as malaria. The same emissions that cause global warming are responsible for more than one-quarter of deaths from heart attack, stroke, lung cancer and chronic respiratory disease. Leaders in both the public and private sectors must work together to clean up our air and mitigate the health impacts of climate change.

SOURCE: https://www.who.int/news-room/photo-story/photo-story-detail/urgent-health-challenges-for-the-next-decade
COVID-19 risks further exacerbating the impact of conflicts and natural disasters. Even before COVID-19 hit, 113 million people on the planet were already struggling with severe acute food insecurity due to pre-existing shocks or crises.

Where do the people most at risk live? To give one example, in Ethiopia, Kenya, Somalia nearly 12 million people already found themselves in dire circumstances as a result of extended severe droughts and back-to-back failed harvests before hordes of desert locusts descended on their crops and pastures in late December/early January.

In Africa, we are also worried about the Sahel, the Central African Republic, the Democratic Republic of the Congo, and South Sudan to name a few food crises. But no continent is immune. From Afghanistan to Haiti to Syria to Myanmar, COVID-19 risks further exacerbating the impact of conflicts and natural disasters. Even before COVID-19 hit, 113 million people on the planet were already struggling with severe acute food insecurity due to pre-existing shocks or crises. This means they were already on the extreme end of the hunger spectrum—weak, and less well-equipped to fend off the virus.

The vast majority live in rural areas, and depend on agricultural production, seasonal jobs in agriculture, fishing, or pastoralism. If they become ill or constrained by restrictions on movement or activity, they will be prevented from working their land, caring for their animals, going fishing, or accessing markets to sell produce, buy food, or get seeds and supplies.

These people have very little to fall back on, materially speaking. They could find themselves forced to abandon their livelihoods.


3/4 of human diseases known to date come from other animals, and 60% of emerging diseases have been transmitted by wild animals. Zoonoses each year cause around one billion cases of disease and millions of deaths, with incalculable human consequences.

Of all the emerging diseases, zoonoses of wildlife origin represent one of the most significant threats to the health of the world population. Three-quarters of human diseases known to date come from other animals, and 60% of emerging diseases have been transmitted by wild animals. Zoonoses each year cause around one billion cases of disease and millions of deaths, with incalculable human consequences. These diseases also have a heavy socio-economic impact, contributing significantly to enduring poverty in some regions.

The World Bank estimates that the economic burden of just six zoonotic diseases amounted to US$80 billion over 12 years. The risk of pandemics, as highlighted by the current coronavirus crisis, underlines the urgent need for decisive global action to safeguard people’s lives and health.

AGRICULTURE AND MALARIA. Some changes in land use directly affect disease exposure. In Belize, nitrogen and phosphorus from agricultural runoff in deforested areas hundreds of
kilometres upstream changed the vegetation pattern of lowland wetlands. This favoured the most efficient vector for malaria, Anopheles vestitennis, compared to the less efficient carrier, Anopheles albimanus, increasing exposure to malaria for coastal human populations.

SOURCE: The loss of nature and rise of pandemics. Protecting human and planetary health

➢ 70 percent of emerging infectious diseases and almost all recent epidemics originate from animals, in particular wildlife.

In total, people eat an estimated 5 million tonnes of wild meat per year in Africa’s Congo Basin, and around 1.3 million tonnes in the Amazon Basin. As a source of income, wild meat is also a common component of household economies throughout the supply chain, from the hunter to urban markets and food stalls.

Research indicates that outbreaks of animal-borne diseases are on the rise, mostly due to environmental degradation and the intensification of livestock production and trade. The SARS-COV-2 pandemic has once again highlighted our close relationship with nature, as well as issues related to the use of wildlife for food. Wild meat is an important and traditional source of protein, fat and micronutrients for millions of Indigenous Peoples and rural communities, particularly in tropical and subtropical regions. However, around 70 percent of emerging infectious diseases and almost all recent epidemics originate from animals, in particular wildlife. Furthermore, the trade in wildlife, especially in large urban areas, is increasing the risk of zoonotic disease transmission.


➢ Every year, some 2 million people, mostly in low- and middle-income countries, die from neglected zoonotic diseases

Every year, some two million people, mostly in low- and middle-income countries, die from neglected zoonotic diseases. The same outbreaks can cause severe illness, deaths, and productivity losses among livestock populations in the developing world, a major problem that keeps hundreds of millions of small-scale farmers in severe poverty.

➢ In the last two decades alone, zoonotic diseases have caused economic losses of more than $100 billion, not including the cost of the COVID-19 pandemic, which is expected to reach $9 trillion over the next few years.

SOURCE: Life on Land: Why it matters
➢ 80% of all industrial and municipal wastewater is released into the environment without any prior treatment, with detrimental effects on human health and ecosystems

Globally, an estimated 80% of all industrial and municipal wastewater is released into the environment without any prior treatment, with detrimental effects on human health and ecosystems (WWAP, 2017). This ratio is much higher in least developed countries, where sanitation and wastewater treatment facilities are grossly lacking.


➢ Lack of safe water can compromise hygiene and increase the risk of diarrhoeal disease, which kills over 500 000 children aged under 5 years, every year

Lack of safe water can compromise hygiene and increase the risk of diarrhoeal disease, which kills over 500 000 children aged under 5 years, every year. In extreme cases, water scarcity leads to drought and famine. By the late 21st century, climate change is likely to increase the frequency and intensity of drought at regional and global scale. Rising temperatures and variable precipitation are likely to decrease the production of staple foods in many of the poorest regions. This will increase the prevalence of malnutrition and undernutrition, which currently cause 3.1 million deaths every year. https://www.who.int/news-room/factsheets/detail/climate-change-and-health

➢ Desertification threatens largely agricultural country of 3.4m people.

Vast sandstorms expose Mongolia’s long-ignored ecological crisis. Desertification threatens largely agricultural country of 3.4m people. Official weather data shows the sandstorm originated March 13 in China’s northern neighbor, Mongolia, where it caused at least 10 deaths, left hundreds of people missing, and killed more than 1,200 livestock, a major source of income in a largely agricultural nation.


➢ Severe sand and dust storm hits Asia- the strongest in China in the past 10 years
One of the worst sand and dust storms in a decade has hit Mongolia, northern China and other parts of Asia, with big environmental and economic impacts and harming air quality for millions of people. CMA statistics show that the storm was the strongest in China in the past 10 years. In many places, levels of the coarse particulate matter, PM10, were hazardous. In Inner Mongolia, Gansu, Ningxia, northern Hebei and Beijing, PM10 peak concentration exceeds 5000 micrograms per cubic meter (μg/m³). The peak PM10 concentration in Beijing rose to over 9000 μg/m³, according to CMA.


➢ In 2017 an estimated 93% of global malaria deaths occurred in Africa

Africa is particularly at risk for the health effects of climate change because it has high burdens of climate-sensitive diseases and low preparedness and adaptive and response capacity at the institutional and community levels. Increases in temperature as well as changes in rainfall patterns also contribute to infectious disease transmission across Africa. Warmer temperatures and higher rainfall increase suitability for habitats of biting insects and transmission of vector-borne diseases such as dengue fever, malaria and yellow fever. In addition, new diseases are emerging in African regions where they were previously not present.

In the drought-prone sub-Saharan African countries, the number of undernourished people has increased by 45.6% since 2012 according to the Food and Agriculture Organization of the United Nations (FAO). Increases in temperature and changes in rainfall patterns also significantly affect population health across Africa. Warmer temperatures and higher rainfall increase habitat suitability for biting insects and the transmission of vector-borne diseases such as dengue fever, malaria and yellow fever.

In addition, new diseases are emerging in regions where they were previously not present. In 2017, an estimated 93% of global malaria deaths occurred in Africa. Malaria epidemics often occur after periods of unusually heavy rainfall. In addition, warming in the East African highlands is allowing malaria-carrying mosquitoes to survive at higher altitudes.

State of the Climate in Africa 2019

Multi-agency report highlights the current and future state of the climate in Africa

Africa climate change report reveals heat rising north and south, Sahel getting wetter

➢ Since 1900, over 11 million people have died as a result of droughts, and 2 billion people have been affected.
It has been estimated that droughts are the world’s costliest natural disaster, accounting for 6-8 billion US dollars annually, and impacting more people than any other form of natural disaster. Since 1900, over 11 million people have died as a result of droughts, and 2 billion people have been affected.

Since the 1970s, the land area affected by drought has doubled, undermining livelihoods, reversing development gains and entrenching poverty among millions of people who depend directly on the land. In the period from 1970 to 2012, drought caused almost 680,000 deaths, due to the severe African droughts of 1975, 1983 and 1984.

https://public.wmo.int/en/resources/world-meteorological-day/previous-world-meteorological-days/climate-and-water/drought

➢ 60% of diseases in the world are zoonotic, meaning it can spread from animals to people. They are responsible for at least 2.4 billion cases of human illness and 2.2 million deaths per year.

Zoonoses threaten people: Just 13 zoonoses, diseases which can be transferred from animals to people and vice-versa, are responsible for 2.4 billion cases of human illness and 2.2 million deaths per year. Stopping zoonoses in animals safeguards our health.

Emerging diseases control: Five new emerging diseases appear each year; three or four of these will be zoonotic. Most of these will originate in wildlife. Improving wildlife monitoring can better protect people and animals against these diseases.

https://healthforanimals.org/zoonoses.html

https://www.who.int/news-room/fact-sheets/detail/zoonoses

➢ Saharan storms are thought to be responsible for spreading lethal meningitis spores throughout central Africa, where up to 250,000 people contract the life-threatening disease every year. WHO estimates that 7 million people die from poor air quality every year.

Dust storms contribute to poor air quality. The World Health Organization estimates that seven million people die from poor air quality every year. Saharan storms are thought to be responsible for spreading lethal meningitis spores throughout central Africa, where up to 250,000 people contract the life-threatening disease every year.

• In China, as much as 330,000 tonnes of sand fell on Beijing in a single night in 2006
Dust storms damage crops and remove the fertile top soil, which reduces agricultural productivity. Much of Iraq’s fertile lands have been literally blown away as desertification intensifies.

- The Iraqi government recorded 122 dust storms and 283 dusty days in a single year. Within the next ten years, Iraq could witness 300 dust events per year.

- **About two to three billion tonnes of fine soil particles leave Africa every year in dust storms, draining the continent of its fertility and biological productivity.**

- China’s Great Green Wall project has reduced the frequency and intensity of dust storms, research suggests. By 2006, China will have planted more than 100 billion trees since 1978.

- Senegal has planted 12 million trees covering 40,000 hectares as part of a pan-African scheme to combat desertification in the Sahel.

[https://uneplive.unep.org/media/docs/assessments/Sand_and_Dust_Storms_fact_sheet.pdf](https://uneplive.unep.org/media/docs/assessments/Sand_and_Dust_Storms_fact_sheet.pdf)

> With more than 100 reported fatalities, the recent dust storm that swept through India was one of its deadliest. (in 2018)

At least 100 people were recently killed by a massive dust storm that swept through the region on Wednesday night. According to local reports, many of the fatalities occurred when intense wind knocked over large structures, killing or injuring those in its way. Dust storms are an annual weather pattern seen in the region. The scale and intensity of this most recent storm, however, surprised officials on the ground. It stretched from the western state of Rajasthan to the eastern state of Uttar Pradesh and hit Delhi, which lies between them.

In past years, fatalities from the dust storms rarely caused more than a dozen fatalities.

**Land Under Pressure – Health Under Stress (UNCCD GLO paper)**


For further reference see also COP document page 11 on VII. Interactive dialogue 2: Healthy land – healthy people

[https://www.unccd.int/sites/default/files/sessions/documents/2019-08/ICCD_COP%2814%29_INF.2-1914005E.pdf](https://www.unccd.int/sites/default/files/sessions/documents/2019-08/ICCD_COP%2814%29_INF.2-1914005E.pdf)

Land
• Land degradation negatively impacts 3.2 billion people. This represents an economic loss of around 10 per cent of annual global gross product.
• Drylands take up 41.3 per cent of the Earth’s surface. The total drylands population is of 2.1 billion; that is, one in three people live in drylands. The largest such areas are in Asia and Africa.
• The livelihoods of more than 1 billion people in some 100 countries are threatened by desertification. The most severely affected are poor and marginalised people who live in the most vulnerable areas.
• In sub-Saharan Africa half a billion inhabitants live in rural areas and most of them depend on the land. Desertification is a constant threat to their livelihoods.
• Globally, about one third of all agricultural land is either highly or moderately degraded; 10 per cent, however, is improving.
• Globally, 24 per cent of the land is degrading. More than 1.5 billion people directly depend on these degrading lands, and 74 per cent of them live in poverty.
• Nearly 20 per cent of the degrading land is cropland; 20-25 per cent is rangeland.
• Every year, 12 million hectares become unproductive due to desertification and drought; 20 million tons of grains are no longer produced for this reason.
• Droughts kill more people than any other single climate-related hazard. They create conflict among communities, and are a cause of forced migration.
• In rural areas where people depend on scarce productive land resources, land degradation is a driver of forced migration.
• Available land for the expansion of agriculture is becoming more limited. More agricultural expansion takes place on marginal lands, which include less fertile soils and less-favourable climatic conditions, resulting in lower yields.
• Many countries are losing Agricultural Gross Domestic Product (AGDP) through land degradation. This challenge combined with increased population, demands on natural resources and climate change impacts food and water supplies, which could in turn increase the likelihood of conflict.
• Biodiversity loss was estimated at 34 per cent in 2010 compared to an undisturbed state, and is projected to continue with some 10 per cent points of additional loss up to 2050.

**Water**

• Every person requires a minimum of 2,000 cubic metres of water per year. People in drylands have access to 1,300 cubic metres, and availability is projected to decrease.
• 71 per cent of the global population (5.2 billion people) has access to safely managed drinking water services (available when needed and free from contamination, including in some areas which experience water scarcity).
• 2.8 billion people worldwide (40 per cent) live in regions with water scarcity. The highest water scarcity occurs in drylands.
• In 2015, 263 million people spent over 30 minutes per round trip to collect water from an improved source.
• Women from sub-Saharan Africa spend a greater fraction of time collecting water. Collectively, this amounts to about 40 billion hours per year.
• Agriculture takes the largest share of global water use. Vast areas of the Middle East, South Asia and North America rely, for large proportions of their water withdrawals, on aquifers that are non-renewable and will become depleted.

Food

• Up to 44 per cent of all the world’s cultivated systems are in drylands. One in three crops, including oats, barley, tomatoes, potatoes, cabbage and saffron originate from drylands.
• In 2018, worldwide, 149 million children under 5 years of age were stunted, 49 million wasted, and 40 million were overweight.
• Poor people spend 50 to 80 per cent of their income on food. During crises, the price of food increases, placing poor people at risk of famine.
• An estimated one third of all food produced globally is either lost or wasted, which amounts to about 1.3 tonnes per year. Meanwhile, an estimated 815 million (approximately one out of nine people worldwide) are undernourished.
• Five years (2013 to 2018) of acute food insecurity in South Sudan increased the risk of famine and led to one of the major refugee crises in the world in 2018, with 4.4 million people displaced and 6.1 million people in crisis.
• Conflict and insecurity remained the key drivers of hunger in 2018. Around 74 million people (two thirds of which were facing acute hunger) were located in 21 countries and territories affected by conflict or insecurity. About 33 million of these were in 10 countries in Africa; over 27 million were in seven countries and territories in West Asia/Middle East; 13 million were in three countries in South/South-east Asia and 1.1 million in Eastern Europe.
• Climate and natural disasters pushed 29 million people into situations of acute food insecurity in 2018, most of these were in Africa, with 23 million people affected

Future projections

• By 2025, up to 2.4 billion people worldwide may be living in areas subject to periods of intense water scarcity.
• Currently, between 1-2 billion people are affected by water scarcity, most of them in drylands. Furthermore, demand for water will increase by 30 per cent by 2030, which is likely to displace a further 700 million people currently living in arid and semi-arid areas.
• By 2050, human populations in drylands are projected to increase by 40 to 50 per cent. By 2050, at the global level, increases in agricultural yields are projected slow, with yields about 10 per cent lower than they would have been without the hurdles of climate change, mostly due to water shortages and higher temperatures.

• Agriculture in tropical and sub-tropical regions, such as India and Sub-Saharan Africa, will be the most negatively affected by climate change. Lower yields due to climate change would result in more land (around 10 per cent) having to be used for agriculture.

• Currently, assuming no significant reduction in food waste coupled with food consumption trends, the world will need food production to increase by 60 per cent by 2050.

• Approximately 250,000 additional deaths per year are estimated between 2030 and 2050 as a consequence of climate change.

• Drought, heatwaves and variability in rainfall are likely to increase, and will thus result in water scarcity issues, vegetation and soil loss and decreased crop yields, particularly in drylands.

• **African meningitis belt, with approximately 900 thousand cases reported between 1995 and 2014 (average of 45 thousand cases per year), of which 10 per cent resulted in deaths (average of 4,500 deaths per year)**

**Sandstorms in Africa** are a risk factor of Meningococcal meningitis in the Sahel, a semi-arid region of sub-Saharan Africa. Exposure to airborne dust pollution, coupled with high temperature and low humidity causes outbreaks of bacterial meningitis (Meningococcal meningitis) every year during the Sahel’s dry season (the hottest time of the year). This area is known as the “African meningitis belt”, stretching from Senegal (in the West) to Ethiopia (in the East), covering 26 countries (WHO map). **The population is estimated to be of approximately 300 million.**

This disease is observed worldwide, but the highest burden occurs in the **African meningitis belt, with approximately 900 thousand cases reported between 1995 and 2014 (average of 45 thousand cases per year), of which 10 per cent resulted in deaths (average of 4,500 deaths per year)**. Large epidemic cycles occur during the dry season from December to June. Social and economic factors, such as poverty and overcrowded housing, can influence the transmission of the disease. In addition, large epidemics can disrupt the health care systems, posing risks to rapid response and recovery. Major epidemics of Meningococcal meningitis have been occurring in the meningitis belt for over 100 years. Since the introduction of a vaccine in 2010 and other strategic health measures (e.g. risk assessment by monitoring the number of cases, reinforcement of surveillance, reactive vaccination campaigns, and the use of specific antibiotic treatment protocols) the epidemiological pattern has changed.
• Dust from the Chihuahuan Desert has led to increased hospital admissions for children (aged 1-17) due to asthma and bronchitis, in El Paso, Texas

For instance, dust from the Chihuahuan Desert has led to increased hospital admissions for children (aged 1-17) due to asthma and bronchitis, in El Paso, Texas. The same study also found that girls are more sensitive to acute bronchitis hospitalisations after dust events than boys (Grineski et al., 2011). Meanwhile, respiratory mortality among elderly in Italy (aged 75 or older) and Spain increased during Saharan dust events

• Ecosystem degradation can cause soil erosion and contamination. In turn, soil contaminants move into surface water leading to water contamination (UNCCD, 2017c).

Some heavy metals such as lead, mercury, arsenic, cadmium and chromium, coupled with pesticides pollutants and pharmaceuticals used for livestock management (e.g. antibiotics) are degrading soil biodiversity and their function. This situation in turn poses risks to agricultural productivity, livelihoods, food security and human health, as well as to wildlife (Tóth et al., 2016; UNEP, 2017).

• Contaminated soil can affect human health through three main routes: inhalation, ingestion and the skin.

The effects on human health are: a) increased risk of cancer, b) harmful effects on the nervous, digestive and immune systems, lungs and kidney, c) Political and economic instability

• One of the best examples of environmental degradation with several impacts on ecosystems and human health is that of the Aral Sea, on the border of Kazakhstan and Uzbekistan affecting almost 50 million people

It is one of the largest ecological disasters in the world, covering the five states of Central Asia, thereby affecting almost 50 million people. In the 1900s, the Aral Sea was the fourth largest inland lake in the world, an important ecosystem providing natural resources to many communities, with good access to fishing, water and land.

Many health impacts emerged: cancers, respiratory diseases, anaemia, miscarriages, maternal and infant mortality, maternal milk toxicity, kidney and liver diseases, and some infectious diseases. The average life expectancy declined from 64 to 51 years, and almost one-half of the population reported emotional stress. Furthermore, with livelihood, health and well-being damaged and unfavourable living conditions increasing, people were forced to migrate. Currently, although, some measures are being improved in the area by the government, with positive results on the ecosystem and human health, a large area of the Aral Sea is still disappearing.
• The WHO estimates over 566 thousand yearly deaths from lower respiratory infections worldwide attributable to environmental risks, all of which occur in children under five. The largest impact is in sub-Saharan Africa with over 298 thousand children deaths.

In terms of burden of disease, lower respiratory infections are responsible for 8.7 per cent of all deaths and disability-adjusted life years (DALYs) attributable to the environment. Upper respiratory infections have a lower impact, causing 1190 deaths worldwide.

• Food security and food safety are crucial for good health. DLDD adds further pressures, which may result in conflict, forced migration and increased poverty

However, social and demographic changes, including population growth and rapid urbanisation, as well as an increasing demand for food, are threatening food security and safety in many parts of the world. DLDD adds further pressures, which may result in conflict, forced migration and increased poverty. Food insecurity contributes to different forms of malnutrition: undernutrition (stunting and wasting), overweight, and obesity. Deficiencies of micronutrients (including reduction in concentrations of iron, zinc, vitamins A and C) in soil, due to soil erosion, affect crops quality. Consequently, it affects people’s dietary nutrient consumption, especially for those who living in remote areas or those with low incomes that have no easy access to diverse food types and nutrients. For example, people living in low-income countries in situations of prolonged conflict or crisis show a higher (2.5 to 3 times) proportion of undernourished persons than other low-income countries. Globally, especially among vulnerable populations, food insecurity and the triple burden of malnutrition (undernutrition; overweight and obesity; and micronutrient deficiencies) are increasing, posing challenges to achieve SDG 2 (zero hunger) and, consequently, SDG 1 (no poverty).

• Environmental factors are responsible for 27 thousand deaths per year, all of them in children under five.

Hunger and malnutrition are significantly worse in countries where people’s livelihoods depend on agriculture and livestock, and where the agricultural systems are highly sensitive to rainfall and temperature variability.

The proportion of children under five who are stunted is declining. In the five-year period between 2012 and 2017, the number of stunted children decreased from 165.2 million to 150.8 million, a 9 per cent decline. In 2017, 7.5 per cent of children under five years of age suffered from wasting (most of the burden is concentrated in Asia), and 5.6 per cent were overweight. The obesity form of malnutrition continues to rise in adult age. It rose from 11.7 per cent in 2012 to 13.2 per cent in 2016 (i.e. 672.3 million people). Regarding anaemia, the prevalence
among women of reproductive age also increased, from 30.3 percent in 2012 to 32.8 percent in 2016. This means that one in three women of reproductive age are affected by a condition that can cause significant health and development problems for both woman and child.

- The number of undernourished people is 50 per cent higher in countries with high exposure to extreme climate events (specifically drought).

Impacts from water scarcity, land degradation and population growth raise the risk of food insecurity, and consequently aggravate malnutrition, which can also be influenced by migration processes. Globally, 2 billion people suffer dietary deficiencies of zinc and iron. Migration can also alter family diet, both on quantity and nutrient composition, exposing migrants to malnutrition. The number of undernourished people is 50 per cent higher in countries with high exposure to extreme climate events (specifically drought). In 2017, 821 million people were estimated to be undernourished (WMO, 2019)

- Globally, asthma is one of the world’s leading non-communicable diseases, which affects 334 million people every year (UNEP/WMO/UNCCD, 2016).

It is responsible for around 0.9 per cent of the global disease burden, of which, 4.3 per cent relates to adults and 14 per cent to children (Prüss-Üstün et al., 2016). Airborne mineral dusts can also cause or exacerbate asthmatic conditions. Atmospheric materials (e.g. pollens and spores) and wind-borne dust can be transported across regions by high winds coupled with situations of drought, increasing airborne allergic diseases

- In the decade 2006 to 2015 there were 164 drought events globally, which resulted in over 20 thousand deaths (an average of 2000 per year), and 726 million affected persons. The large majority of deaths occurred in Africa

Africa and Asia are the worst affected continents in number of deaths from droughts, with Africa being significantly larger. Asia suffers more deaths from floods, followed by both Africa and the Americas

- 101 diseases out of 133 linked to the environment. From 61 main diseases and injuries (both deaths and disability adjusted life years, DALYs). At least 29 of these can be associated with DLDD are responsible for 10.3 million deaths per year (based on 2012 data)
A WHO report on the burden of disease from environmental risks analysed the 133 diseases listed in the WHO’s Global Health Observatory and found 101 linked to the environment (Prüss-Üstün et al., 2016). The report found that environmental determinants of health are responsible for more than 23 per cent of the burden of diseases, globally.

Environmental risk factors, such as lack of food and water security, air and soil pollution, lack of sanitation and hygiene, exposure to hazardous chemicals, change in vector distribution, and climate-related disasters result in communicable and noncommunicable diseases, malnutrition, disability, and mortality. The study quantifies 61 main diseases and injuries (both deaths and disability adjusted life years, DALYs). At least 29 of these can be associated with DLDD.

There are no studies that have determined what fraction of the burden of disease can be attributed to DLDD, however these 29 health outcomes are responsible for 10.3 million deaths per year (based on 2012 data). We could approximate further by taking the rural population of each region used in the WHO study (ranging from 18.5 per cent in developed regions, up to 59.6 in the African region), and this would reduce the figure to 5.2 million deaths.

There are no separate estimates for urban and rural areas in the WHO study, so taking the rural fraction would bias the numbers because of the large impacts of air pollution in cities as well as occupational factors. If we, therefore, further reduce by assuming that only 10 per cent of the burden of disease in rural areas of more developed (OECD) countries are DLDD linked, and we consider 25 per cent in less developed regions, this would give us a crude estimate of close to 1.28 million deaths per year. An in-depth study of the burden of disease is required to accurately determine the real impact of DLDD on human health.

- Globally, more than 820 million people have insufficient food, leading to malnutrition and the risk of infectious diseases.

An even larger number of people consume an unhealthy diet that contributes to premature death and morbidity from noncommunicable diseases. Both these extremes occur while pressures on food systems increase (Willett et al., 2019). As populations increase and standards of living and nutrition improve, the demand for food will continue to rise.

The current world population is 7.6 million and is projected to increase to 8.6 billion in 2030, and 9.8 billion in 2050. The world population is projected to continue to increase towards the end of the century (UN/DESA, 2019). This growth, together with an increasing demand for meat and dairy products, will add further pressure on the food producing system, both land-based and aquatic (FAO, 2011). While the world’s population is expected to grow by 32 per cent between 2015 and 2050, much of the rate of growth will be highest in low-income countries. The population of sub-Saharan Africa, for example, is projected to grow by 124 per cent in the same period (UN/DESA, 2019b). The challenge is how to produce more food, of better nutritional quality, to an increasing population, but without further stressing the land.
The relationship between poverty, DLDD and health is well established. In 2015, 736 million people lived in extreme poverty, with 80 per cent in South Asia and sub-Saharan Africa. Moreover, two billion rural people live on poor agricultural land.

Efforts to end extreme poverty and reduce by half people living in poverty by 2030 (Targets 1.1 and 1.2) as well as efforts towards ensuring equal rights to economic resources and ownership and control over land (Target 1.4) will require renewed energy, specifically in the agricultural sector, which when poorly managed can become a major driver of land degradation. In addition, building the resilience of the poor and of those in vulnerable situations and reducing their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters (Target 1.5) will depend upon the extent of sustainable management of the land, as well as upon the amount of fresh water and food supplies, ecosystem loss reduction, and forestry restoration. These improvements can strengthen and empower poor people’s autonomy, which can also positively influence good health and well-being.

Food shortage related impacts on nutrition are some of the most direct DLDD impacts on human health, especially in low-income countries.

These impacts present a challenge to the achievement of Targets 2.1 and 2.2, which aim to end hunger and all forms of malnutrition in children under five years of age, adolescents girls, pregnant and lactating women, and older persons, and also ensure access to safe, nutritious and sufficient food for all people. In rural and in poor areas, where people cannot purchase food, local food production is crucial to prevent hunger and promote development. Achieving Target 2.3 (aiming by 2030 to double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment), will be an important step in combating DLDD, and in helping to relieve poverty and hunger. Target 2.4, which aims by 2030 to ensure sustainable food production systems with resilient agricultural practices, strengthening capacities to cope with climate change, extreme weather, and disasters, and aiming to improve land and soil quality, will help reduce inequalities, food security, and will provide better nutrition and quality of life (these targets are closely connected with Targets 12.2 and 12.3)

Strategies to avoid land degradation and to ensure land sustainability and land restoration would protect and promote health in the long term (WHO/WPRO, 2017).
In addition, community participation is a key measure to avoid health impacts and promote health (Kravitz, 2017). Similarly, there are opportunities to support local systems, and to implement resilient policies, which respond to the DLDD challenges impacting on health (Table 9); (Patz et al., 2012; Sena et al., 2017; Sanz et al., 2017).

A recent IPCC special report on Climate Change and Land provides important findings, challenges and response options related to human health and well-being (Box 11). Although most findings refer to food security and nutrition, there are also important findings on dust storms and general risks to human health; and on populations at risk, including women, the very young, the elderly, and poor. **Findings are organized in four areas:** People, land and climate in a warming world; Adaptation and mitigation response options; Enabling response options; and Action in the near-term (IPCC, 2019)

Table 8. Health sector actions needed to respond to DLDD challenges

Table 9. Policy actions needed to respond to DLDD challenges

**IPCC Climate and land report 2019**

*(see links at the end of this section)*

Many of the report findings are related to human health and well-being: People, land and climate in a warming world

- Changes in consumption patterns have contributed to about 2 billion adults now being overweight or obese.
- **An estimated 821 million people are still undernourished.**
- Dust storms were associated with global cardiopulmonary mortality of about 402,000 people in 2005 with 3.47 million years of life lost in that single year. Although globally only 1.8% of cardiopulmonary deaths were caused by dust storms, in the countries of the Sahara region, Middle East, South and East Asia, dust storms were suggested to be the cause of 15–50% of all cardiopulmonary deaths ([https://www.ipcc.ch/srccl/chapter/chapter-3/](https://www.ipcc.ch/srccl/chapter/chapter-3/))
- Dryland regions have experienced desertification. People living in already degraded or desertified areas are increasingly negatively affected by climate change.
- Climate change, including increases in frequency and intensity of extremes, has adversely impacted food security and terrestrial ecosystems as well as contributed to desertification and land degradation in many regions.
- The frequency and intensity of dust storms have increased over the last few decades due to land use and land cover changes and climate-related factors in many dryland areas resulting in **increasing negative impacts on human health, in regions such as the Arabian Peninsula and broader Middle East, Central Asia.**
• Climate change has already affected food security due to warming, changing precipitation patterns, and greater frequency of some extreme events. In many lower-latitude regions, yields of some crops (e.g., maize and wheat) have declined, while in many higher-latitude regions, yields of some crops (e.g., maize, wheat and sugar beets) have increased over recent decades.

• **Climate change creates additional stresses on land, exacerbating existing risks to livelihoods, biodiversity, human and ecosystem health, infrastructure, and food systems.**

• The stability of food supply is projected to decrease as the magnitude and frequency of extreme weather events that disrupt food chains increases. Increased atmospheric CO2 levels can also lower the nutritional quality of crops.

• In drylands, climate change and desertification are projected to cause reductions in crop and livestock productivity.

• **Asia and Africa are projected to have the highest number of people vulnerable to increased desertification. North America, South America, Mediterranean, southern Africa and central Asia may be increasingly affected by wildfire. The tropics and subtropics are projected to be most vulnerable to crop yield decline.**

• **Land degradation resulting from the combination of sea level rise and more intense cyclones is projected to jeopardise lives and livelihoods in cyclone prone areas. Within populations, women, the very young, elderly and poor are most at risk.**

• Extreme weather and climate or slow-onset events may lead to increased displacement, disrupted food chains, threatened livelihoods.

• Urban expansion is projected to lead to conversion of cropland leading to losses in food production. This can result in additional risks to the food system. Strategies for reducing these impacts can include urban and peri-urban food production and management of urban expansion, as well as urban green infrastructure that can reduce climate risks in cities.

• **Source:** IPCC(2019)

• Land and Climate (Chapter 2)
• Land Degradation (Chapter 4)
• Desertification (Chapter 3)
• Interlinkages between desertification, land degradation, food security and greenhouse gas fluxes: Synergies, trade-offs and integrated response options(Chapter 6)
• Food Security (Chapter 5)
• Climate and Land - complete report
• Frequently Asked Questions (FAQ)
• Summary for policymakers

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