BESNet
Biodiversity and Ecosystem Services Network

BACKGROUND DOCUMENT

Biodiversity and Ecosystem Services Network (BES-Net) Regional Trialogue for Anglophone Africa:

Bright Spots for Land Degradation Neutrality, Pollinators and Food Security

Nairobi, Kenya
28-30 May 2019

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

SwedBio
A programme at Stockholm Resilience Centre

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GC-RED Resilient Ecosystems and Desertification

The United Nations Development Programme (UNDP) works in about 170 countries and territories, helping to achieve the eradication of poverty, and the reduction of inequalities and exclusion. We help countries to develop policies, leadership skills, partnering abilities, institutional capabilities and build resilience in order to sustain development results. The Nairobi-based Global Policy Centre on Resilient Ecosystems and Desertification (GC-RED) is one of UNDP's Global Policy Centres. GC-RED is responsible for advancing global thinking and knowledge sharing on inclusive and sustainable development in drylands and other fragile ecosystems.

BESNet Biodiversity and Ecosystem Services Network

The Biodiversity and Ecosystem Services Network (BES-Net) is a capacity sharing "network of networks" that promotes dialogue between science, policy, and practice for more effective management of biodiversity and ecosystems, contributing to long-term human well-being and sustainable development. The Network is using a three-pillar approach: face-to-face capacity building activities (the BES-Net Trialogues), National Ecosystem Assessments and an online platform for networking – with all components mutually reinforcing one another. BES-Net is hosted by UNDP GC-RED.

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Acknowledgements: The author would like to thank all of the experts who provided their valuable comments and contributions through interviews and written inputs. He would also like to acknowledge the contributions of Dr. Dino J. Martins, Dr. John Esitadimma Onyekuru, Dr Muo Kasina, Prof. Peter Kwapong and Ms. Sibusisiwe Caroline Limuwa. Special thanks also go to the following members of the BES-Net team, who provided invaluable guidance and support: Pippa Heylings, Kumar Bhattacharyya, Marta Panco and Yuko Kurauchi.

The production of this paper and the organization of the *BES-Net Regional Trialogue for Anglophone Africa: Bright Spots for Land Degradation Neutrality, Pollinators and Food Security* was made possible through the partnership with the Ministry of Environment and Forestry in Kenya and the financial support of the German Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMU) and SwedBio at the Stockholm Resilience Centre.

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KEY MESSAGES

WHY LAND DEGRADATION MATTERS

- Land, literally the ground beneath our feet, is a finite resource composed of soil, water, minerals, plants, and animals. It is an essential part of our life support system and the key building block of our societies and economies (Figure 1).

- Land is the basis for biodiversity and estimates for values of ecosystem services range from US$ 2,188/ha/year for woodlands to as high as US$ 20,851/ha/year for tropical forests. Land is also important for achieving many of the Sustainable Development Goals (SDGs) because it underpins the resources and sectors that depend on them (Figure 2).

- Currently, degradation of the Earth's land surface through human activities is negatively impacting the well-being of at least 3.2 billion people, pushing the planet towards a sixth mass species extinction, and costing more than 10 per cent of the annual global gross product in loss of biodiversity and ecosystem services.

- Land degradation includes but goes well beyond issues of desertification in drylands. Ecosystems affected by land degradation mainly include forests, rangelands and wetlands. Wetlands are particularly degraded, with 87 per cent lost globally in the last 300 years, and 54 per cent since 1900.

- In developing countries, the extent of transformation is lower, but the rate of transformation remains high. In the future, most degradation and especially transformation is forecasted to occur in sub-Saharan Africa, Asia, Central and South America, which have the largest remaining amount of land suitable for agriculture.

- One of the key land-based ecosystem services affected by land degradation is food security. Agriculture is dependent on a range of ecosystem services: supporting services like nutrient cycling and soil formation; and regulating services such as water purification, atmospheric regulation, and pollination, all of which are negatively affected by land degradation.

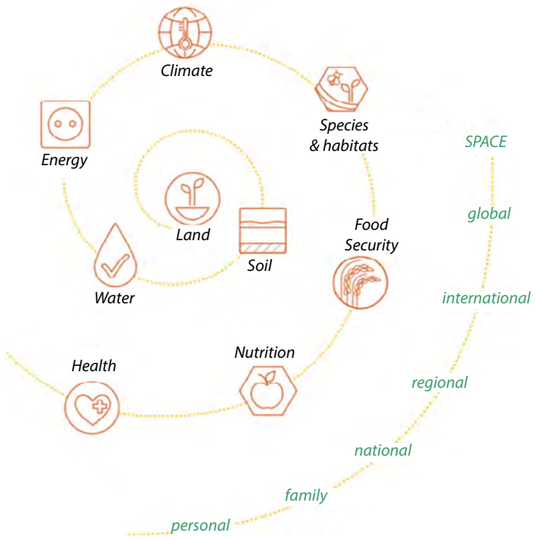

Figure 1. Dimensions of land-human relationship

Land is the foundation of many activities by both humans and other organisms. These activities provide a myriad of benefits at different levels from individuals to nations and the world. These benefits include food production for both addressing food security but also for export markets and providing habitats for organisms such as pollinators which contribute to agriculture related activities (including food production but also the production of non-food crops). Source: United Nations Global Land Outlook - First Edition (UNCCD 2017)

- The main drivers of land degradation in Africa include the inappropriate management of grazing lands, croplands, tree plantations, as well as urbanization, extractive industries and non-timber natural resource extraction.

- Timely action to avoid, reduce and reverse land degradation makes sound economic sense, resulting in, inter-alia, increased food and water security, increased employment, improved gender equality, a substantial contribution to the adaptation and mitigation of climate change and avoidance of conflict and migration.

- Although land is finite in quantity, there is some evidence to suggest that changes in consumer and corporate behaviour, and the adoption of more efficient planning and sustainable practices, can reverse the negative impacts of land degradation, which will leave sufficient land available in the long-term to meet the demand for both economic activity (e.g. land for agriculture) and environmental sustainability (e.g. protecting biodiversity and ecosystem services, including pollinators).

- Worldwide commitment to protect land resources is strongly reflected in SDG15, particularly SDG target 15.3 of achieving Land Degradation Neutrality (LDN), which is recognized as the SDG accelerator and expected to connect dots between many of the SDGs and their targets.

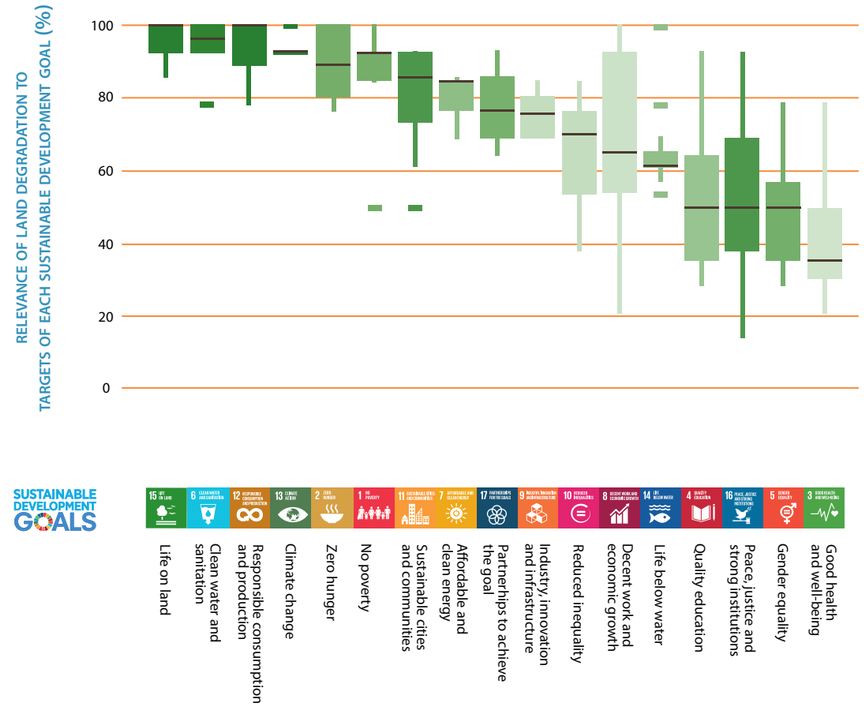

Figure 2. Relevance of land degradation to targets of each SDG

Land degradation affects all Sustainable Development Goals, but some more than others. It particularly affects the ecosystems underpinning much of the society's benefits and it also affects food security (for example through reduced productivity of agricultural land, reducing pollinators and affecting water resources). Source: IPBES Land Degradation and Restoration Report (IPBES 2018).

WHY POLLINATORS/POLLINATION MATTER

- Pollination is an ecosystem process that is fundamental to the reproduction and persistence of flowering plants. It occurs when animals move viable pollen grains from anthers (the male reproductive organ of the flower) to receptive and compatible stigmas (the female reproductive organ of the flower) of flowering plants and when followed by fertilization, usually results in fruit, nut and seed production.

- The vast majority of pollinators are wild, including more than 20,000 species of bees, some flies, butterflies, moths, wasps, beetles and thrips, as well as birds, bats and other vertebrates. Some species of bees are managed, including the European honeybee (*Apis mellifera*), the Asian honeybee (*Apis cerana*), some bumblebees (*Bombus sp.*) and other solitary bees.

- Globally, nearly 90% of wild flowering plant species depend, at least in part, on the transfer of pollen by animals. Plants are critical for the continued functioning of ecosystems as they provide food, form habitats (including for pollinators) and provide other resources for a wide range of other species.

- Similarly, the area of pollinator-dependent crops has increased disproportionately compared to other crops and the trend is more pronounced in the developing, as compared to the developed, world.

- The Food and Agriculture Organization of the United Nations (FAO) has declared pollination services an "agricultural input" that ensures the production of crops. Pollinator-dependent crops rely on animal pollination for yield and/or quality to varying degrees. 75 % percent of the world's food crops depend at least in part on pollination and pollinator dependent crops contribute to 35% of global crop production volume. This means that one in every three mouthfuls of food are pollinator-dependent.

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- The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) assessment on pollinators, pollination and food production estimates that between 5-8% of current global crop production, with an annual market value of US$ 235 billion - US$ 577 billion (in 2015) worldwide, is directly attributable to animal pollination.

- Chocolate, for example, is derived from cacao tree seed (annual world cocoa bean crop value, US$ 5.7 billion), which relies on Cecidomyiid and Ceratopogonid midges for its pollination.

- Pollinator-dependent food products are also important contributors to healthy human diets and nutrition. Most of the fruits and vegetables, which are essential sources of micronutrients, depend significantly on pollinators.

- Pollinators provide multiple benefits beyond food production and their value has an important cultural and social component. Many livelihoods and cultural practices depend on pollinators, their products and multiple benefits such as medicine, fibres, materials for musical instruments, source of inspirations for arts, literature to name a few.

- Practices based on indigenous and local knowledge can be a source of solutions to current challenges, in co-production with science, by supporting an abundance and diversity of pollinators.

WHAT ARE THE CHALLENGES OF LAND DEGRADATION AND POLLINATORS?

- Land degradation is a pervasive, systemic phenomenon and it occurs in all parts of the terrestrial world and can take many forms (e.g. soil erosion, biodiversity degradation, deforestation, etc.).

- Land degradation is not only affecting forests and ecosystems but also affects people by diminishing the contributions made by these ecosystems to food production, food security, water security, climate regulation and many more activities essential to human life.

- Rapid expansion and unsustainable management of croplands and grazing lands in response to increasing demand for food and biofuels are the most extensive global direct driver of land degradation. Paradoxically, whilst nutrient-rich food depends on pollinators, agricultural production could be a driver of pollinator decline, especially when done in an intensive, input heavy fashion. Destruction, fragmentation and degradation of native habitats, along with conventional intensive land management practices, often reduce or alter pollinators' food and nesting resources.

- While there is a well-documented decline in some species of wild pollinators, data on the status of most wild species is lacking. The IPBES assessment on pollinators, pollination and food production drew most of its conclusions from the majority of studies based in Europe and North America – signifying important gaps in data in other regions of the world (including Africa).

- Multiple causes are linked to the decline in pollinators as well as land use change and intensive agricultural management, there are risks associated with pesticides and particular inputs (insecticides and herbicides) associated with Genetically Modified (GM) crops. Additionlly, disease, pests, predators and invasive alien species are key threats. Climate change is serving to exacerbate all of these negative factors.

- Institutional, policy and governance responses to address land degradation are often reactive and fragmented and fail to address the ultimate causes of degradation. National and international policy and governance responses to land degradation are often focused on mitigating the damage already caused. Most policies directed at addressing land degradation are fragmented and target specific, visible drivers of degradation within specific sectors of the economy, in isolation from other drivers.

WHAT IS THE PROBLEM IN THE REGION?

- Land degradation drivers are varied across the different regions but typically involve agricultural expansion, overgrazing, slash and burn, harvesting of firewood for energy, mining, built up infrastructure, pesticides application on agricultural fields and others.

- Currently, almost all countries in Africa have committed to setting LDN targets; and all of the six countries targeted for the Anglophone Africa Regional Trialogue (i.e. Ethiopia, Ghana, Kenya, Malawi, Nigeria and Zambia) have already developed their LDN strategies, recognizing the severity of the problem (Annex I).

- While land degradation, as a concept and an issue, is not new in Sub-Saharan Africa, appreciation of the challenges posed by land degradation tends to be undermined by the fact that negative impacts may not be observed immediately and can be highly variable and localized in nature.

- Much of the focus on land degradation has focused on a limited suite of impacts, often leaving out strategies to maintain and ensure the benefits from ecosystem services such as pollination and the provision of nutritious foods.
- As a region which is expected to experience the largest share of population increase globally, much of the drivers of land degradation and pollinator declines such as food demand will increase, demand for land for settlement, urbanization, deforestation and habitat fragmentation and overall land degradation will be amplified.

- Unlike land degradation, pollination is not a well-known problem on the continent. There is no region-wide information about the status of pollinators in Sub-Saharan Africa, and very little research exists across the continent (there are more studies in East and parts of Southern Africa).

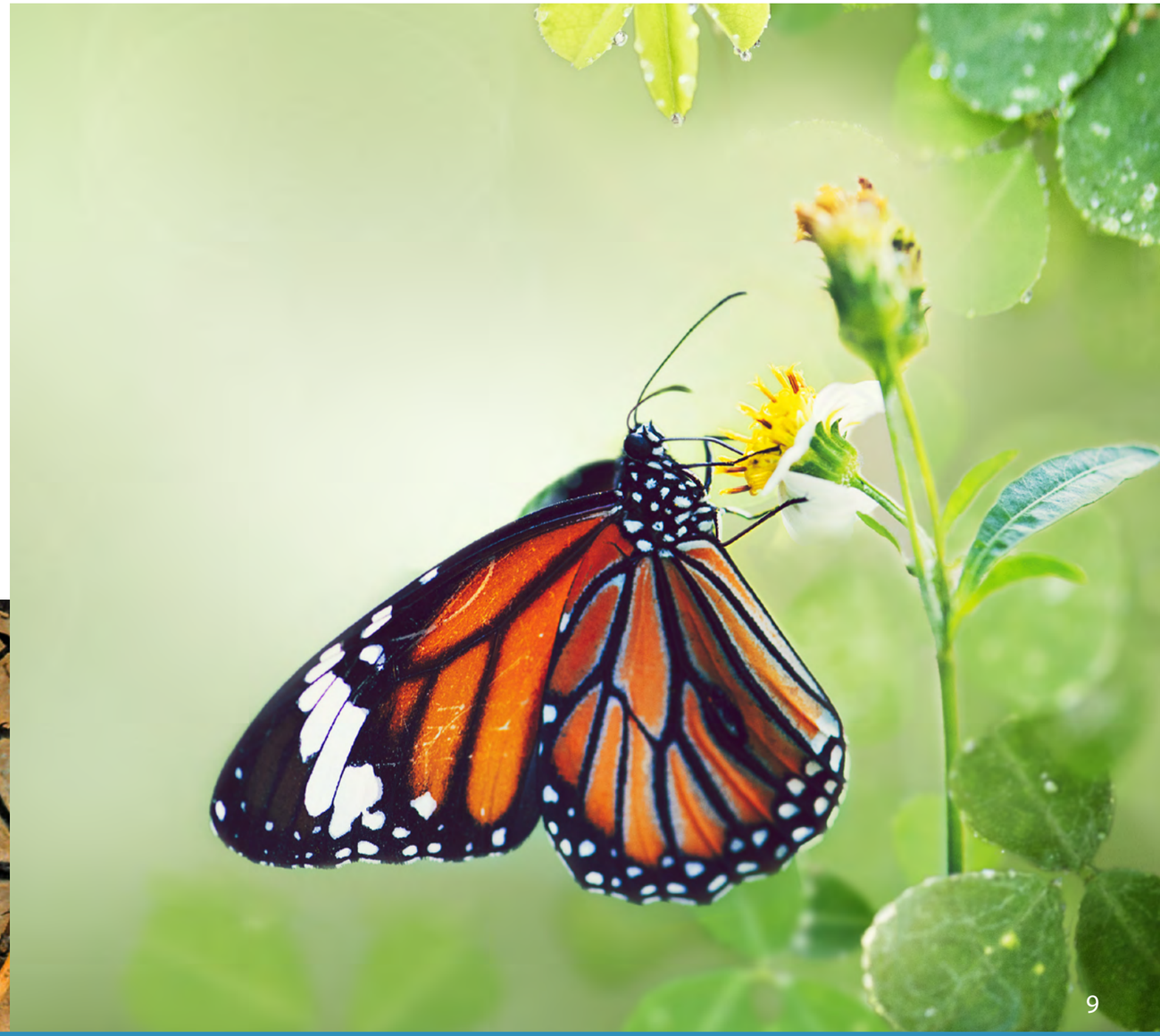
- Although no direct evidence exists everywhere, there are indications from country-specific cases that the region is experiencing some pollinator declines. For example, the increasing dependence on non-natural pollination (e.g. hand pollination) in Ghana, South Africa, Ethiopia and Kenya suggest that pollinators in these countries might be declining, at least in specific parts of the countries.

- A lot of the foods eaten in the continent, which are also high in nutrients, are not part of the formal accounting process and are therefore not featured in accounts about impacts of land degradation and pollination declines on food availability.

- Combating land degradation and restoring degraded land is an urgent priority to protect the biodiversity and ecosystem services vital to all life on Earth and to ensure human well-being.

2. INTRODUCTION

This document aims to provide background material for the BES-Net Regional Trialogue for Anglophone Africa: Bright Spots for Land Degradation Neutrality, Pollinators and Food Security to be held in Nairobi, Kenya, from 28-30 May 2019. The BES-Net Trialogues are multi-stakeholder dialogues among the three communities of policy, science and practice that focus on specific policy questions at the national and regional levels. This Trialogue, representing six countries in Anglophone Africa, namely Ethiopia, Ghana, Kenya, Malawi, Nigeria and Zambia, will engage a diverse set of stakeholders in dialogue around the two IPBES global thematic assessment reports – namely 1) Thematic Assessment Report on Pollinators, Pollination and Food Production; and 2) Thematic Assessment Report on Land Degradation and Restoration. The Trialogue will explore ways to integrate the key messages from the two assessments, given the clear connections between the themes, especially within the context of Anglophone Africa towards the achievement of LDN. The Trialogue will also take into account the relevant findings and recommendations from the Regional Assessment Report on Biodiversity and Ecosystem Services for Africa.



WHAT DO WE KNOW ABOUT LAND DEGRADATION IN AFRICA?

Land degradation is a widespread problem affecting all regions of the world. It is also extensive, covering approximately 23% of the globe's terrestrial area, increasing annually, and affecting about 1.5 billion people globally (Stavi and Lal 2015), and resulting in soil losses averaging 24 billion tonnes a year. The Global Land Outlook report declares that approximately 20% of the Earth's vegetated surface has seen declining trends in productivity over the last two decades, mainly as a result of land/water use and management practices.

In Sub-Saharan Africa, land degradation has a long history and manifests itself through decreased crop productivity, reservoir and irrigation system siltation, seasonable water deficits and variable river flows (Millington et al 1989). Sub-Saharan Africa accounted for 17% of the global 3.623 billion ha that experienced land degradation in 1982–2006 (Le et al 2014, Nkonya et al 2016).

Currently, almost all countries in Africa have committed to setting LDN targets; and all of the six countries in the Trialogue (i.e. Ethiopia, Ghana, Kenya, Malawi, Nigeria and Zambia) have already developed their LDN strategies, recognizing the severity of the problem. The different regions represented by these countries are affected differently by land degradation (Figure 3).

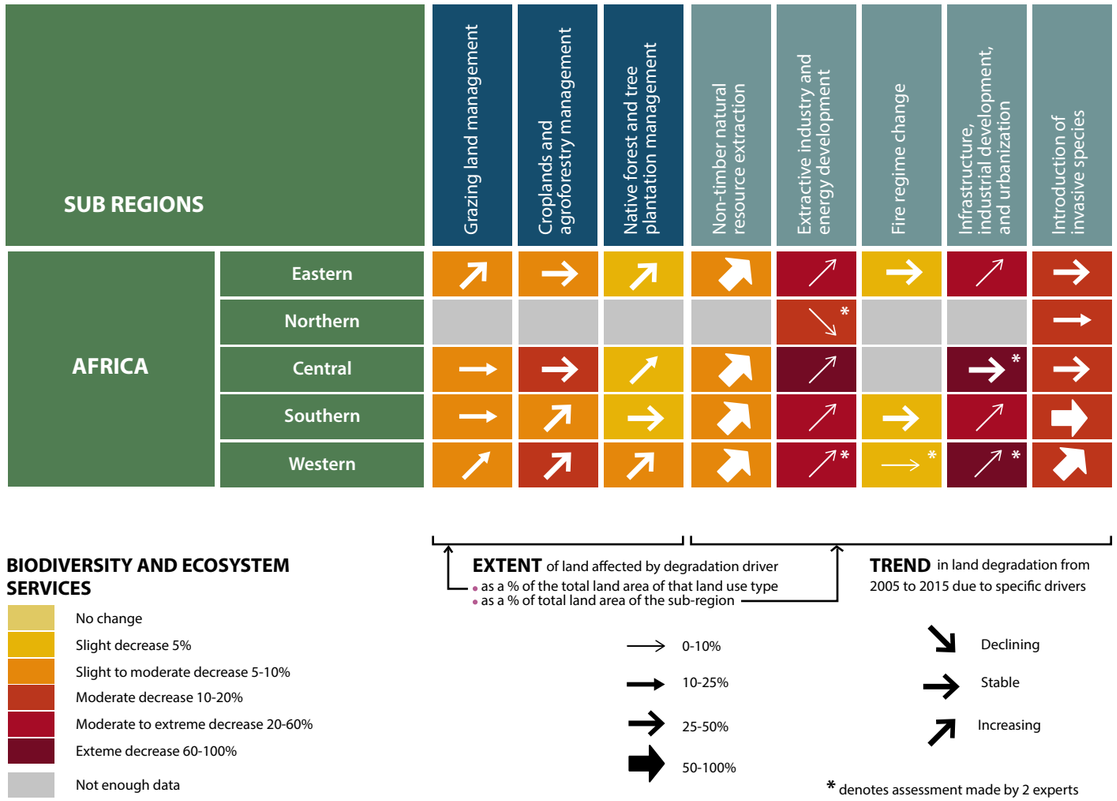


Figure 3. Status, trend and extent of direct drivers of land degradation across subregions of Africa

WHAT DOES IPBES BRING TO THE CONVERSATION ON LAND DEGRADATION?

Despite land degradation being a pervasive problem affecting all ecosystems globally, the recently published IPBES report on land degradation and restoration is the first comprehensive scientific assessment of land degradation at a global scale. The extent of land degradation is lower in many developing countries, as most of them have not yet exploited their land to the extent of the developed countries.

However, the rate at which these countries are currently degrading their lands is much higher. With future forecasts showing that most transformation of land will occur in Central and South America as well as sub-Saharan Africa and Asia, this is cause for concern. This is particularly a challenge for Africa, where many people are still undernourished, food production is lagging behind demand and population is expected to grow faster than any other region in the world.

To exacerbate the problem, there are presently several "development corridors" which involve large-scale expansions of infrastructure such as roads, railroads, pipelines, and port facilities ongoing or planned, which will open up extensive areas of land to new degradation (Laurance et al 2015). These same development corridors are also facilitating the development of agriculture on the continent at rates never seen before. While this expansion of agriculture will contribute positively to food security, it will also have significant impacts on biodiversity and ecosystems - and ultimately on people and the economies of countries on the continent.

The IPBES report complements the LDN strategies developed and adopted by countries by expanding the 'impact basket'. That is, in addition to assessing the impacts of land degradation to the extent of ecosystems (e.g. forests), the IPBES land degradation assessment report also assesses its impacts on a suite of ecosystem services (Figure 2 & 3). In this way, land degradation is not only affecting forests and ecosystems but also affects people by diminishing the contributions made by these ecosystems to food security, water security and many other essential services. To illustrate with an example, let's look at how land degradation impacts pollination and pollinators, and how this, in turn, affects agricultural productivity and food security.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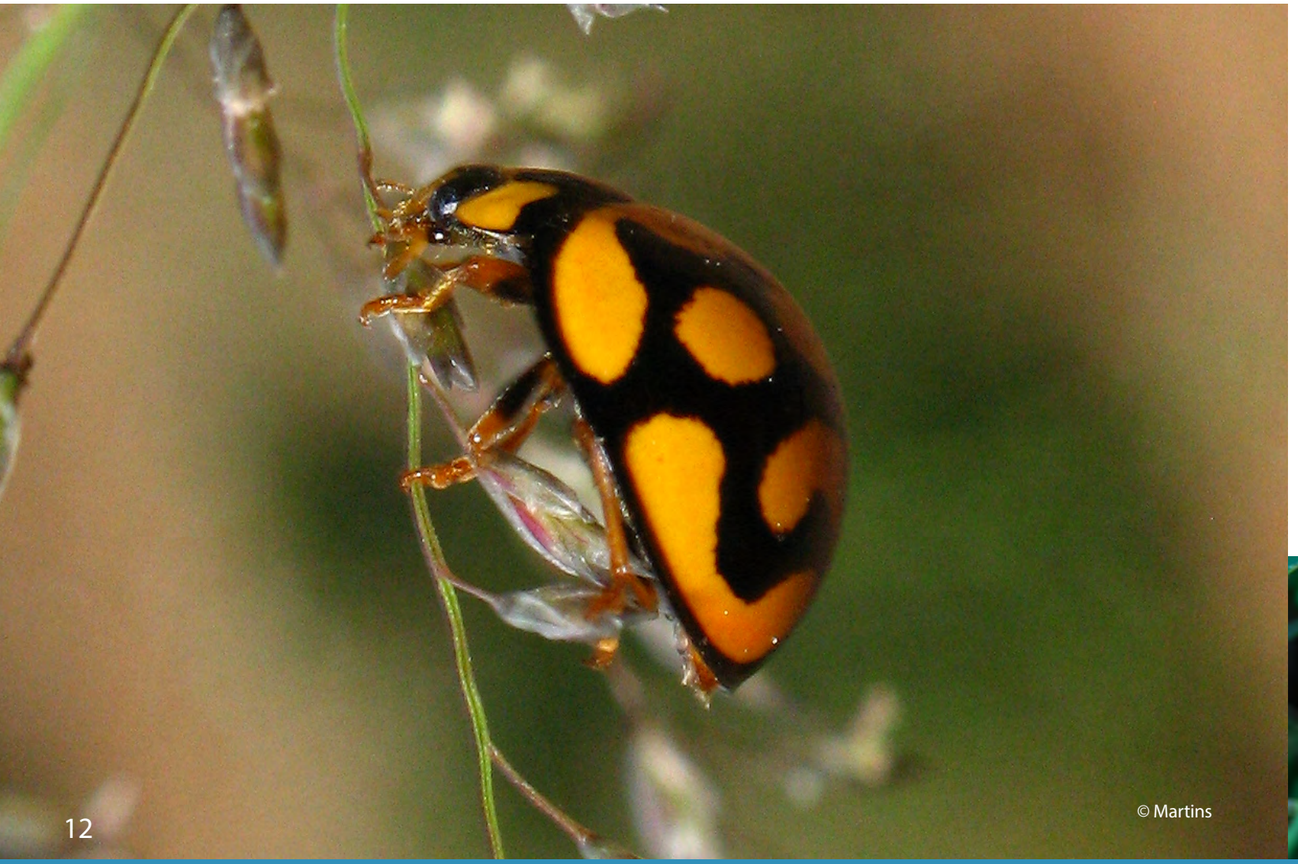
WHAT IMPACT DOES LAND DEGRADATION HAVE ON POLLINATORS AND HOW DOES THIS AFFECT AGRICULTURE AND FOOD SECURITY?

Land offers various ecosystems services (Figure 1). Once degraded, it is a rather slow process to restore the degraded land and to regain the associated benefits. This is because key organisms which enhance the fertility of the soil and land get wiped away with land degradation, or their populations become too small to sustain themselves. As ecosystem function is progressively impaired and important organisms decline and disappear, the capacity of an ecosystem to self-restore becomes increasingly restricted.

Several reports both in the scientific literature and in the media highlight the declining trends in pollinators in many parts of the world. The IPBES assessment report on pollinators, pollination and food production (IPBES 2016) represents the current state of our knowledge on this issue. This report confirms much of the concerns raised about the state of pollinators and concludes that pollinators, which are economically and socially important, are increasingly under threat from human activities. Some of the human activities contributing to pollinator declines include land degradation, which effectively takes away the habitats of most of the pollinators. This is particularly true in many parts of Africa, where farmers burn their fields, households cut down vegetation for energy supply, and pesticides are over applied.

The IPBES pollinators assessment also concludes that 75% of our food crops depend at least to some extent on animal pollination and that a high diversity of wild pollinators is critical to pollination even when managed bees are present in high numbers. Pollinator dependent crops contribute to 35% of global crop production volume. This means that one in every three mouthfuls of food are pollinator-dependent. Pollinators help to increase yields, improve the quality of the crops, and help maintain the diversity of crops grown for various purposes including for food and horticultural crops.



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The availability of fruits, nuts and vegetables, which are equally important contributors to nutrition, providing vital micronutrients as such vitamins (e.g. vitamin C) and minerals (e.g. calcium and fluoride), depend on a range of pollinators (see selected examples in country-specific information below). It is important to emphasize that globally, fruits and vegetables have not received the same subsidies that grains have (because of the focus on meeting calorie quotas in the food security circles), and they tend to be more expensive (Gemmill-Herren *et al* 2014), a trend that could be worsened if the pollinators they depend on continue to decline. Particularly for these heavily dependent fruits, replacing natural pollination services with managed hives can be prohibitively expensive (for example, renting one hive for almond pollination in Australia costs anywhere between US$ 70-100 per hive). At such prices, much of the agriculture on the continent will be devastated.

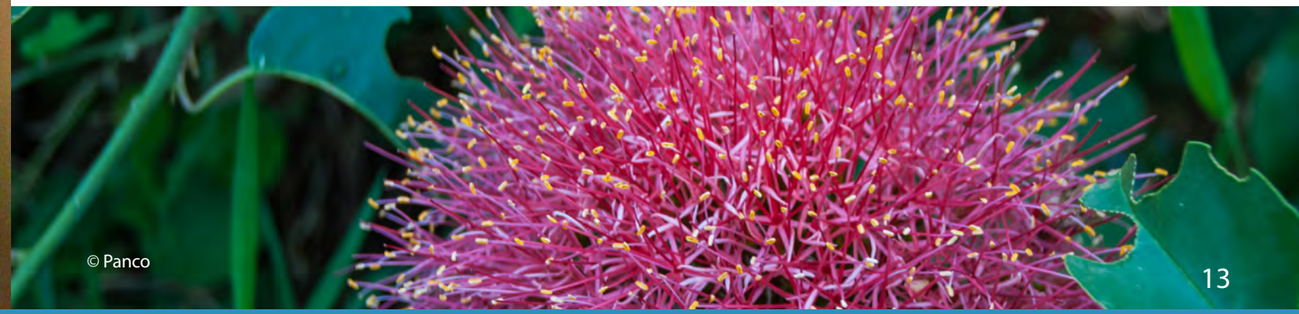
Although an accurate number of bee species in sub-Saharan is not known due to lack of data, 2,600 species of bees from the continent have been described (Eardley *et al* 2009), most of which are effective pollinators. There are other insect and mammal pollinators including moths, flies, wasps, beetles, butterflies, bats, and bush babies, on top of the commonly referred to bees. All of these require a place to live, raise their young and eat. By degrading land, both in terms of wholesome removal of vegetation (e.g. for fuelwood or for forestry or mining) or decrease in quality of ecosystems (e.g. invasive species, monoculture forestry plantations), these essential insects and mammals are essentially left 'homeless'.

This threatens 35% of crops dependent on pollination services, some of which are grown for food and for export markets, with significant contribution to the economies of the countries producing them: some examples of these are given below for the six countries included in this background document. All is not lost, however. The report also outlines a wide range of management and response options that are available to halt the further decline of pollinators. So while the situation is declining, there are tangible options for reversing the course for pollinators. Before we discuss these options, let's first turn to the six countries involved in the Trialogue.

BRIGHT SPOT

Multi country commitments to landscape restoration

About half (26 countries) of the countries in Sub-Saharan Africa have signed up to the African Forest Landscape Restoration Initiative, a country-led effort to bring 100 million hectares of land in Africa into restoration by 2030. Five of the six countries represented in this Trialogue have committed or started work on implementing this agreement. In 2016, Kenya committed to restoring 5.1 million hectares, a commitment which aligns well with its domestic targets. Ethiopia made a commitment to restore 15 million hectares in the same year, as did Malawi committing to restore 4.5 million hectares. Ghana committed earlier in 2015, pledging to restore 2 million hectares and finally Nigeria committed in 2017 to restore 4 million hectares. All the six countries in the Trialogue have also committed and have set targets for LDN.



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DESCRIPTION OF THE ISSUE AT THE NATIONAL LEVEL

ETHIOPIA

Land degradation

Ethiopia is the country most seriously affected by land degradation in Sub-Saharan Africa, and some estimates show that as much as 85% of Ethiopia's land is degraded to some various degree (Gebreselassie *et al* 2015). This is mainly in the form of degradation of forests, croplands and wetland productivity, and is occurring across most of the country's regions. The drivers for this degradation include deforestation, conversion to cropland cultivation, overgrazing, soil erosion, pressure from livestock movement, urbanisation and mining, among others.

According to studies in Ethiopia, the annual costs of land degradation related to soil erosion and nutrients loss from agricultural and grazing lands is estimated at about US$106 million, which is about 3% of Ethiopia's agricultural Gross Domestic Product (GDP) (Yesuf et al 2008; Kirui and Mirzabaev 2015). These studies further estimated that other annual losses included US$23 million forest losses via deforestation and US$10 million loss of livestock capacity. The combined costs of these translated to an annual total loss of about US$139 million (about 4% of Ethiopia's GDP).

Pollination

A series of studies investigating various relationships between forests, coffee production and pollinators in a subsistence farming context in Ethiopia show that: pollination services increase coffee yields by as much as 91% (Samnegård *et al* 2016); while the semi-wild honeybee survival was not related to shade tree structures, this mattered for other types of pollinators (Samnegård *et al* 2014); that bee species richness and abundance is better around forests (Samnegård et al 2015). On a more general level, i.e. beyond subsistence agriculture, a recent study in Ethiopia estimated the economic value of pollination at US$815.2 million in 2015/16 (Alebachew 2019). This is hardly surprising as pollination services are also important for crops which are important for the export market (Table 1).

TABLE 1. Selected top export crops for Ethiopia and their level of dependence on pollinators

CROP	EXPORT VALUE (US$ 1,000)	POLLINATOR DEPENDENCE*
Coffee, green	1,018,149	Modest
Sesame seed	474,398	Modest
Beans, dry	134,498	Little
Broad beans, horse beans, dry	47,290	Modest
Tomatoes	18,542	Little
Soybeans	17,539	Modest

* http://www.fao.org/fileadmin/user_upload/pollination/docs/POLLINATION_VALUE_ARRAY.xls

BRIGHT SPOT

Bright spot: Land restoration transforming landscapes

Restoration efforts in four watersheds in northern Ethiopia transformed previously desolate watersheds in a 15-year period. This process, which started as a grassroots movement in the 1990s has yielded transformation which has brought back healthy soils and allowed farmers to produce a surplus, from previously barely surviving. In one community, new economic activities such as beekeeping and growing fruit trees have sprung up in the restored landscape. They restore the area using a leguminous plant, Faidherbia albida, whose flowers are considered excellent bee forage for local honey production.

GHANA

Land degradation

Ghana had 35% of its land under threat of desertification since the 1960s and 1970s. This is particularly true in the Upper East, Upper West and Northern Regions. As a result, large tracts of cropland have become unproductive, despite being previously fertile. Land degradation is also affecting non-agricultural areas and is resulting in losses of grasslands, forests and woodlands. Similarly, natural water bodies are drying up due to prolonged droughts and sedimentation of watercourses resulting from soil erosion.

A recent study assessed the impacts of land degradation on six ecological zones in Ghana and found that all these ecological zones are at risk – but this is particularly concentrated in the Sudan and Guinea savannah ecological zones in the northern, upper east, and upper west regions of Ghana (Mensah et al 2015). Diao and Sarpong (2007) estimated and projected the economic cost of agricultural land degradation between 2006 – 2015. They suggest that land degradation reduced agricultural income by US$4.2 billion during that period.

Pollination

The Ghanaian Cocoa Board (COCOBOD) recognises the decline of pollination services in the cocoa production and launched a national hand pollination programme targeted at increasing cocoa yield in the country after observing declines in pollination services. This is an important initiative as cocoa production is particularly important both for smallholder farmers (it involved nearly 800,000 households (FAO, 2018) – and the initiative aimed to employ 30,000 youth to pollinate cocoa trees) but cocoa is very important for the export market in the form of beans, paste and butter. According to FAO, pollination services are essential for cocoa production. Although this initiative does not address the problem of pollinators by protecting and sustainably managing them, it certainly recognises their importance – or the importance of the services they provide.

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Pollination services are also shown to be important for increasing yields in Ghana. A study comparing cashew nut farms with managed honey bee colonies and farms without colonies shows that a total cashew nut yield increase of 102% was obtained on farms with bee colonies. This is also significant as the cashew sub-sector is an essential source of income for about 70,000 smallholder farmers in Ghana as well as being an important contributor to the Ghanaian export market. In fact, most of the main export crops in Ghana depend heavily on pollinators, as detailed in Table 2 below.

TABLE 2. Selected top export crops for Ghana and their level of dependence on pollinators

CROP	EXPORT VALUE (US$ 1,000)	POLLINATOR DEPENDENCE*
Cocoa, beans	1,675,462	Essential
Cocoa, paste**	309,315	Essential
Cocoa, butter**	139,984	Essential
Cashew nuts, with shell	79,139	Great
Mangoes, mangosteens, guavas	23,089	Great
Papayas	1,477	Little
Coconuts	1,354	Modest
Almonds shelled	191	Great
Beans, dry	153	Little

* http://www.fao.org/fileadmin/user_upload/pollination/docs/POLLINATION_VALUE_ARRAY.xls
** Not a crop but would not be possible without the crop

BRIGHT SPOT

Stingless bee initiative

In Ghana, there is a Stingless Bee Centre dedicated to protecting stingless bees and raising awareness about their contribution to the country as pollinators. While the centre initially started as an effort to protect stingless bees, it currently has three core activities: 1) conducting research on stingless bees, studying their behaviour, investigating the potential uses of propolis produced by the bees (propolis has many uses including as varnish for string musical instruments, developed into a chewing gum, and as a car wax); 2) the centre offers consultancy on beekeeping, biodiversity conservation and hive product development; and 3) the centre offers ecotourism activities offering people an opportunity to 'watch bees that do not sting', including taking their honey – allowing people to learn about the African Rainforest and the role of bees in conserving it. This initiative brings a lot of awareness not only on bees but also about the systems on which they depend.

BRIGHT SPOT

Traditional farming practices help save bees

In traditional farming systems in Ghana, farmers who work together on their farms use patches of natural vegetation or planted crops to mark the borders of their farms. This vegetation or intermediate crops become useful temporary habitat and forage areas for bees in between the flowering periods of the main crops grown on the farm. Because of these benefits, researchers have started quantifying the benefits of such practices, which have positive outcomes for both pollinators and in turn for crops and farmers are encouraged to maintain this practice.

KENYA

Land degradation

Land degradation in Kenya was estimated at 22% of the land area in the country between 1982 and 2006. This included 31% of croplands, 46% of forested land, 42% of shrublands, and 18% of grasslands (Nkonya *et al* 2016). The problem of land degradation in Kenya is more pronounced in the Eastern parts and North Eastern parts of the country. Here, 12.3 % of the land suffers from severe degradation, 52 % from moderate degradation and 33 % is vulnerable to land degradation (Nkonya et al 2016).

Soil nutrient mining, which represents the loss of soil fertility, is one of the major land degradation problems in Kenya, alongside wind and water erosion, rangeland degradation, deforestation and desertification. Between 2001 – 2009, the costs of land degradation in Kenya were estimated at US$ 10,645 million (See Table 3 for a breakdown by region).

Some of the main listed drivers of land degradation are: unsustainable fuelwood extraction, logging for charcoal and commercial timber, and land clearing for purposes of agriculture and for human settlement, industry and infrastructure development.

TABLE 3. Costs of land degradation in Kenya from 2001 – 2009

REGIONS	MILLION USD
Central	647.4
Coast	2321.5
Eastern	1713.7
Nairobi	18.5
North Eastern	1502.8
Nyanza	577.1
Rift Valley	3616.6
Western	247.7
Total	10645.2

Source: Nkonya et al 2016

Pollination

Pollination services in Kenya contribute both to the increases in quantities of the crop (through yield increases) sa well as helping to improve the quality of produce. A study of the production of strawberries in Kenya aimed at testing the pollination efficiency of three stingless bee species and the honey bee, *Apis mellifera scutellata* (strawberries require different honey bee and stingless bee species for optimal pollination), on two strawberry varieties in order to recommend their use by commercial farmers to increase horticultural production and for improved fruit quality. The study found that combining pollination by both stingless and honey bees resulted in more marketable strawberries, and the study recommended the cultivation of strawberries using both or any bee species best adapted to the climatic condition for their pollination requirement (Asiko, 2012).

Pollinators are also important for indigenous crops, which are often overlooked. Researchers in Kenya observed that African indigenous vegetables, some of which have many nutritional and health benefits, have not been well researched (Abukutsa-Onyango *et al* 2010). They go on to identify a wide range of pollinator-dependent indigenous foods such as African nightshades (*Solanum scabrum*), amaranths (*Amaranthus blitum*), spider plant (*Cleome gynandra*), slender leaf

(*Crotalaria ochroleuca* and *Crotalaria brevidens*), African kale (*Brassica carinata*), jute mallow (*Corchorus olitorius*) and African eggplant (*Solanum macrocarpon* and *Solanum gilo*).

Pollination services are also important for the production of many fruits and vegetables, which are important both for providing micronutrients for the local population but also for Kenya's export market (Table 4).

TABLE 4. Selected top export crops for Kenya and their level of dependence on pollinators

CROPS (2015)	EXPORT VALUE (US$ 1,000)	POLLINATOR DEPENDENCE*
Coffee, green	106,588	Modest
Beans, green	69,413	Little
Avocados	28,024	Great
Beans, dry	22,017	Little
Mangoes, mangosteens, guavas	11,853	Great
Sesame seed	2,758	Modest

* http://www.fao.org/fileadmin/user_upload/pollination/docs/POLLINATION_VALUE_ARRAY.xls

BRIGHT SPOT

Farmers reduce pesticide use to protect polinators

In Kenya, over 500 farms reduced up to 75% of pesticide use, and 10% of farms have stopped using them altogether, following outreach regarding the negative effect of pesticides on pollinators and on crop yields. This effort improves land productivity, conserves pollinators, boost yields, and improves livelihoods. As a result, their crop yield increased up to tenfold. The outreach programme went further to lobby the government to secure a ban on several highly toxic pesticides, now being implemented in the country, and contributed to Kenya's first legislation to specifically protect bees from pesticides and recognise their harmful effects. To raise awareness on the different types of pollinators, a handbook on pollinators, which is freely available, was produced and has been accessed by over 150000 farmers. The handbook is available for download here.

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MALAWI

Land degradation

A recent assessment of Malawi's land degradation shows that the country is a 'land degradation hotspot' of around 41% of the land area. Land degradation in Malawi is driven by charcoal and wood fuel (for domestic and commercial uses), timber production; unsustainable agriculture, slash and burn, and mining among human-driven activities. These drivers are underlined by the need and demand for resources such as energy, forest products, agriculture and water sectors – but also by persistent poverty, weak policy environment, lack of planning and insecure land tenure.

The main form of land degradation in Malawi is chemical land degradation, which includes soil pollution and salinization/alkalinisation, which has led to 15% loss in the arable land in Malawi in the last decade alone (Kirui 2016). The annual costs associated with Malawi's land degradation from 2001 – 2009 are staggering, estimated at US$244 million – which is equivalent to 6.8% of the country's GDP. Kirui (2016) estimates that the costs of action against land degradation are lower than the costs of inaction by about 4.3 times in Malawi over the 30-year horizon.

Pollination

There is not much information on pollination services in Malawi. From the FAO guidelines on pollination services valuation database, it was possible to show the importance of pollinators for a few crops which are important for export (Table 5).

TABLE 5. Selected top export crops for Malawi and their level of dependence on pollinators

CROPS	EXPORT VALUE (US$ 1,000)	POLLINATOR DEPENDENCE*
Groundnuts, shelled	4,101	Little
Soybeans	2,886	Modest
Coffee, green	1,656	Modest
Sesame seed	219	Modest
Sunflower seed	75	Modest

* http://www.fao.org/fileadmin/user_upload/pollination/docs/POLLINATION_VALUE_ARRAY.xls

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NIGERIA

Land degradation

Like other countries in Sub-Saharan Africa, Nigeria is experiencing land degradation. Much of this, however, is driven primarily by expansion of agriculture – Nigeria has the largest area under cultivation in the region. Rainfed agriculture, for example, accounted for 40% of the country's territory in 2013 – which is double what it was in 1975. Overall from 1975 – 2013, Nigeria converted the area more than the size of Ghana into a cultivated area. This expansion involves intensive clearing of the natural vegetation.

Pollination

Most of Nigeria's exports of food crops depend significantly on pollinators. Table 6 shows that most of the important export crops in Nigeria depend to a great extent on pollination services.

TABLE 6. Selected top export crops for Nigeria and their level of dependence on pollinators

CROPS	EXPORT VALUE (US$ 1,000)	POLLINATOR DEPENDENCE*
Sesame seed	265,631	Modest
Cocoa, beans	65,905	Essential
Cocoa, butter	50,437	Essential
Cashew nuts, with shell	18,000	Great
Cocoa, powder & cake	3,149	Essential
Cocoa, paste	1,499	Essential
Soybeans	1,284	Modest
Kola nuts	750	Great
Cashew nuts shelled	494	Essential

* http://www.fao.org/fileadmin/user_upload/pollination/docs/POLLINATION_VALUE_ARRAY.xls

ZAMBIA

Land degradation

Zambia has ample agricultural land and 60% of the population depends on small-scale agriculture both for subsistence and for income generation. The smallholder sector employs 67% of the labour force while commercial farming employs 14% (Msangi 2007). In parts of Zambia, the soils are fragile and infertile due to misuse and a long period of weathering of old mineral-rich rocks. Degradation is thus attributed to prolonged use of the land without appropriate tillage methods and the age of the parent material (Msangi 2007).

During the last decade, several projects were undertaken in Zambia to ensure sustainable land management. These include conservation farming technologies, with the objective to enable small-scale farmers to adopt more productive and environmentally friendly sustainable conservational farming systems. Other initiatives focused on agroforestry technologies such as improved fallows, mixed cropping, relay cropping and biomass transfer for fertility improvement (Msangi 2007).

Pollination

Although there is not much information on pollination services in Zambia, several important crops for the export market are dependent on pollinators, as can be viewed in Table 7 below.

TABLE 7. Selected top export crops for Ghana and their level of dependence on pollinators

CROPS	EXPORT VALUE (US$ 1,000)	POLLINATOR DEPENDENCE*
Cotton lint	17,156	Modest
Soybeans	4,245	Modest
Beans, dry	2,079	Little
Cottonseed	684	Modest
Coffee, green	163	Modest

* http://www.fao.org/fileadmin/user_upload/pollination/docs/POLLINATION_VALUE_ARRAY.xls

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INTERNATIONAL POLICY PROCESSES UNDERPINNING REGIONAL AND NATIONAL ACTIONS

UNCCD: UNCCD is the sole legally binding international agreement linking environment and development to sustainable land management, and its new UNCCD 2018-2030 Strategic Framework is the most comprehensive global commitment to achieve LDN in order to restore the productivity of vast expanses of degraded land. The convention's key target is now part of the SDG framework, and particular SDG Target 15.3 which aims to combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.

IPBES: IPBES is an independent intergovernmental body that provides policymakers with objective scientific assessments about the state of knowledge regarding the planet's biodiversity, ecosystems and the benefits they provide to people, as well as the tools and methods to protect and sustainably use these vital natural assets. The IPBES offers a catalogue of policy support tools and methodologies to support the suggestions of policy options as part of the Trialogue and other processes.

Convention on Biological Diversity: CBD has considered the implications of the IPBES assessment on pollinators, pollination and food production for the work of the Convention and, at its thirteenth meeting in 2016, adopted Decision XIII/15 "To integrate consideration of issues related to the conservation and sustainable use of pollinators in agriculture and forestry policies, national biodiversity strategies and action plans, national adaptation plans for climate change, national action programmes for combating desertification and other relevant national policies plans, and programmes, taking into account the values of pollinators and pollination, inter alia, to promote the implementation of actions to improve the management of pollinators, to address drivers of pollinator declines and to reduce the crop yield gaps due to pollination deficit". The CBD has recently attempted to adopt the IPBES assessment on pollinators, pollination and food production outcomes to Africa in an unfinished report published on their website. This report was intended to highlight the region-specific implications.

SDGs: The United Nations Agenda 2030 for Sustainable Development is embraced by almost all countries, addresses the concerns about land degradation and food security in goals 2 and 15 as follows: SDG2: "End hunger, achieve food security and improved nutrition and promote sustainable agriculture" and SDG15: "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss" (UN 2016). The SDGs are explicit about biodiversity and ecosystem services and could facilitate the creation of regulations to protect pollinators.

Paris Agreement and Ecosystem-Based Adaptation (EbA): Climate change is one of the main drivers of land degradation. EbA is one of the recommended approaches to climate change adaptation. It integrates the use of biodiversity and ecosystem services into an overall strategy to help people adapt to the adverse impacts of climate change. It includes the sustainable management, conservation and restoration of ecosystems to provide services that help people adapt to both current climate variability, and climate change. Healthy ecosystems have a greater potential to adapt to climate change themselves and recover more easily from extreme weather events.

Coalition of the Willing on Pollinators: The key messages of IPBES assessment were recognized by the CBD at the Thirteenth meeting of the Conference of the Parties (COP) to CBD in Cancun, Mexico, 2016 (Decision CBD/COP/DEC/XIII/15). This stimulated a limited number of countries to form a "Coalition of the Willing" to work on some of the key problems identified in the assessment. This coalition is committed to taking action to protect pollinators and their habitats by developing and implementing national pollinator strategies; share experience and lessons learnt in developing and implementing national pollinator strategies, especially knowledge on new approaches, innovations and best practices; reach out to seek collaboration with a broad spectrum of stakeholders – countries as well as businesses, NGOs, farmers, local communities; develop research on pollinator conservation; and mutually support and collaborate with each other – and those parties that are willing to join the coalition.

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ANNEX I: VOLUNTARY LDN TARGETS OF THE ANGLOPHONE AFRICA TRIALOGUE TARGET COUNTRIES

ETHIOPIA

The following are nine national voluntary targets with the strategies set by the LDN national working group to achieve a land degradation neutral environment throughout the country.

- **Target 1:** By 2031, promote the implementation of community based forest management, forest landscape restoration with indigenous species, avoiding overgrazing, area closure and alternative livelihood systems, and ensure the restoration of 427,730haof forest land lost between 2000 and 2010.
- **Target 2:** By 2036, ensure the rehabilitation and improvement of the productivity of 21,359,490ha of forest land by stopping uncompensated conversion of forest area, especially in slopes, into grassland, cropping or urban areas, and promoting agroforestry, energy saving stoves and, alternative livelihood systems, in order to avoid reduction of carbon sock and limit the risk of erosion.
- **Target 3:** Improve the productivity of 314,990ha of shrubs, grasslands and sparsely vegetated areas by the year 2040 through avoiding overgrazing, promoting controlled grazing, and rangeland management/improvement.
- **Target 4:** By 2040, rehabilitate and improve the productivity of 12,578,714ha of shrubs, grasslands and sparsely vegetated areas through stopping uncompensated conversion of permanent grasslands in to croplands, promoting controlled grazing, and rangeland management/improvement so as to avoid reduction of soil carbon stock.
- **Target 5:** By 2031, ensure improved productivity of 14,193,615ha of cropland by reverting negative trends of arable land deterioration, including acidification, alkalization and salinization, erosion by strongly discouraging inappropriate practices and supporting soil, water and vegetation long-term conservation practices; limiting drastically the size of individual parcel to the maximum permitted to conserve biodiversity and natural regeneration potential, through agroforestry and green corridors and biodiversity grids, especially in large-scale commercial farms; accelerating the conversation of unsustainable to sustainable cropping, grazing, forestry in the framework of scientifically grounded watershed management plans implemented under legally binding long-term agreements and contracts; and 100% cropland shows stable of increasing land productivity capacity.
- **Target 6:** By 2026 ensure improved productivity of 72,766ha of wetlands and water bodies through stopping uncompensated conversion of wetlands into cropping or urban/industrial/infrastructure areas, in order to avoid depletion of carbon stock and critical biodiversity.
- **Target 7:** Take urgent and significant actions like stopping uncompensated artificialisation /urbanization of arable lands, through urban densification and "building city on city" approach; restoring as much as possible lands degraded by pollutions, originated by urban, industrial, mining untreated contaminants; revitalizing vegetation in degraded slopes, dried lands, closed mines, infrastructure (airports, harbours, roads, dams and reservoirs) using pools of endogenous species and further sustainable use and promoting plantation of indigenous tree species, and improve the productivity of 33,452ha of artificial areas by the year 2026.
- **Target 8:** Through sustainable land management practices particularly implementing biophysical soil and water conservation practicesimprove the productivity of 3,751,173haof bare land and other areas by the year 2036.
- **Target 9:** By 2040, ensure the increase of carbon stockin the country by 148.67 million tons of carbon between 2016 and 2040through achieving the above mentioned target.

GHANA

All listed targets should be accompanied by sustainable management of the resource and envisaged to be achieved by 2030.

- Reforest 882.86 km2 of converted forest into other land use/cover types, and rehabilitate/restore all abandoned legal and illegal mineral mining and sand winning sites by 2030.
- Improve productivity and soil organic carbon stocks in 18,475.96 km2 of cropland by 2030.
- Rehabilitate/restore 5107.70 km2 of degraded forest, including abandoned legal and illegal mineral mining sites for enhanced productivity by 2030.
- Rehabilitate/restore and sustainably manage 4593.39 km2 of degraded shrubs, and sparsely vegetated areas for improved productivity and reduction in bush/wild fires by 2030.
- Reduce conversion of 45,079.72 km2 of remaining forest to other types of vegetation, and halt all illegal mining activities by 2030.
- Increase the soil organic carbon of degraded croplands and rangelands by 66 % (i.e., 1.20 % to 2.0 %) by 2030.

KENYA

LDN at the national scale:

- LDN is achieved by 2030 as compared to 2015 and an additional 9% of the national territory has improved (net gain).

LDN at the sub-national scale

- LDN is achieved in EwasoNgiro North (Lak Dera 2) of Kenya by 2030 as compared to 2015 (no net loss).
- LDN is achieved in the Tana River catchment zone of Kenya by 2030 as compared to 2015 and an additional 16.7% of the zone has improved (net gain).
- LDN is achieved in Athi River catchment zone (Galana, Pangani, Kenya South east Coast) of Kenya by 2030 as compared to 2015 (no net loss).
- LDN is achieved in Rift Valley catchment zone (Lake Turkana, Naivasha, Natron) of Kenya by 2030 as compared to 2015 and an additional of 9% of the zone has improved (net gain).
- LDN is achieved in the Lake Victoria region (Nile basin) of Kenya by 2030 as compared to 2015 and an additional 9 % of the zone has improved (net gain).

Specific targets to avoid, minimize and reverse land degradation

- Increase forest cover through Afforestation/Agroforestry in existing forests; areas of shrubs/grassland; wetlands; croplands by 5.1 million Ha.
- Increase by 16% net land productivity in forest, shrubland/grassland and cropland showing declining productivity; achieved through SLM practices.
- Increase soil organic carbon by 319626 total tonnes in cropland land use achieved through SLM practices.
- Halt the conversion of forests to other land cover classes by 2030.
- Rehabilitation of all abandoned Mining and quarrying areas through enforcement of by- laws.

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MALAWI

LDN at the national scale:

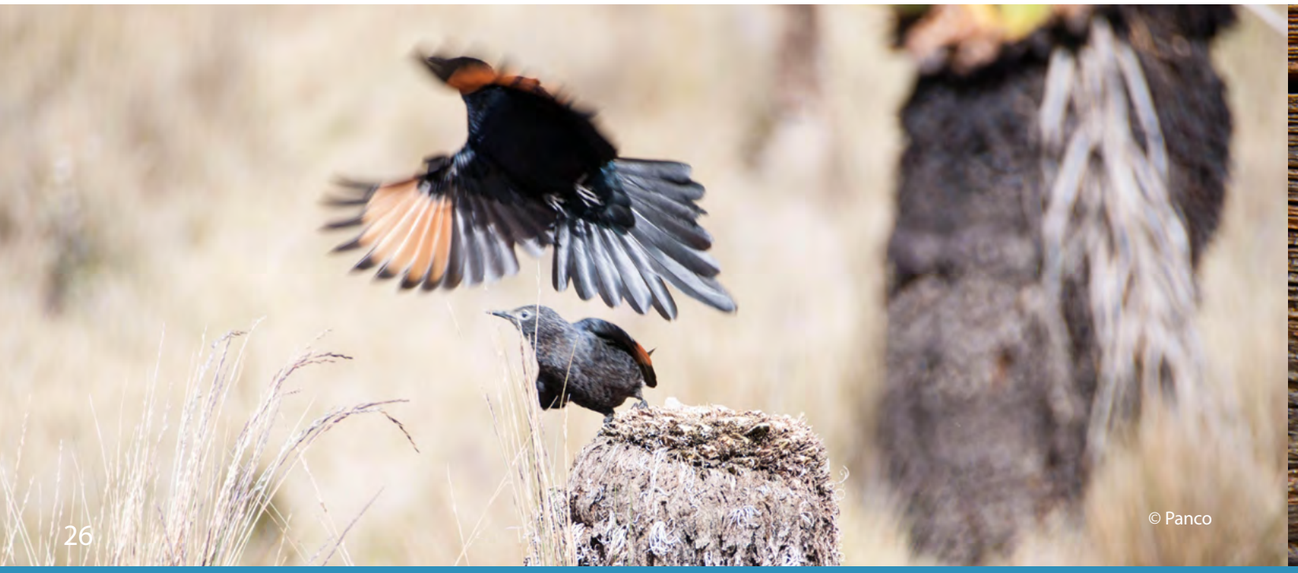
- At national scale Malawi has set a target of achieving land degradation neutrality by 2030 as compared to the baseline of 2015 (no net loss) and an additional 2% of the land territory of 9.4 million hectares improvement. This translates to 188,000 hectares with net gain as compared to 2015.

At sub-regional level the following are the targets:

- LDN is achieved in the High Lands of Nyika, Viphya and Mulanje, Dedza and Zomba mountains by 2030 as compared to 2015 (no net loss).
- LDN is achieved in the land degradation Hotspots along the Rift Valley Escarpment Area of Malawi by 2030 as compared to 2015.
- Attain land degradation neutrality on the Plateaux ecological zone by 2030 as compared to 2015.
- Attain land degradation neutrality in the Shire River basin catchment by 2030; compared to 2015 and an additional 2% of the basin has improved (Net gain).

Specific targets for avoiding, minimizing and reversing land degradation:

- Improve productivity of 754,320 hectares cropland by 2030.
- Improve Soil Organic Carbon (SOC) stocks on cropland to 55 ton/ha by 2025 as compared to 44.7 ton/ha estimated in 2015.
- Rehabilitate one million hectares of degraded land for crop production by 2030.
- Halt the conversion of forests and wetlands to other land cover classes by 2020.
- Improve forest (plantation & indigenous) cover by 33,750 hectares by 2030 as compared to 2015.
- Reduce the rate of top soil loss (soil erosion) to 20 tons per hectare per year by 2030 from the 2015 estimated rated of 29 tons/ha/year.
- Increase forest cover by 2% from 2015 baseline by 2022.
- Restore 820,000 hectares of degraded indigenous forest by 2030.
- Sustainably manage 138,000 hectares of plantation forest by 2025.
- Restore 36,000 hectares of degraded stream banks by 2030.
- Protect 2.4 million hectares of natural forest by 2035.



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NIGERIA

LDN at the national scale:

- LDN is to be achieved by 2030 as compared to 2015 and an additional 20 % of the national territory has improved (net gain).

LDN at the sub-national scale

- LDN is to be achieved in the following regions by 2030 as compared to 2015 (no net loss) and an additional 20% of the following regions has improved (net gain): South western region, South East region, South Southern region, North western region, North Eastern region, North Central region, Imeko Game Reserve of Imeko/Afo LGA, Ogun state, Aworo Forest Reserve of Yewa North LGA, Ogun state, Saki of Saki East LGA, Oyo state, Ilesha Ibaruba of Baruten LGA, Ejeba of Ughilli North LGA, Delta, Oroma-Etiti of Anambra west LGA, Anambra state, Orishaeze of Ngor-Okpalla LGA, Imo state, Ifiang Nsung of Bakasi LGA, Cross Rivers, Badoko of Kachia LGA, Kaduna state, Amba of Nsarawa LGA, Nasarawa state, Banaga of Anka LGA, Zamfara State.

Specific targets to avoid, minimize and reverse land degradation

- Improve land productivity and soil organic carbon stocks (SOC) in 463,300 hectares of cropland and grasslands by 2030 as compared to 2015.
- Rehabilitate 1,722,660 ha of cropland showing declining land productivity and 10,565,040 ha of cropland showing early signs of declining land productivity by 2030.
- Halt the conversion of forests and wetlands to other land cover classes by 2020.
- Increase forest cover by 20% by 2030 as compared to 2015.
- Reduce the rate of soil sealing (conversion to artificial land cover) by 40% by 2030 as compared to 2015.

ZAMBIA

Information not available on UNCCD Knowledget Hub

BESNet
Biodiversity and Ecosystem Services Network

Global Policy Centre on Resilient Ecosystems and Desertification (GC-RED)
United Nations Development Programme
United Nations Office at Nairobi
Gigiri, Block M, Middle Level
Nairobi, Kenya

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May 2019