

A close-up photograph of a woman with a patterned headwrap and a blue and white striped garment, holding a large, vibrant rooster with orange and red feathers and a prominent red comb. The background is a soft-focus outdoor setting with dry earth and sparse vegetation.

# GLOBAL LAND OUTLOOK

## West Africa Thematic Report

Land Degradation Neutrality:  
Benefits for Human Security



United Nations  
Convention to Combat  
Desertification



This GLO West Africa Thematic Report was prepared by the AGRHYMET Regional Centre under a Memorandum of Understanding signed in 2019 between the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) and the United Nations Convention to Combat Desertification (UNCCD). This report was made possible with the generous support of TetraTech, USAID and SERVIR West Africa.

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# **GLOBAL LAND OUTLOOK**

## **West Africa Thematic Report**

**Land Degradation Neutrality:  
Benefits for Human Security**



# PREFACE



**Dr. Djimé Adoum**  
Executive Secretary, CILSS

In the aftermath of the unprecedented droughts that hit the Sahel region, which increased the fragility of the ecosystem and the degradation of its environment, the States of the region mobilised around major structuring initiatives so as to deal with the crisis situation; this included the creation of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) in 1973.

For over forty-five years, the CILSS and its partners have worked to mitigate the effects of drought and desertification in West Africa and the Sahel.

The actions and initiatives undertaken in the region are organised around four main pillars, namely: the governance of natural resources through policy support; training and information on combatting desertification and sustainable land management (SLM); mobilisation of financial resources for the implementation of multi-country projects to combat desertification and adapt to climate variability and change at the local and regional levels; and capitalisation and dissemination of best practices in SLM and climate change adaptation and mitigation. These actions implemented through several programmes have created political, strategic and technical conditions for promoting SLM and strengthening the region's resilience to climate change. In this respect, I would like to mention, inter alia, the Programme for Monitoring the Evolution of Land Use and Land Cover in the Sahel (LU/LC Programme), which led to the development and dissemination of a Regional Atlas\*; the Regional Programme for Sustainable Land Management and Adaptation to Climate Change in the Sahel and West Africa (PR-SLM), which was enabled through technical and financial support of the UNCCD and the Global Mechanism. Today, these efforts have helped facilitate the formulation of Land Degradation Neutrality (LDN) objectives, regarding which countries have committed: to support the process of realigning/revising National Action Programmes (NAPs) and Sub-Regional Action Programmes (SRAPs) to UNCCD's ten-year strategy; to prepare their national country reports to the Convention; and to strengthen the negotiating capacity of the subregion during the Parties Conference on Desertification.

The results obtained after implementing the actions of the PR-SLM have notably enabled: an improvement of the living conditions of communities; increased land productivity; restoration of the degraded environment; an increase in land capital; improved food security; the replenishment of water tables; an expansion of irrigated areas; the restoration of river catchment areas; and the strengthening of the resilience of populations to drought.

Nevertheless, despite the efforts made, the impact of the various initiatives remains localised. Therefore, I remain convinced that scaling up these successful SLM experiences in the Sahel and West Africa offers significant potential for achieving LDN goals. This approach for scaling proven experiences is a guarantee of efficiency and effectiveness for future investments. Successful experiences of revegetation, improved socio-economic conditions for the local population, and enhanced governance practices are but a few of the benefits which arise from a pooling of efforts towards achieving sustainable development.

Moreover, it should be emphasised that further investment in SLM can meet not only challenges of continued land degradation, but also new regional issues, especially inter-community conflicts, terrorism and youth migration – given the interconnected nature of these challenges.

While welcoming the existing efforts of States and of the various technical and financial partners in the Sahel and West Africa, I urge all stakeholders to boost their cooperation and devote further efforts and investments to transform this region into a land of peace and well-being.

I remain convinced that “another Sahel is possible”.

Thank you.

A handwritten signature in blue ink, appearing to read 'Djimé Adoum', written in a cursive style.

# EXECUTIVE SUMMARY

Located in the arid and semi-arid areas of West Africa, the Sahel has undergone profound changes over the past 50 years. Known for the prevalence of land degradation processes, the Sahel is suffering from the combined negative effects of population growth, human activities and climate variability, resulting in recurrent droughts and the continued decline of natural resources and land productivity. While agriculture, livestock and forestry provide income and employment for more than 80% of the population, overexploitation of natural resources and unsustainable water and agro- and silvo-pastoral land management practices threaten rural livelihoods and economic development. This has direct and persistent impacts on food, water and energy security as well as amplifying social inequalities, conflicts over access to land and resources, and forced migration. While the situation in the region seems critical, solutions exist to reverse these trends.

This GLO regional thematic report analyses the challenges, constraints and assets of 7 countries (Burkina Faso, Chad, Mali, Mauritania, Niger, Nigeria, Senegal and Nigeria), highlighting past achievements and future opportunities to promote sustainable and inclusive development throughout the entire region. In response to land degradation trends, good practices for Sustainable Land Management (SLM) have been developed. Often implemented at the instigation of local communities, they have reduced soil erosion, restored vegetation cover, retained water for irrigation, improved agro- and silvo-pastoral production and increased the resilience of ecosystems and populations in the face of climate change. In addition, youth and women have an essential role to play in developing and managing the productive potential of land, since more than 60% of the population is under 25 years of age and women farmers represent more than 40% of the agricultural labour force. Finally, many parts of the Sahel have groundwater and surface water resources sufficient for local needs, vast areas of land and perpetual sunshine - an important source of renewable energy that has yet to be exploited.

While not all of these opportunities have been fully explored, the concept of Land Degradation Neutrality (LDN), target 15.3 of the Sustainable Development Goals (SDGs), provides a vehicle by which to do so. Based on land use planning, responsible and inclusive land use governance, and SLM practices to avoid, reduce and reverse land degradation, this innovative approach aims to maintain or even improve land productivity and resilience. The LDN-inspired projects and programmes provides multiple benefits in terms of poverty reduction, food, water and energy security, green job creation, conflict reduction and environmental migration. It thus helps to ensure human security in a broad sense.

With its assets and capacity to make the most of its natural resources, the countries of West Africa have the capacity to carry out ambitious LDN programmes, including within the framework of existing initiatives such as the Great Green Wall, and through the implementation of transformative projects and programmes that scale up SLM practices. Their success will depend in particular on (i) mobilizing significant innovative financial resources, (ii) securing equitable access to land, (iii) developing renewable energy sources and water conservation, (iv) undertaking institutional reforms, (v) creating market opportunities and new value chains, and (vi) good governance of land resources, equitable use of the labour force especially youth and women, and improving overall human rights relative to access to natural resources.

Another Sahel is possible with LDN implementation, by harnessing the full productive potential of its lands, taking advantage of existing technological achievements and the demographic dividend to create opportunities and wealth from natural resources, leading to inclusive and sustainable economic, social and environmental transformation.

# KEY MESSAGES

**West Africa, and the Sahel in particular, has been undergoing profound environmental, social and economic change** over the past 50 years due to land degradation, aggravated by increasingly severe climatic conditions and increasing demand due to exponential population growth.

**West Africa, which is periodically affected by severe climatic and humanitarian crises, is now seen as a region of poverty, conflict and human insecurity in the broadest sense.** These crises have given the region a negative image, an area where natural resources can be a major asset for inclusive and sustainable social and environmental transformation.

**Countries in West Africa have numerous assets and capacities that would allow it to provide a better and more prosperous future,** including:

- **The development of local know-how and the scaling up of SLM practices and other technological advances that have been developed.** These actions make it possible, among other things, to improve the productivity of animal and plant resources, and to ensure food and water security in high-risk areas. This will have the direct benefit of creating economic opportunities and green jobs for the most vulnerable populations, especially youth and women in rural areas, thus providing them with alternatives to migration;
- **The demographic dividend, such as the proper consideration of the role of women in the agricultural sector and green growth** based on the mobilization of youth under 25 years of age (more than 60% of the population) and women farmers (40% of the agricultural labour force) will need to be employed to carry out much-needed SLM and restoration activities;
- **The development and sustainable use of groundwater and surface water resources** with a view to developing irrigated agriculture;
- **The development of renewable energies and solar energy in particular,** with a view to improving agro- and silvo-pastoral productivity and supporting the development of new sustainable value chains.

**Land Degradation Neutrality is an innovative approach,** which can act as a real lever to replicate and scale up successful experiences of SLM and restoration practices within existing national and/or regional initiatives as well as new transformative projects and programmes.

**Aiming to avoid, reduce or reverse land degradation, West African countries have set realistic and achievable targets for LDN by 2030.** Their achievement is based on:

- **The mobilization of innovative financing, commensurate with the challenges,** for the restoration and sustainable management of land, and production and processing of natural resources. Existing financial institutions and models must include a special portfolio to meet the needs of an inclusive economy based on the sustainable use and management of land resources.
- **Securing access to land,** which is a major strategic, economic and social challenge, in order to manage inequalities in access to land for various actors and strengthen the land rights of vulnerable groups and women.

**We can permanently change the image of the Sahel and create real lands of opportunity through LDN implementation by leveraging the existing productive potential.**



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# Global Land Outlook

## WEST AFRICA THEMATIC REPORT

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# INTRODUCTION

Over the last 50 years, human activities and climatic variability have caused major environmental changes in West Africa and the Sahel region. Situated in an arid and semi-arid zone, the Sahel is well-known for the prevalence of processes of desertification and degradation of productive lands. The effects of land degradation are a major factor in recurrent food crises in the subregion. Since the 1970s, exceptional drought periods have led to a serious degradation of natural resources and ecosystems with a significant negative impact on the development of the countries concerned.

Desertification is a complex and multifaceted phenomenon that exacerbates poverty and can be seen as both a cause and a consequence of the loss of land productivity. The Sahel is an area always cited among the parts of the globe with the most degraded lands. This subregion faces both chronic variability of rainfall and strong pressure on arable land. Agriculture and livestock depend heavily on the quality of ecosystems, yet investment in these sectors remains very low. These two sectors constitute the main sectors of employment in the subregion (accounting for 60 per cent of households) and generate at least 40 per cent of the Gross Domestic Product in the majority of countries. In addition, ecosystem services provide much needed subsistence products, such as fuelwood and various harvesting products.

Unfortunately, growing population pressures on these resources make the environment vulnerable to land degradation, especially vegetation cover (UNCCD, 2017). In many situations, people have no choice but to implement unsustainable practices because of their urgent needs. This leads to a dangerous spiral where unsustainable practices contribute to increased land scarcity, loss of water resources, and jeopardise possibilities for adaptation. This phenomenon is experienced mainly in the Lake Chad region and in several small aquatic basins in the Sahel.

The good news is that there are several examples of innovative practices in Sustainable Land Management (SLM) in the region. Despite limited means, community programmes and initiatives have succeeded in implementing good practices for the protection of fragile soils. These practices have contributed to improving land productivity

and reducing rural poverty. Today, the countries of West Africa and those of the Sahel in particular, face the challenges of knowing how to profit from these innovations and good practices, and of how to create the synergies necessary for scaling them up. This will be achieved by combining efforts across national boundaries in order to be able to jointly address the difficulties presented by political barriers, low investment and limited institutional technical capacity.

At the local level, there is social instability characterised by mass emigration of youths, i.e. of labour forces, and by the presence of tensions, which fuel conflict and insecurity in the subregion. Human security is a prerequisite for inclusive development, and without it opportunities for land restoration cannot be made use of (Mbow, Halle and Thiaw, 2019). Similarly, land protection is inextricably linked to objectives of income source diversification, which makes it possible to improve the well-being of communities and, ultimately, helps retain young people who might seek to emigrate. At the same time, improved land management has a positive impact in reducing tensions between farmers and pastoral communities (Ndiaye et al., 2016).

This West Africa regional report focusses on seven countries, namely Burkina Faso, Mali, Mauritania, Niger, Nigeria, Senegal and Chad. These countries share the same issues that are at the heart of the priorities of sub-regional organisations.

The report is based on good practices and innovations in the fight against land degradation in West Africa and the Sahel in the context of Land Degradation Neutrality (LDN) objectives. It presents a series of detailed case studies and experiences that can lead to the scaling up of good practices in the sustainable management of degraded lands. The information is based on an analysis of LDN opportunities and barriers that will be supported by an analysis of good practices, which can, in turn, be scaled up to improve the resilience of ecosystems and local communities.



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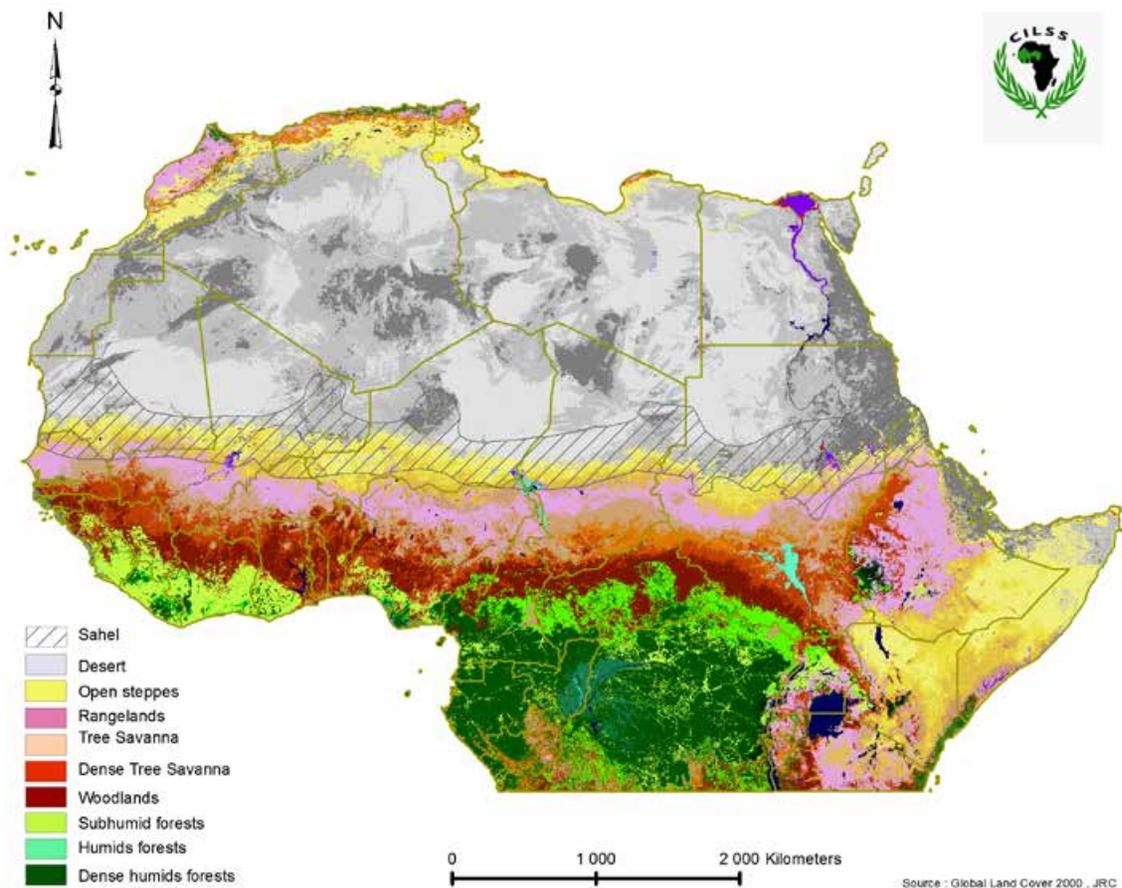
# 1. HUMAN-ENVIRONMENT INTERFACE AND ECONOMIC ISSUES

The population of West Africa was estimated in 2018 at over 397 million inhabitants, i.e. 38 per cent of the sub-Saharan population, and five per cent of the global population. It is characterised by strong cultural and sociological diversity. The annual population growth rate has been above 2.4 per cent since 1980. The rate of urbanisation is on average four per cent per year; in 2015 more than 43 per cent of the population – over 366 million inhabitants – lived in cities, compared with 86 million in 1960. This urban population is expected to reach 843 million in 2050, or nearly 63 per cent of the total population. The population of the Sahel mostly consists of young people with the population segment of those under 14 estimated at nearly 44 per cent of the total population. This situation places the Sahel countries under significant pressure in terms of employment opportunities for young people. These demographic challenges can be kept in check if the numerous opportunities regarding natural resources and production systems are seized by the people. This natural

resource potential is currently limited by deforestation, expansion of cultivated land, overgrazing and frequent droughts (Kandji et al., 2006). Heavy urbanisation has led to an increase in the area occupied by cities from 15,172 km<sup>2</sup> to 36,412 km<sup>2</sup>, an increase of 140 per cent - at the expense of cultivation areas and pastoral lands. At the same time, the urban market creates a strong demand for products from the primary sector to meet the rising demand of food. The reduction of areas covered by natural vegetation in favour of cultivated areas and residential areas, as well as poor cultural practices, have contributed to a decline in land productivity in the subregion.

The Sahel is the fringe separating the Sahara from the forested cover further south. It is characterised by a pronounced north-south rainfall gradient (200-800 mm/year) and several vegetation facies (from steppes to forests) (Figure 1). The Sahelian belt cuts through the main river basins (Senegal, Niger, Gambia, Volta, Lake Chad and

**Figure 1:** Ecological diversity in the Sahel (GLC, 2000, EU-JRC data)



several rivers in the south) and is an area of great ecological diversity. The region is dominated by pastoral activities and agriculture; other land uses include irrigation agriculture around water bodies, agroforestry and conservation areas. Pastoralism is the main productive activity that gives value to the resources of the arid and semi-arid zones of the Sahel; age-old practices have been preserved through a long tradition of transhumance. The driest areas of the northern limit are generally dominated by rangelands, where pastoralism directly affects 50 million people living on 1.8 million km<sup>2</sup> of rangelands – 35 per cent of the entire Sahel (Ndiaye et al. 2016). Pastoral livestock farming constitutes a primary economic value (40 to 60 per cent of agricultural GDP). It is therefore important to ensure the mobility conditions of pastoralists while managing the various pressures on resources in order to improve and maintain biodiversity, conserve soil health, and enable management of natural regeneration by farmers.

**Figure 1:** Ecological diversity in the Sahel (GLC, 2000, EU-JRC data)

Use of the Sahel's many natural resources will depend on the ability of countries to develop a common vision for inclusive development that generates jobs, creates businesses, and promotes high-value production based on a wide variety of natural resources. Animal production must increase by six per cent to meet growing demand. Production of cereals and processed foods is expected to support an annual population growth of 2.4 per cent. With the establishment of the African Continental Free Trade Area (AfCFTA), which has just been officially adopted by the African Union (AU), there are hopes for a great opening up of African urban markets, which are developing very rapidly, along with the middle class.



## 2. CONCEPTS AND RESPONSES TO LAND DEGRADATION

As part of its support to its Member States, the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) and its partners have developed important restoration and SLM investment programmes and projects, with the aim of reducing ecosystem vulnerability while increasing the social and environmental resilience of agro- and silvo-pastoral production systems. The multiple benefits of land restoration that contribute to LDN include: improved yields; improved soil fertility; reduced erosion; increased forage availability; income diversification; access to economic services; greater resilience to climate change; greater biodiversity; and a reduction in community conflicts over access to resources. Following the series of droughts in the Sahel and throughout West Africa since the early 1970s and 1980s, the United Nations has focussed on the problem of desertification, organising the United Nations Conference on Desertification (UNCOD) in Nairobi in 1976. This led to a greater prioritisation of land degradation as a response

to desertification-related crises. This dynamic has led to substantial efforts to quantify the extent of desertification and to understand its causes.

There are several understandings of these notions of land degradation, deforestation and LDN, because the factors that explain them are the same. Desertification is a complex and multifaceted phenomenon that exacerbates poverty and can be seen as both a cause and a consequence of the depletion of land resources. As defined by the UNCCD, desertification is “land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities”. While desertification was considered an important phenomenon for arid areas around the world, the Sahel-West Africa region remained a special area of interest and many scientific efforts were made to provide an empirical understanding of the anthropogenic and climatic factors involved.

**Successful example of SLM:** Bare soil restored in Tahoua, Niger



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Addressing the problems of land degradation and food security is an important contribution to the fight against poverty and the maintenance of lasting peace in the region (AFR100, OSS, CILSS, Office du Niger, OMVS, Lake Chad Authority, etc.). All countries in the Sahel and West Africa have established a National Action Programme (NAP) on LDN. The goal of these national policies is to improve ecosystem services and the living standards of vulnerable communities, thereby reducing land degradation and ultimately, rural exodus and emigration. Several actions have helped to protect and restore biodiversity; improve agro- and silvo-pastoral productivity; combat rural depopulation and youth emigration (through job creation for rural communities); combat climate change, poverty, and food insecurity; and improve the well-being of communities. This report will focus on these practices.

## Box 1: Key Definitions

**Land Degradation** is defined by the UNCCD as: “the reduction and loss of the organic or economic production capacity of production lands. Land degradation is often caused by human activities, and exacerbated by natural processes such as climate change and loss of biodiversity” (UNCCD, 2016).

**Sustainable Land Management (SLM):** “the adoption of land use systems that, through appropriate management practices, enable land users to maximise the economic and social benefits of the land while maintaining or improving ecological support functions of land resources” (TerrAfrica, 2009).

**Land Degradation Neutrality (LDN):** “The state in which the quantity and quality of land resources needed to support ecosystem functions and services and enhance food security remain stable or increase at specific temporal and spatial scales, and ecosystems” (UNCCD).



### 3. CLIMATE: CRISES AND OPPORTUNITIES

The Sahel is a climatic zone covering arid and semi-arid biomes. It is one of the largest arid areas in the world. Rainfall, dominated by the West African monsoon, is largely determined by the progress of the Intertropical Convergence Zone (ITCZ) during the West African monsoon (Nicholson and Palao, 1993).

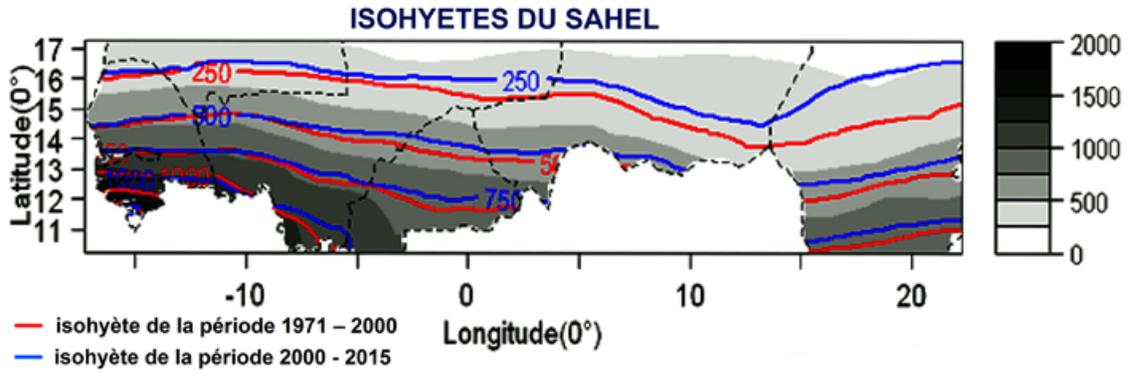
The Sahel is considered to be the region having experienced the greatest rainfall anomalies in the world during the last century (Nicholson, 2000), suffering from recurring droughts and large interannual variations in rainfall and, hence, in vegetation productivity (Figure 2). Seasonal precipitation has been found to vary considerably in territories spanning a few tens of kilometres (so-called mesoscale) (Nicholson 2000). Spatial variability at daily time scales is also high due to the predominantly convective nature of precipitation during the rainy season (Lebel et al., 2003).

The Sahel is one of the ecosystems that are the most sensitive to climate change and variability. Populations are acutely dependent on a very

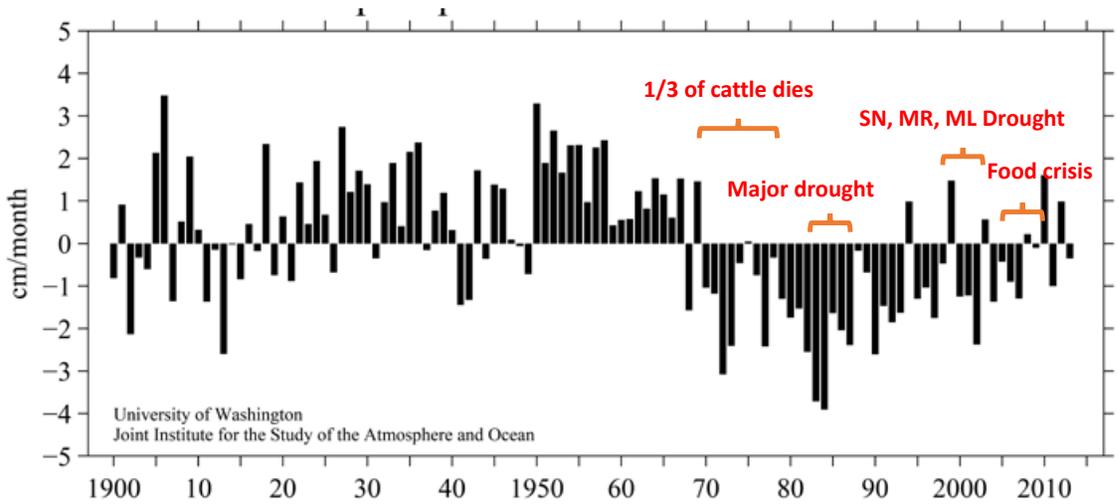
variable and uncertain rainy season. However, this is an area in which important responses to climate change are possible. To better manage pastoral and agricultural resources in the Sahel, it is important to strengthen the monitoring of variability, and of its implications for ecosystem productivity. The great resilience of populations that have survived many climate crises shows that there are proven adaptation practices that need to be highlighted and shared in similar semi-arid areas.

Analysis of the Sahelian climate is often reduced to a simple rainfall dimension. Yet, the Sahel ought also be known for its great potential for solar energy, wind power, and for its rich fauna and flora. Contrary to popular belief, the long dry season in the Sahel has become a high-yield period for fruit growing (mangoes, cashew nuts, gum arabic), market gardening activities by micro or macro-irrigation or flood-recession crops, and inland fishing in converted lagoons. All of these practices contribute to the restoration of degraded lands and to the production of high nutritional value food.

**Figure 2: Sahel delineation** (150-700 mm/year precipitation isohyets) and annual average precipitation (Climate Prediction Centre Merged Analysis of Precipitation, CMAP 1982-2015)



**Figure 3: Sahel Precipitation Index** (20-10N, 20W-10E), June through October 1950 – November 2016





## 4. THE PARADOX OF WATER IN THE SAHEL

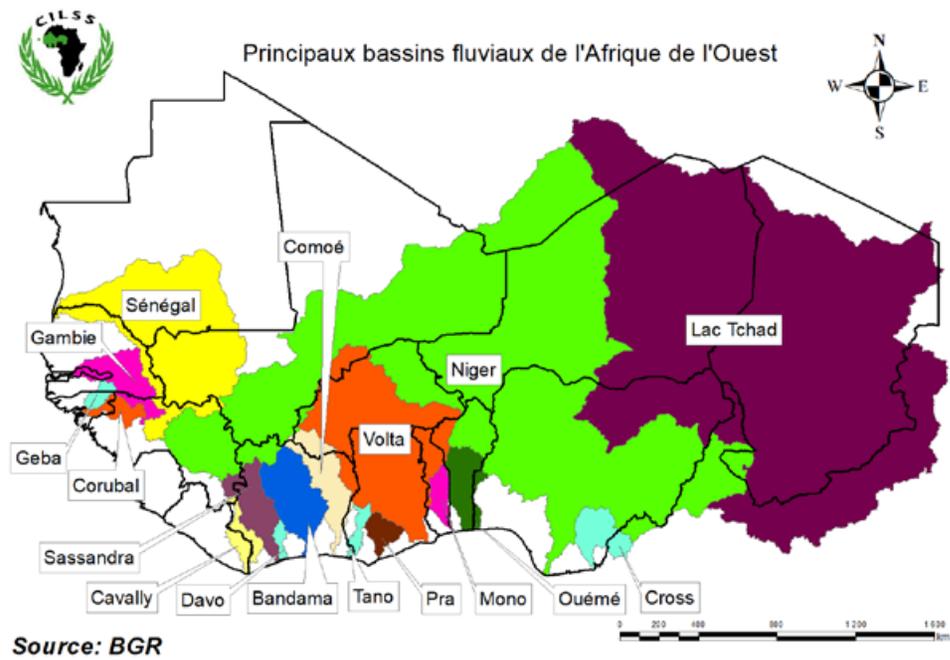
There is a lot of water in the Sahel, but aridity is the first barrier to development. The Sahel is irrigated by 11 major rivers, the basins of which are shown in Figure 4 (ECOWAS-OECD, 2008). These are, from east to west, the basins of: Lake Chad, Niger, Oueme, Mono, Volta, Comoé, Bandama, Sassandra, Senegal and Gambia-Gorubal. In total, 28 cross-border river basins have been counted in West Africa. Apart from Cape Verde, an island country, all the others harbour at least one cross-border basin. Guinea alone has 14 cross-border basins. The regime of these surface water sources has been affected by decreases in rainfall and the succession of dry years in the region since the early 1970s.

In order to reduce uncertainties and water shortages, dams are often constructed to store fresh water during the dry season, thereby building

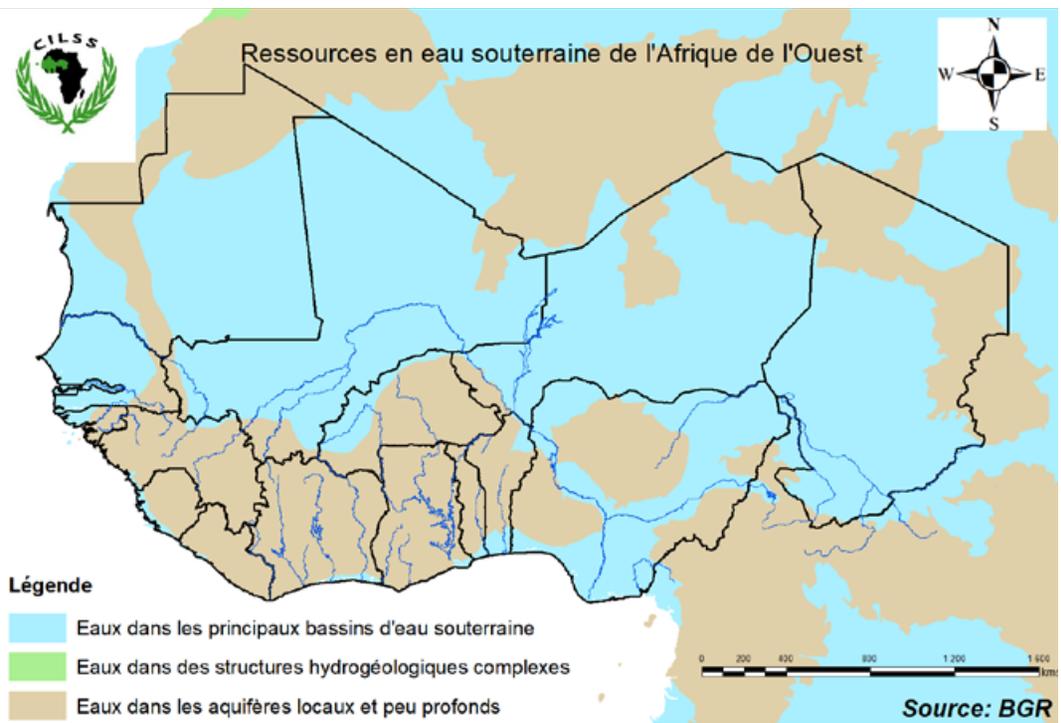
year-round reserves for productive activities. These dams also largely serve the production of hydroelectric power, reducing reliance on fossil fuels and especially on fuelwood. At the same time, large dams pose a number of problems, including downstream water shortages, nutrient contamination and sometimes conflicts over the use of resources and access to water bodies.

The level of extraction of renewable water resources in West Africa is currently at 11 billion m<sup>3</sup> per year for an available potential of 1,300 billion m<sup>3</sup>, that is to say less than one per cent (Figure 5). Agriculture uses 75 per cent of this water, domestic consumption 17 per cent, and industry seven per cent. Of the 75.5 million hectares of arable land in West Africa, only 1.2 per cent (917,000 ha) benefit from irrigation, and even less – 0.8 per cent (635,000 ha) – are used effectively.

**Figure 4:** Major River Basins in West Africa (ECOWAS-OECD, Atlas 2008)



**Figure 5:** Groundwater resources (ECOWAS-OECD, Atlas 2008)



# 5. A TRADITION OF REHABILITATION OF DEGRADED LANDS

**(a)** Livestock is the main source of income for most people in the Sahel. **(b)** Woody vegetation in the Sahel consists of small scattered trees and shrubs. **(c + d)** Degraded soils are a more local and rarely widespread phenomenon.



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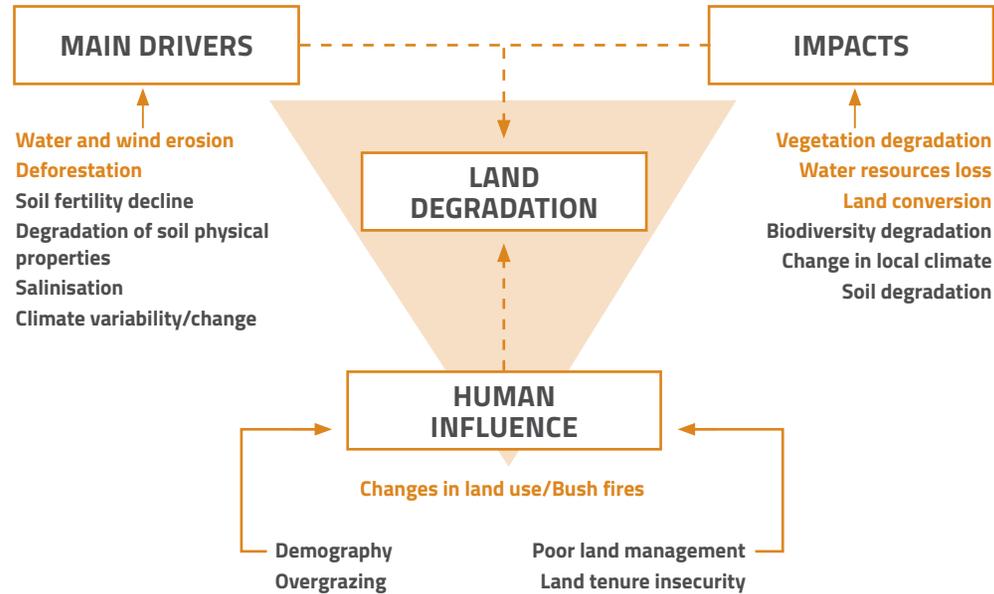
Land degradation, a major handicap for agriculture in the Sahelian countries, leads to the abandonment of large areas that cannot be exploited, and, in extreme cases, to exodus. It also leads to the expansion of cultivated areas on marginal lands, and to an evolution in land use and production systems. In the northern half of Burkina Faso, the continuous degradation of soils by encrustation and vegetation cover due to natural (climate) and anthropogenic (non-conservative cropping systems) phenomena, has resulted in the formation of bare glacis.

Neither excess population pressure nor poverty are the only main underlying causes of land degradation in the Sahel. People's reactions to economic opportunities, influenced by institutional factors, rather determine interventions on degraded

lands. Opportunities and constraints for new land uses are created by local and national policies, and by markets. Global forces are becoming the main determinants of land-use change, to the extent that they amplify or mitigate local factors.

The technical requirements for the rehabilitation of degraded lands and LDN are not difficult to implement. Most of these techniques do not involve modern machinery. These are often innovative practices based on a series of coordinated actions that engage local communities for their achievement and are based on rational geographic targeting. There are three categories of interventions: those on standing vegetation and biodiversity, those relating to soil improvement, and those relating to water resources.

**Figure 6.** Main causes and consequences of land degradation in the Sahel (Mbow, 2015)



## ON VEGETATION COVER:

- Tree regeneration techniques include natural tree regeneration techniques on agricultural soils or within natural formations. Replanting, direct sowing, seedling maintenance and soil preparation are technical aspects that national services have mastered after having practised them for several decades.
- Control and management of logging operations in managed forests and in community plantations or forests.
- Enrichment techniques consist of including species adapted for different ecological functions, ecosystem services and erosion protection functions. They consist of introductions of plants of one or more useful species.
- The Sahel is known for techniques put in place to align ferruginous crust blocks, perpendicular to the slope, on fields or off cropland. On sandy soils, the assembly of branches or millet stalks, also resting on stakes, helps to retain sediment and improve soil porosity. These anti-erosive effects are also sought through biological methods such as hedgerows, like plantations of local species including euphorbia (*Euphorbia balsamifera*) or perennial species such as vetiver, and ropogon. When it comes to fields, practices such as mulching, weeding, etc. are used.

## ON WATER RESOURCES

- Water retention techniques are often combined with those aimed at improving land productivity. In all the countries of the Sahel, agricultural practices such as Zai, half-moons, retention ponds, micro-dams, anti-salt dams, etc. have demonstrated their efficacy in the restoration of many degraded lands.

## ON SOILS:

- The restoration of soil fertility involves interventions such as soil amendment, nitrogen-fixing tree planting, soil erosion control by biological (windbreaks, dead hedges) and physical methods that are simple techniques, based on the use of local materials, arranged in small dams and intended to dissipate energy from runoff.



## 6. LAND, A COVETED CAPITAL

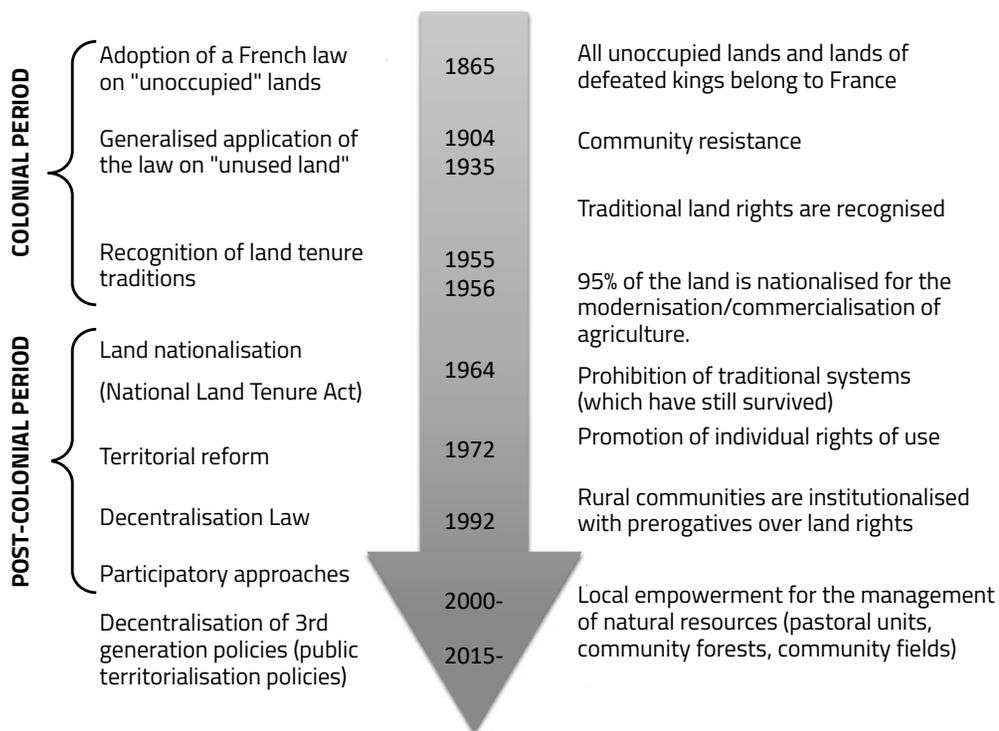
Land tenure systems in the Sahel have developed considerably since the colonial period. In the Sahelian countries, agrarian and rural soil morphology is a heavy legacy of the colonial policy, which had organised the national economy as a productivist culture in order to satisfy a foreign market. Absolute control over productive lands and thus over natural resources was the prime objective. This became a major determinant of national spatial planning, establishing an artificial dualism between urban centrality and rural periphery. The rural-urban relationship which originated from these power relations on the land disrupted regional balances, indispensable for a uniform territorialisation of development essentially based on the potential of natural resources. Urban centres themselves developed, following the opportunities made available due to the exploitation of natural resources. This exploitation-oriented land tenure is in the process of being replaced by one that functions alongside decentralisation and connects with the rights of local communities on the land.

Currently, formal and traditional systems still coexist. In the Sahelian countries, traditional tenure systems

do not allow for long-term sustainable land use planning. This is, for example, the case of many West African countries, which have a prevalence of customary systems. However, the formal (state) system – despite major land reforms during the last 20 years – does not have the means to manage and develop all productive lands, especially in a context where the majority of the Sahel countries have areas greater than one million km<sup>2</sup>. In Burkina Faso, new land policies have been developed, guaranteeing full land ownership and facilitating access to land, as well as opening up investment opportunities in SLM, in order to boost investment in land. A diachronic analysis of land tenure systems in the target countries reveals changes in national policies (Figure 7).

Land systems directly influence LDN. National legal frameworks, conventions, plans of action and strategies are designed to help respond effectively to the deterioration of land, and of means of subsistence. Indeed, the development of these policy instruments offers the opportunity to conduct agricultural activities in a more sustainable manner and to ensure SLM. Sahelian

**Figure 7:** Development of land policies and issues in the Sahel countries (Mbow et al., 2017)



countries have all signed up to, inter alia, the Bonn Challenges, the UNCCD, and the Aichi Targets – all of which mention the importance of land to secure investments, and of land restoration activities.

The extension of agricultural and horticultural production areas remains limited by the availability of suitable soils and the quality of water. The vast majority of arable land is governed by the National Domain Act, despite the territorialisation of public policies resulting from decentralisation. Local producers have no formal title or right. They are beneficiaries without being owners and this does not allow them to access agricultural credit in order to make investments. On the other hand,

the small size of some farms hinders the use of large investments, and as a result, performance is reduced. Access and use rights (on water resources and pastures) are not always guaranteed, either because of exclusion or monopolisation rationales, or because of the real rights on the land.

In the pastoral sector, for example, the obstacles linked to the development of rural land, and right of access to water points have a very strong influence on the performance of the sector. According to national laws and regulations, rangelands and water points incur privatisation (or different forms of appropriation) which makes them inaccessible without agreement or contract with the owner(s).



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### FINKOLO FOREST IN MALI

The village of Finkolo was once known for its high livestock and agriculture potential through the exploitation of the lowlands. Located in the bush, it is particularly exposed given its isolation. A dozen smaller villages mostly populated by hunters commonly called “DOSSO” use the village of Finkolo as a central point. This hunting activity characterises the area, and its practice far exceeds other activities. Persistent climatic variability, however, has made this activity very precarious, particularly with the gradual disappearance of wildlife. These cumulative constraints seriously threaten the DOSSO people, who are keen to preserve their sociocultural values and live off their production.

The drastic degradation of natural resources has precipitated the disappearance of the forest, taking with it a large part of the game. Social groups have often been tempted to make changes in their production activities because they are constrained by the difficult conditions of implementation. The elders regard this situation as an ecological and socioeconomic loss, and thus urge the rest of the population to take heed of the danger threatening their survival in the area. Only a community-wide commitment can rise to the challenge they face.

Active solidarity, which remains a foundation of local sociocultural values, is an essential dynamic for social transformation. This understanding, recognised by the local authorities, is an element which the elders intend to make use of. Since the early 1980s, the population has become aware of the advanced state of degradation of its environment. Effects felt include the silting of

pools, disappearance of the bamboo forest – the main forest wealth, scarcity of game, and frequent herd movement in search of water. To better manage the conflicts inherent in this situation, the community retains its traditional organisation, with, at the head of each village, a traditional chief, recognised and respected by the entire population. Customary rights are respected and harnessed in the process of rehabilitation of the degraded forest. It is an implicit traditional hierarchy that easily escapes modern governance and makes it possible to energise local leaders for consultations on the approaches to be implemented. This approach to problems is established as a rule and is the foundation of the local authority. At the end of one such consultation, which was open to the full village community, the decision to rehabilitate the environment of Finkolo was taken. A series of activities was undertaken, such as dredging of the three ancient pools located around the central village, and regeneration of the Bamboo forest around these pools.

The Finkolo area has once again become very humid and wooded, and diversified agricultural production is being conducted there at all times. However, without substantial technical support, the production system remains artisanal. Logging has not started yet, and game is starting to come back, which is a sign of hope for the Finkolo hunters, who count above all on their collective determination to preserve their region.

**Source:** “Adaptation, histoires vécues”, Centre de recherche pour le développement international, 2010: Authors: Fatima Denton and Alioune Badara Kaéré, with the support of Henri Matthieu LO, and Ibrahima Paul Thiao (p 28-35).



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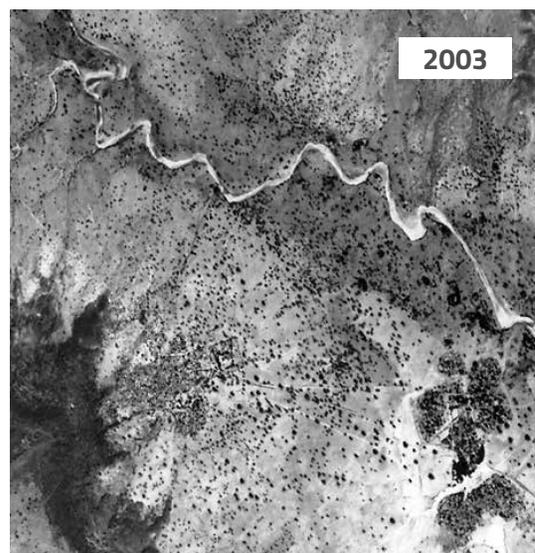
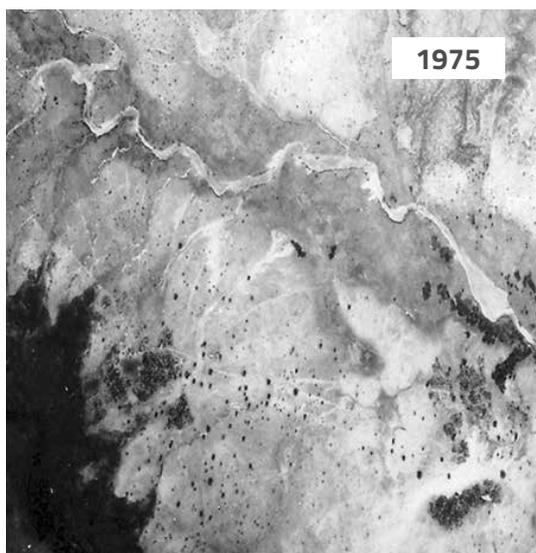


## 7. AMBITIONS FOR A PRODUCTIVE SAHEL

The Sahel has some of the largest groundwater resources on the continent (OECD-ECOWAS, 2008). Agriculture and ecosystem services support millions of people who have survived many climate and environmental shocks over the years. Pastoral activities provide meat and dairy products to many populations, including in the southern forest regions (WB 2019, Mbow et al., 2019). Recent successes in soil, water and vegetation conservation in the Sahel give hope that large-scale restoration is possible to accelerate sustainable development.

Over the past three decades, hundreds of thousands of farmers in the Sahel have transformed vast expanses of arid landscapes into productive agricultural land, improving food security for about three million people. For several generations, assisted natural regeneration, well known to farmers, has been an inexpensive way to grow and reproduce native trees and shrubs that provide useful food, fuel or forage. This practice has enabled farmers in southern Niger, central Senegal, southern Burkina Faso and Mali, in particular, to improve the fertility of millions of hectares of cropland. This success on these agroforestry practices is on a scale not seen anywhere else in Africa.

**Aerial view of the evolution of tree density at Galma, Niger in 1975 and 2003**



**View of positive environmental transformation induced by Assisted Natural Regeneration (ANR) in Niger**



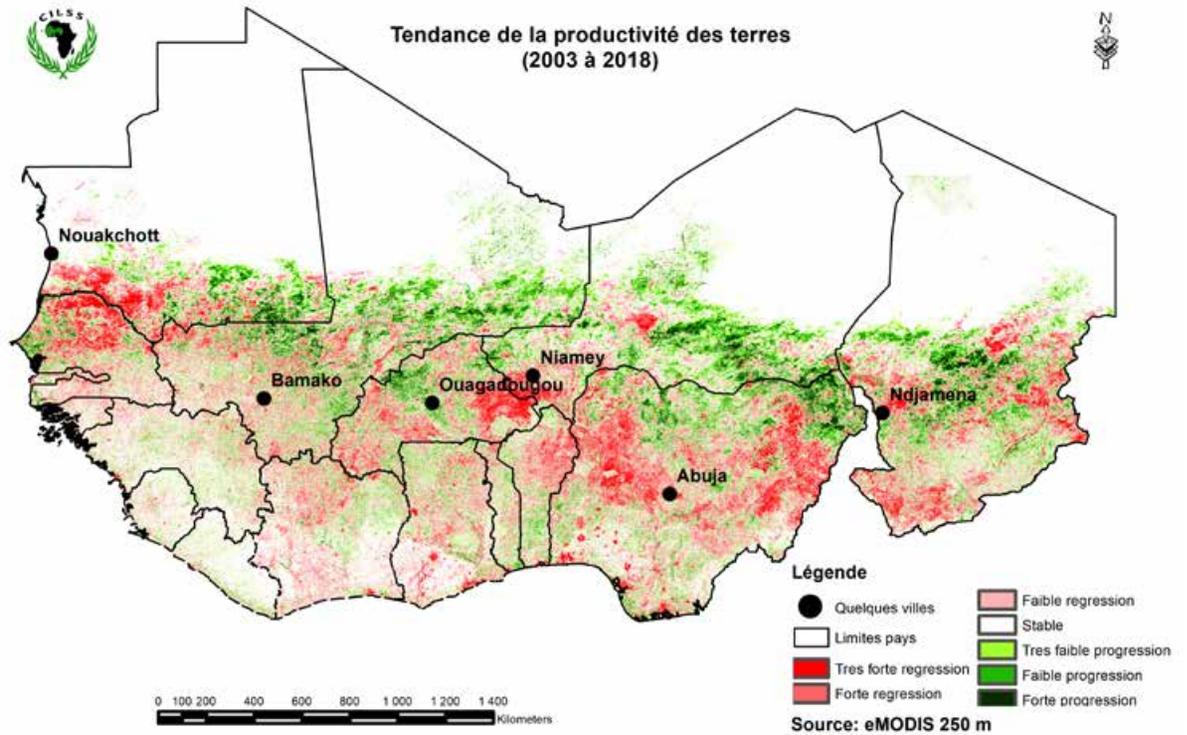
The Sahel is known for these vast expanses of degraded lands that increase over the years. However, land restoration is underway in all countries, particularly within the framework of the Great Green Wall Initiative, as well as via national programmes initiated by States, development partners and NGOs. The problem lies in the lack of funding that would allow for land restoration on the required scale. Specialised financial instruments, such as the LDN Fund, are being developed to address this issue. A growing number of investors are showing interest in financing land restoration as a means of preventing biodiversity loss and strengthening climate resilience.

A mapping of the balance of plant productivity (Figure 8) shows a general trend towards greening in the northern Sahelian zone, especially in Niger, and an increase in land

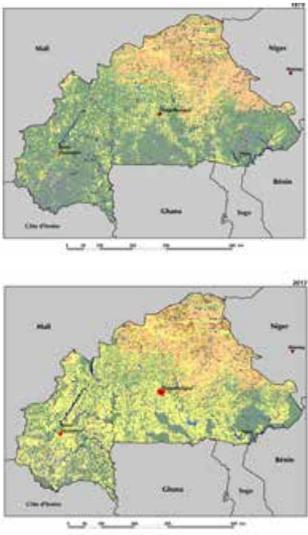
productivity in the southern Sahelian areas and at the Mauritania–Senegal border. This is a reflection of the positive effects of national and regional SLM programmes. Restoration efforts and improved rainfall would explain the improvement in land productivity. Low human pressure could also be partly responsible for the productivity growth, especially in conflict zones (northeastern Nigeria and northern Mali).

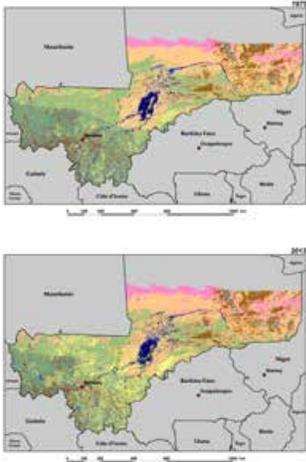
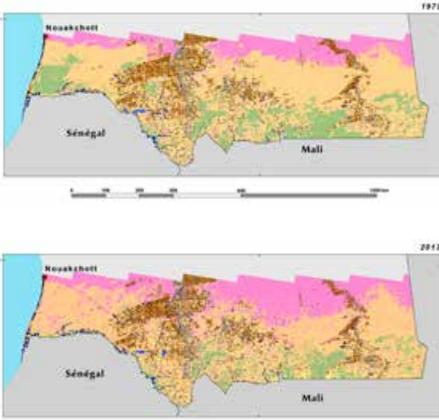
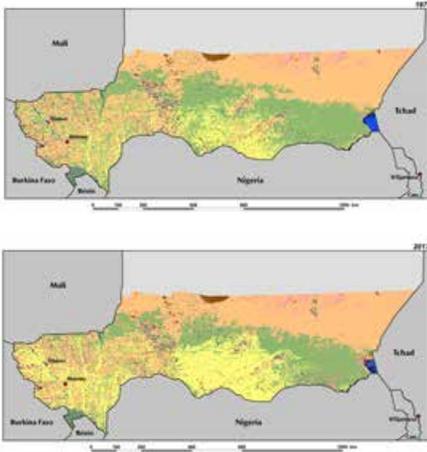
The Sahel countries have a large surface area with varying levels of degradation. Restoration of the productive capacity of these lands is a secure and sustainable lever for a profound transformation of economies and the well-being of populations. Recent analyses of land-use dynamics (CILSS, 2016) provide quantitative information on spatial dynamics that has been coupled with specific targets for restoring degraded lands (Table 1).

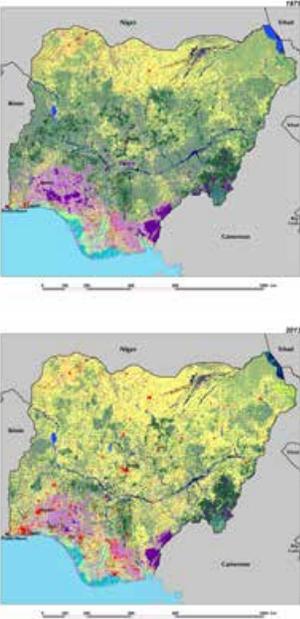
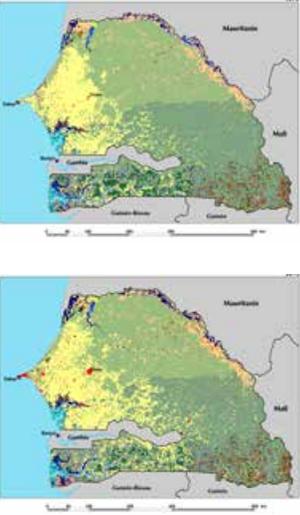
**Figure 8:** Balance of plant productivity in the study area between 2003 and 2018 (NDVI-MODIS, 250 m 2003-2018) / Maxima NDVI averages were calculated from 2003 to 2007 and from 2014 to 2018. The difference between these two averages ((2014 to 2018) - (2003 to 2007)) made it possible to map the trend between the two periods showing the areas with high and low productivity.



**Table 1:** Dynamics of land use and priority actions for rehabilitation of degraded lands.

Country	Land degradation and priority actions
<p><b>Burkina Faso</b></p> 	<p>Rapid expansion of farmland which experienced a 160 per cent increase from 1975 to 2013. This rate of rapid expansion exceeds four per cent per year, which equates to approximately 1,720 km<sup>2</sup> of additional crops each year (CILSS, 2016). On the other hand, plant formations, particularly forests and savannas, declined from 76 to 48 km<sup>2</sup>, and from 19 to 14 km<sup>2</sup>, respectively, or a decline of 37 and 28 percent between 1975 and 2013.</p> <p><b>Priority actions</b></p> <ul style="list-style-type: none"> <li>▪ Stop the conversion of forests to other types of land cover by 2030.</li> <li>▪ Improve the productivity of declining land occupancy categories (shrub savannah, grassland and cultivated land) - on 2.5 million ha.</li> <li>▪ Raise the soil organic matter content to at least one per cent, improving carbon stocks on 798,000 ha.</li> <li>▪ Recover 295,000 ha of degraded land out of a total of 590,000 ha.</li> </ul>

Country	Land degradation and priority actions
<p><b>Republic of Mali</b></p> 	<p>The area under cultivation has grown 2.3 times in 38 years, corresponding to an average annual increase of 3.5 per cent, or 1,300 km<sup>2</sup> per year (CILSS, 2016).</p> <p><b>Priority actions</b></p> <ul style="list-style-type: none"> <li>▪ Combat desertification through reforestation, restoration of degraded soils and promotion of good SLM practices.</li> <li>▪ Ensure the preservation of mountain ecosystems, in particular their biodiversity, in order to better harness their essential benefits for sustainable development.</li> <li>▪ Reduce the degradation of the natural environment, halt the degradation of biodiversity and, by 2020, protect endangered species and prevent their extinction (Mali, 2018).</li> </ul>
<p><b>The Islamic Republic of Mauritania</b></p> 	<p>The overall rate of change in land use increased from 0.4 per cent per annum from 1975 to 2000 to 0.7 per cent between 2000 and 2013. The rate of agricultural expansion grew extraordinarily between 2000 and 2013. Housing increased tenfold between 1975 and 2013, while forests lost more than 56 km<sup>2</sup> of their area in the same period (CILSS, 2016).</p> <p><b>Priority actions</b></p> <ul style="list-style-type: none"> <li>▪ Increase the proportion of continental protected areas in the national territory.</li> <li>▪ Put an end to deforestation by carrying out 100,000 ha of reforestation per year and reducing the rate of fuelwood use.</li> <li>▪ Combat desertification by restoring degraded lands, notably by strengthening aerial seeding operations.</li> </ul>
<p><b>The Republic of Niger</b></p> 	<p>Plant formations (savannas, herbaceous savannas, Sahelian savannas, gallery forests and steppes) fell from 411,372 km<sup>2</sup> in 1975 to 349,328 km<sup>2</sup> in 2013, i.e. a loss of 62,044 km<sup>2</sup>. Croplands increased from 64,848 to 125,672 km<sup>2</sup>, i.e. an increase of 60,824 km<sup>2</sup> with an average annual increase of 16,000 km<sup>2</sup> (CILSS, 2016).</p> <p><b>Priority actions</b></p> <p>To achieve LDN by 2030, Niger has set itself the goal of restoring 4,440,500 ha of degraded land and preventing degradation of non-degraded land. The specific targets defined are:</p> <ul style="list-style-type: none"> <li>▪ Restore 44 per cent (4,440,000 ha) of the 10,760,000 ha of degraded land in 2010.</li> <li>▪ Reduce to two per cent (252,000 ha) the area of cultivated land with a negative trend of net primary productivity.</li> <li>▪ Reduce from one per cent (100,000 ha) to nought per cent the annual rate of conversion of forests/savannas/wetlands to other types of occupation.</li> <li>▪ Put an end to silting and water erosion along the Niger River and other lowlands.</li> </ul>

Country	Land degradation and priority actions
<p data-bbox="344 199 576 262"><b>The Federal Republic of Nigeria</b></p> 	<p data-bbox="682 184 1469 357">Rain-fed crops occupied nearly 380,000 km<sup>2</sup> (40 per cent of the region) in 2013 and increased by 20 per cent in comparison with 1975. High rates of change have been observed for dwellings, irrigated crops, plantations and quarries, with growth of one to two per cent per year between 1975 and 2000 and two to four per cent per year between 2000 and 2013. Plant and forest formations have declined, with reduction rates of more than two per cent per year between 2000 and 2013. Between 1975 and</p> <p data-bbox="682 388 1469 472">Overgrazing, soil pollution, population growth, rapid urbanisation and poverty contribute to land degradation. The appearance of moving dunes in the north and the upsurge of water erosion in the south are the most palpable manifestations (Nigeria, 2018).</p> <p data-bbox="682 504 828 535"><b>Priority actions</b></p> <ul data-bbox="682 535 1469 997" style="list-style-type: none"> <li>▪ Achievement of LDN by improving land productivity in 463,300 ha of cultivated land and grassland compared with 2015.</li> <li>▪ Rehabilitation of 1,722,660 ha of cropland with declining productivity and 10,565,040 ha of cropland with advanced signs of declining productivity.</li> <li>▪ Stop the conversion of forests and wetlands into other land cover classes by 2020.</li> <li>▪ Increase in forest cover by 20 per cent as compared with 2015.</li> <li>▪ Achieve 40 per cent reduction in the soil sealing rate (conversion to artificial land cover) compared with 2015.</li> <li>▪ Restoration of 100 per cent of the 218,958,000 ha of degraded forests through reforestation and rehabilitation actions for an overall investment of USD 19,706.22 million.</li> <li>▪ Restoration of 100 per cent of the 93,442,640 ha of savannah (shrubs, meadows and sparsely vegetated areas showing the first signs of decline) through SLM actions to avoid overgrazing for an investment of USD 63,765.36 million.</li> <li>▪ Improvement of the productivity of 100 per cent of the 1,228,770,000 ha of agricultural land for an investment of USD 110,589.30 million (Nigeria, 2018).</li> </ul>
<p data-bbox="344 1050 609 1081"><b>The Republic of Senegal</b></p> 	<p data-bbox="682 1045 1469 1375">The expansion of cropland has been relatively modest, rising from 32,600 km<sup>2</sup> in 1975, to 32,900 km<sup>2</sup> in 2000, and 41,000 km<sup>2</sup> in 2013 – an increase of 26 per cent between 1975 and 2013 (CILSS, 2016). The development of agriculture has led to the fragmentation of savannas and open forests resulting in loss of vegetation cover and a decline in the quality of remaining natural ecosystems (CILSS, 2016). Savannas decreased by 8,200 km<sup>2</sup>, a 6.3 per cent loss from their 1975 area. As for the open forests, they have decreased by 42 per cent, i.e. 3,160 km<sup>2</sup>. Gallery forests, which border the river system and are known for their high biodiversity, have decreased by 19 per cent, or 570 km<sup>2</sup>. The area occupied by dwellings increased from 530 km<sup>2</sup> in 1975, to 850 km<sup>2</sup> in 2000, and 1,450 km<sup>2</sup> in 2013 – an increase of 172 per cent in 38 years. This situation indicates strong demographic growth (CILSS, 2016).</p> <p data-bbox="682 1407 828 1438"><b>Priority actions</b></p> <ul data-bbox="682 1438 1469 1900" style="list-style-type: none"> <li>▪ The investments will amount to about 16 billion CFA francs during the period 2009-2020.</li> <li>▪ Restoration of 75 per cent of 2,507,995 ha of degraded forests through placing under protection, letting land lie fallow, forest management, reforestation, and assisted natural regeneration for an investment of USD 124,200 million.</li> <li>▪ Restoration of 75 per cent of 1,367,609 ha of degraded savannas (shrubs, grasslands and sparsely vegetated areas) through reforestation actions, firebreaks, windbreaks, forage crops, haying, early bush fires for an investment of USD 96,000 million.</li> <li>▪ Improvement of the productivity of 75 per cent of 2,652,549 ha of agricultural land for an investment of USD 2,616,000 million.</li> <li>▪ Protection and restoration of 75 per cent of 153,010 ha of wetlands and water bodies for an investment of USD 852,000 million.</li> <li>▪ Reforestation and the protection of 75 per cent of 179,770 ha of marginal areas (artificial areas, bare land and other areas) for an investment of USD 102,000 million (Senegal, 2015).</li> </ul>

Country	Land degradation and priority actions
<p data-bbox="344 197 578 222"><b>The Republic of Chad</b></p>	<p data-bbox="678 197 1474 348">Degraded areas have been estimated at 428,000 km<sup>2</sup>, or 33.43 per cent of the total area (Chad, 2015). Open forests declined by 29 per cent between 1975 and 2013, a loss of 4,700 km<sup>2</sup> (CILSS, 2016). Agricultural expansion is largely responsible for the decline in vegetation cover between 1975 and 2013, with an average rate of expansion of five per cent.</p> <p data-bbox="678 390 1468 510">At the country level, cultivated areas increased by 190 per cent between 1975 and 2013 (CILSS, 2016). The reduction of the area of Lake Chad from 25,000 km<sup>2</sup> to 2,500 km<sup>2</sup> between 1963 and 2008 has had a negative impact on the quality of life of communities, biodiversity, and heightened the risks of migration and conflict.</p> <p data-bbox="678 548 824 573"><b>Priority actions</b></p> <ul data-bbox="678 579 1461 892" style="list-style-type: none"> <li data-bbox="678 579 1461 636">▪ In the context of LDN by 2040, Chad has set the following specific targets as its objective:</li> <li data-bbox="678 642 1461 730">▪ Restoration of four per cent of 4,326,860 ha of degraded forests through actions of protection, the fight against bush fires and control of transhumance for an investment of USD 16,995.79 million.</li> <li data-bbox="678 737 1461 793">▪ Fight against water and wind erosion on less than one per cent of 827,975 ha of degraded wetlands with an investment of USD 14.72 million.</li> <li data-bbox="678 800 1461 892">▪ Restoration of 44 per cent of 65,778,170 ha of barren land and other degraded lands through reforestation, agroforestry, water erosion control and transhumance control with an investment of USD 4,156.67 million (Chad, 2015).</li> </ul>

### Occupation des Terres / Land Cover

■ Forêt / Forest	■ Sols dénudés / Bare soil
■ Prairie marécageuse - vallée inondable / Wetland - floodplain	■ Habitation / Settlements
■ Steppe / Steppe	■ Cultures irriguées / Irrigated agriculture
■ Plantation / Plantation	■ Forêt galerie & formation ripicole / Gallery forest & riparian forest
■ Zone de culture / Agriculture	■ Forêt marécageuse / Swamp forest
■ Plans d'eau / Water bodies	■ Savane sahélienne / Sahelian short grass savanna
■ Surfaces sableuses / Sandy area	
■ Terrains rocheux / Rocky land	



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## 8. NEED FOR INNOVATIVE FINANCING

There are several SLM practices and techniques to help communities better manage their environments. The best-known practices are to partition fields so as to reduce runoff spread by establishing live hedges, stone barriers, earthen banks, infiltration ditches; meanwhile, flows in ravines can be reduced by filtering thresholds, anti-erosive fascines, etc.

Retaining water in the soil is achieved through an improvement of infiltration by adopting ploughing perpendicular to contour lines, by direct seeding with a substantial modification of organic matter, by deferring grazing and revegetation of pastoral spaces, by half-moon practice, Zai, stone dams, etc.

To ensure the development of soil fertility and the permanence of a protective plant cover, the Sahel resorts to age-old practices involving the use of nitrogen-fixing plants (such as *Faidherbia albida*, *Cordyla pinnata*, *Parkia biglobosa*, *Sesbania sesban*, etc.), which not only provide organic matter but function as a biological pump that brings nutrients to the surface while providing nitrogen and soil porosity, thereby increasing moisture retention capacity.

Technical options for the rehabilitation of degraded lands are numerous in the Sahel and are described in many scientific and/or technical manuals. A relatively comprehensive recent inventory is provided by Gomes et al. (2008). Cases of successful reversal of the trend of socio-environmental degradation are numerous everywhere in the Sahel. Examples are the Project for Oasis Micro-Basin Sand Invasion Control (PLECO) in the Zinder and Diffa regions of Niger, and the Project for Capacity Building for the Restoration and the Promotion of Effective Use in the Areas of Soil Degradation in the departments of Fatick, Foundiougne (Fatick Region), Kaolack and Nioro du Rip (Kaolack Region) in Senegal. In the same vein, investment projects of the Regional Programme for Sustainable Land Management and Adaptation to Climate Change in the Sahel and West Africa (PR-SLM), coordinated by CILSS, are perfect examples.

To scale up these technologies, the establishment of adequate financing mechanisms is necessary for developing a massive investment in land restoration. This approach is a winning option for achieving LDN goals. Despite the financial barriers that hinder the restoration of degraded lands, the natural products sector remains highly

productive and prosperous in the Sahel. Indeed, the Sahel countries are among the major exporters of several primary products such as shea butter, cotton, peanut, fonio, sesame, as well as several other non-timber forest products, such as moringa, baobab fruit derivatives, and oils. The presence of the private sector is already very noticeable in the horticulture and market gardening sector, the processing of local fruits and in agribusiness. A large proportion of horticultural products, including mangoes, bananas, and cashews, are, however, exported without local producers benefiting much from the process.

In terms of financing, focus is given to the relative risk of investment and not much on the most important aspect, which is the profitability of sustainable land production (TerreAfrica, 2009). At the heart of the question of profitability is the role of states in improving agricultural practices and related investments to ensure the profitability of developments both from a private point of view for farmers, and collectively, for the local region. An important prerequisite is for farmers to benefit from a more secure land tenure regime and to have broad market access.

Therefore, the biggest hurdle for funding land degradation projects is the limited interest in prioritising this sector in the national budget. This would require an increase in financial resources strictly allocated to SLM for achieving greater dissemination of good practices. Improving SLM funding in the LDN context demands, as a first step, improving the level of information on the extent of land degradation, and its consequences. As a second step, it would be desirable to make a detailed examination of public expenditure on SLM, in order to derive recommendations for better targeting and calibration of projects in accordance with ambitions. This funding should include efforts to be made for developing and adopting better technologies for SLM, land tenure security and national (integrated) strategic planning (TerreAfrica, 2009).

Progress on natural resource development would become significant if investment focussed not only on production factors but also on product processing and marketing. Development banks still charge interest rates that are out of reach for local farmers who provide a large share of commodity and processing output. The consequence of these financial barriers directly affects small and medium-sized enterprises (SMEs), which face a lack of

access to commodities in the quantity and quality required to create added value (AGRA, 2017).

The Sahelian countries have applied different finance governance mechanisms that consider the harmonisation of financing institutions, including commercial banks, credit unions, micro-credit institutions and agricultural banks, as well as the implementation of standards and recommendations for conventional finance and digital financial services, etc. Very few options exist for guaranteeing this financing against numerous risks, particularly climatic risks, which in the Sahel is the big unknown. National policies on credit guarantees have evolved but remain largely insufficient to heavily support bankable projects on sustainable agricultural production.

It is also important to note that the existing mechanisms for financing land do not currently concern long-term financing as in other development sectors. However, in the area of natural resources, apart from seasonal rain-fed agricultural production, which is annual, forms of production involving trees and land restoration take many years or even decades to yield benefits. For the moment, the situation of agricultural and natural resource financing is based on microfinance systems that respond more to subsistence needs, rather than via the development of sustainable entrepreneurship based on natural resources.

Funding remains the main cross-industry catalyst for growth. The demand for funding for the rehabilitation of degraded lands has been the subject of substantial state funding since the droughts of the 1970s. This funding includes portfolios ranging from commercial financing (timber production, energy) to long-term investments in the form of programmes financed by technical support through the missions of national directorates for forests and soil protection. Regardless of the operational model, funding for land restoration has had mixed results with a real impact that has not always been satisfactory.

With the limit of public funding, NGOs and the private sector are providing an increasingly significant amount of support that requires better structuring and planning. Investment in land restoration can, in many situations, be an opportunity to develop value chains on natural resources. Examples of gum arabic, non-wood forest products, fruits, oils and leaves with nutritive values are abundant in the Sahel.





## 9. SCALING UP OF SLM GOOD PRACTICES

Scaling up of SLM can only succeed if land users recognise and benefit from the advantages it provides or have access to incentive mechanisms. For poor producers in the Sahel, the factors driving adoption of land restoration practices will depend on several factors, namely:

- Long-term political and financial commitment to the implementation of SLM programmes.
- Regulation of land tenure and access to land and local governance.
- Effective beneficiary involvement in policy development, planning and implementation of strategies.
- Alignment with local practices, existing production systems, cultural values, community aspirations, etc.
- Poor biophysical conditions, including climate and soils.
- Technical challenges, market opportunities, land and social dynamics in place.

The issue of scaling up good practices has been a major concern in the land sector. Successful land remediation solutions are not always widely used because of the highly variable contexts, with needs differing from one place to another. Efficient scaling-up thus requires: ambitious good practice co-production programmes; the establishment of conditions to favour seed finance; a consolidating and sustainable policy framework; a market to support value chains; and, above all, a huge capacity-building effort not only through the technical channels of the state, but also through the communities themselves, based on exchange and demonstration platforms. The skills required vary across sectors and contexts. We present here some cross-cutting proposals to improve the large-scale implementation of sustainable practices for the restoration of degraded lands.

## ON AGRICULTURE AND LAND MANAGEMENT

Substantial investments in SLM are needed and should include investments in facilities and systems, such as: (i) water-related infrastructure (storage, transport systems, irrigation systems, etc.); (ii) soils and conservation systems; (iii) research and development for SLM, with an emphasis on trade-offs between land uses and ecosystem goods and services; (iv) development and optimisation of viable systems for the integration of crops, animals and forests; (v) large-scale development and distribution of improved planting materials; and (vi) post-harvest treatment technologies.

Natural Resource Management (NRM) approaches, supported by local conventions to ensure local commitment. These mainly concern the management and local exploitation of all the natural resources of village or inter-village areas. These approaches have been developed in favour of the soil management approaches of the 1990s.

Climate Smart Agriculture (CSA). Agricultural practices have long overlooked the ecosystem dimension and the conservation of nature. In the Sahel, where agriculture is the primary driver of deforestation and land degradation, a broad adoption of sustainable agricultural practices should be a general rule (CCAFS). CSA reconciles agriculture, carbon sequestration and adaptation of populations to climate change. CSA techniques aim at ensuring better land planning and development without compromising food security and climate balance with the adoption of more efficient techniques in land production and preservation. CSA techniques include: cover crops; crop rotations; introduction of useful plants in agroforestry; fertilisation management; nitrogen fixation with legumes; use of organic matter; combination of agriculture-livestock; reduction of ploughing; promotion of worked fallows; techniques for reducing methane production by rice cultivation; inoculation techniques; reduction of ploughing; promotion of irrigation; management of pests; reducing the burning of crop residues; reduction of crop losses; and management of genetic resources.

## ON PASTORAL LIVESTOCK FARMING

Pastoral livestock farming is the main rural economic activity of the Sahel. This activity uses the natural resources of the Sahel to produce value-added products, for instance, through the production of foods with very high nutritional value (meat, milk), but also through the production of skins, wool and leather; it also contributes to many transport and animal traction services, an essential element in production systems. Pastoral livestock farming is an important sector of food security, which enjoys increasing demand due to population growth and urbanisation. Livestock farming is a major contributor to soil fertilisation through organic soil amendment that is very widely used as a source of fertilisers. For example, the faecal and urinary excretions of livestock ensure rapid recycling of nearly half of the forage consumed and large fractions of mineral elements, particularly nitrogen and phosphorus, which favour good land productivity.

Livestock farming encourages a heterogeneous and variable distribution of plant and water resources over the seasons and years, based on principles of community management and mobility. Forest plantations and agro-forestry techniques offer a wide range of options for improving forage resources in agricultural soils, such as: agroforestry parks; hedgerows on the edges of fields and hedgerow systems; and bushy or shrubby fallow land which enables assisted natural regeneration, pruning and receptive systems. Stubble, haulm and crop residues – whether harvested and stored for distribution in the trough or left on the field for grazing – are an important forage resource.

However, it is difficult to assess the impact of pastoral livestock farming on land degradation, since this can only be done on the scale of vast pastoral areas. Pastoral livestock farming, nevertheless, is repeatedly challenged due to its contribution to the degradation of vegetation cover and soils through overgrazing. However, observations made in experimental protocols and long-term ecosystem monitoring qualify these assertions (Ndiaye et al., 2016).

Indeed, if intensive grazing of herbaceous plants during the rainy season can reduce their production and affect their diversity, this only applies very locally because of the short growing season and the regional mobility of livestock. At lower intensity, grazing tends rather to diversify flora, favour the

## Case study 2

### "ZAI", THE PRACTICE THAT STOPPED THE DESERT

#### Zai pits

One hundred and eighty-four km north of Ouagadougou, capital of Burkina Faso, the "Gourga" forest extends over 25 ha. This area was categorised as semi-arid/arid thanks to the work of Yacouba Sawadogo, known as "the man who stopped the desert" and winner of the 2018 Alternative Nobel Prize (Right Livelihood Award 2018).

After several decades of continuous rainfall decline in a context of high population pressure, Burkina Faso's northern region has experienced a gradual degradation of land, and a sharp decline in agricultural yields. In 2011, according to data from the National Observatory for Environment and Sustainable Development (ONEDD), this region ranked among the top three areas in terms of soil degradation. This situation exposes communities to food insecurity. Studies done in 2013 indicate that 74.1 per cent (over a national total of 273,828 km<sup>2</sup> of cropland) are land affected by desertification and drought.

At 80 years of age, Yacouba Sawadogo took action to reverse the degradation trend in this context of strong natural resource degradation. To meet this challenge, he promoted Zai, an innovative practice adapted to the context of the crusted Sahelian soil. This practice involves concentrating water and compost in small crevices at the beginning of the dry season. These crevices have diameters ranging from 30 to 40 cm, and a depth of 10 to 15 cm. They are set 80 cm apart and arranged in staggered rows. The excavated soil is used as a water dam placed downstream of the hole in the direction of the slope. To increase the performance of the structure, manure and organic household waste are added to favour microbiological activity. In turn, the additional mineral elements in the organic matter improve the porosity and fertility of the soil. To prevent the organic matter from being carried off by rainfall runoff, the manure is sparsely covered with soil. With this technique, farmers can recover fine particles and organic matter transported by wind and runoff water. Thus, as the rainy season comes, the seedbed will be fertile and retain enough



water for crops. Moreover, the presence of woody seed in organic matter or in sediments transported by wind and water would help improve the woody cover in the fields.

To turn this achievement into sustainable practice, Yacouba Sawadogo sought to share his technique. Accordingly, in his native village of Gourga (four km west of Ouahigouya), a "Zai market" mini-fair was created, as well as an "Association of Zai groups for the development of the Sahel".

Combined with assisted natural regeneration discovered by farmers, Zai could become a symbol of improving the resilience of communities living from the exploitation of natural resources.

**Source:** "Impact Journalism Day, pour changer l'info", June 26, 2017

#### View of the Gourga Forest in Burkina Faso



© AGHYMET Abreuvoir

fragmentation of surface crusts on arid soils and thus promote rainwater infiltration, which improves the efficiency of water use by vegetation.

This livestock farming can only flourish after the removal of certain obstacles linked to land cover dynamics. In the Sahel, many areas – such as crops and agro-forestry or forest plantations – are often formally subtracted from rangelands, although exceptions exist in practice. This often creates conflict among social groups. These conflicts have been known since land registration and modern zoning, which have largely ignored certain sociological realities. Recurring crises occur on the management of cattle passage corridors, including access to water points, the enclosing of rangeland inside cropland, and so forth. Even if fields and forests in agroforestry systems produce forage (stubble, weeds, crop residues, forage crops), this is unavailable during the plant growth season. Furthermore, areas devoted to nature conservation (classified forests, national parks), infrastructure (road networks, railways, dams, irrigated perimeters) and the urban network also help reduce and break up pastoral areas.

There are further obstacles linked to the regulation of access to resources and infrastructures (water points, passage corridors, vaccination parks, livestock markets, etc.) as well as to the lawful or unlawful taxation of livestock movements, in particular cross-border movements.

Therefore, opportunities for sustainable management of pastoral areas lie in improving the mobility of herds on a grazing circuit, as well as in seasonal regional or even cross-border mobility for optimising livestock grazing. Selective grazing allows livestock to benefit from forage resources that vary in quantity and quality from place to place, and through the seasons. It ultimately determines the productivity of pastoral livestock farming. Herd mobility also facilitates farmers' access to the market (livestock, farming inputs, consumer goods) and to services. Mobility is also an effective response to reduce the risks to which breeders and their livestock are exposed in situations of crisis, namely, drought, epizootic disease, civil unrest, etc.

## ON WATER AND WATER EROSION CONTROL.

It is estimated that the productivity of irrigated land is about three times higher than that of rain-fed land. Investing in irrigation development provides extra insurance against irregular rainfall, stabilises agricultural production, increases crop productivity and allows farmers to diversify their productivity. In turn, this can result in increased farm incomes and the putting in place of improved and sustainable livelihoods in rural areas. In sub-Saharan Africa, irrigated land could be increased by 330 per cent to significantly increase agricultural production, given that 85 per cent of sub-Saharan Africa's irrigation potential remains untapped (Frenken, 2005).

Nowadays, there are numerous opportunities for investing in irrigation projects in the Sahel, the irrigated area of which could double by 2030. In fact, the Sahel offers a huge irrigation potential, with abundant surface water and groundwater for transforming and diversifying agricultural productivity, on the one hand, and improving the livelihoods of rural communities, on the other.

Irrigation-related problems, such as inefficient water logging systems and salinisation, are largely responsible for declining crop yields on irrigated land in arid and semi-arid regions.

There is an urgent need to invest in water storage for irrigation. The main challenge for sub-Saharan Africa will be to capture more available water resources. Accordingly, the effective use of water in current irrigation systems proves increasingly problematic, as some people are estimated to waste 60 per cent or more of diverted or pumped water (Frenken, 2005). The major challenge lies in meeting the growing food needs of urban populations without compromising food production. It is, therefore, crucial to seek productivity gains that can change the economic conditions of irrigation and develop viable alternative water management technologies for improving rainfall-fuelled production in sub-Saharan Africa.

Erosion control measures require specific actions that consider intended soil use, the specificities of land to be improved (topography, soil properties and structure, type of degradation, vegetation cover, influence of catchment areas, etc.), as well as local climatic factors (rainfall characteristics, temperatures, evapotranspiration rate, wind characteristics). Therefore, the assessment of an entire watershed becomes essential to ensure successful operations because it allows for the selection of the most suitable combinations of techniques and approaches, avoiding strategies that would prove inaccessible to farmers from a technical and financial standpoint, and thus without plausible direct effects. This assessment must be carried out using participatory methodologies involving local populations as well as people from neighbouring areas. These participatory assessments would highlight potential land conflicts, sensitise populations to land degradation issues and facilitate their participation.

## MANAGEMENT OF FOREST RESOURCES, PLANTATIONS AND AGROFORESTRY

In all Sahelian countries, reforestation has been the main lever of forest policy for many decades. The drought crisis of the 1970s prompted a massive deployment of financial and technical means to replant trees over vast areas. There have been several types of interventions. For example, there are purely forestry interventions consisting in the implementation of preventive strategies against deforestation, such as improvements to management plans, control of firewood exploitation, and bush fire control. Added to the above are interventions for the rehabilitation of degraded lands, production of regulated seedlings, linear plantations, massive plantations, soil conservation and restoration plantations, and replanting operations (Diouf, et al., 2000). Efforts on the forest inventory, an integral part of the implementation of the Forest Action Plans (PAFs) of the 1990s, had two objectives: (i) estimate the wood potential for calibrating the exploitation of the wood, especially in a wood-energy dependence context; and (ii) identify degradation sites in order to target tree replanting interventions.

Despite these sustained efforts over three decades, the Sahel countries have not achieved significant reforestation results. Their classic approach, inherited from colonialism, was strongly centralised and supported by consistent budgets. This gradually gave way to a decentralised, community-based and participatory approach. Several community initiatives have emerged in which forest policies are designed and implemented together with communities. It is from such activities that some good practices can be identified and scaled up. Several success stories on assisted natural regeneration, deferred grazing, bush fire prevention, the improvement of production and consumption of wood energy have prospered in the subregion (Ribot et al., 2010).

The private sector is increasingly investing in massive plantations of high value-added trees such as gum arabic, moringa, cashew, etc. In some cases, however, land acquisition was not transparent enough and eventually created social crises in several places. This race to acquire land does not only arise from foreign capital investment, but also from national buyers who also start to develop agricultural enterprises which, in some cases, do not benefit local communities. The development of local entrepreneurship in a context of right of use of spaces and resources must be done with a strong local content.

## Case study 3

### PROJECT FOR OASIS MICRO-BASIN SAND INVASION CONTROL (PLECO) IN THE GOURÉ, GOUDOUMARIA AND MAINÉ-SOROA DEPARTMENTS IN NIGER: PILOT PHASE FOR THE PERIOD 2010-2015

The project was funded by the Global Environment Facility (GEF), in partnership with the World Food Programme (WFP), the United Nations Development Programme (UNDP), the State of Niger, and the eight municipalities of the Gouré, Goudoumaria and Mainé-Soroa departments for a total of USD 22,280,000. It has been implemented in the rural municipalities of Bouné, Kellé, and Guidiguir; the urban district of Gouré, in the Zinder region; the rural municipalities of Goudoumaria, N'Guel Beyli, Foulatari; and the urban municipality of Mainé-Soroa, in the region of Diffa.

These municipalities have 3,674 oasis basins that can be exploited agriculturally, representing 138,391 ha, of which 12,701 ha are threatened with silting, as are the 22,000 ha of agro-silvo-pastoral lowlands and 60 per cent of socioeconomic infrastructures, including water points, national roads, villages, schools and health centres. It should be noted that oasis basins are the only exploitable areas that allow local populations to survive in this arid and semi-arid climate. Mechanical and biological fixation of mobile dunes was used for the sustainable preservation of basins. This technique allowed for the stabilisation of mobile dunes and their revegetation using ligneous and herbaceous plants. This led to a reduction in wind and water erosion, the increase of biodiversity and the restoration of soil fertility.

To favour the restoration sustainability of this fragile ecosystem, various initiatives were undertaken alongside dune fixation efforts, namely community awareness actions on the socioeconomic and environmental importance of basins, including support for market gardeners and operators of drinking water, and provision of

natron (kind of soda ash) for better efficiency in the valorisation of oasis basin resources.

The project contributed to the protection and stabilisation of 44 basins (3,952 ha), the establishment of nine demonstration sites of good SLM practices, sensitisation and training of 3,600 to 4,800 people in basin protection techniques, the creation of 10 basic land commissions, and the revitalisation of 42 Local Natural Resource Management Committees (LNRMC). It also led to the development of 17 technical data sheets, particularly on village nurseries, dune fixation, mulching, and to the development and operationalisation of a partnership with Abdou Moumouni University of Niamey and the CNSEE.

This project developed actions aimed at increasing and diversifying plant and fruit production, increasing the availability of grass and woody fodder, securing this important ecological potential, but also reducing conflicts between farmers, while simultaneously strengthening the institutional capacity of local communities.

In partnership with the ICP-REC2 (FA/UAM), this project has launched the Observatory for Monitoring Silting and Land Degradation, which aims to improve and increase the efficiency of control actions to fight basin silting and ensure their recovery.

These photos are from the implementation of the pilot phase of the project, during the 2009-2011 period. They illustrate the efforts achieved by the project in a short period of time, mainly in the Gouré area (Zinder Region).

**Source:** [https://qcat.wocat.net/fr/wocat/technologies/view/technologies\\_3257/](https://qcat.wocat.net/fr/wocat/technologies/view/technologies_3257/)



Site installation



Mechanical fixation



Biological fixation

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## Case study 4

### GUM ARABIC FAVOURS GREEN GROWTH IN MAURITANIA

In the Sahel region of Mauritania, *Acacia sp.*, a traditional resource, is being deployed in the fight against desertification and rural poverty. This tree, which thrives in dry and hot southern Mauritania, has long been prized as a source of gum arabic – a natural gum made of hardened sap. This extremely versatile ingredient has been used for millennia. Used as a stabiliser in many foods, beverages and medicines, gum arabic has become a staple for the agri-food and pharmaceutical industries.

Mauritania was once the world's second largest exporter of gum arabic, producing an annual average of 5,700 tonnes at its peak. However, these numbers collapsed sharply following the severe droughts of the 1970s and 1980s and continued to fall with mass migration from rural to urban areas. Now, Mauritania only produces around 500 tonnes of gum arabic per year.

To exploit the socioeconomic potential of gum arabic thanks to the tolerance of *Acacia senegal* to drought, the World Bank has endorsed the Mauritanian policy of regeneration of this species and the development of gum arabic production. This project is part of the USD 1.1 billion Sahel and

West Africa Programme (SAWAP), jointly led by the World Bank and the Global Environment Facility (GEF) in support of the Great Green Wall (GGW) initiative. It aims to restore degraded ecosystems and to improve rural livelihoods.

The SAWAP programme aims to consolidate SLM in 39 municipalities in the southern regions of Trarza, Brakna and Gorgol. Located in the extreme south of the Sahara Desert and still expanding, these areas are home to gum arabic production ecosystems that help fight against desertification and enrich and retain land and water. The World Bank's recent study on inclusive green growth in Mauritania stressed the need to develop income-generating activities linked to renewable natural resources. This project meets this objective by promoting the development of a sustainable value chain of gum arabic through improved market access. Villagers understand that their long-term prosperity is closely linked to that of the land, and aspire to a better future where, by tending to their own needs, they can preserve the ecosystem's health for future generations.

**Source:** World Bank, 2016

View of an *Acacia senegal* park



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For agroforestry, the greatest gains come from the people themselves. The Sahel countries have not identified agroforestry early enough as a sector to recover degraded lands. The hybrid nature of agroforestry and the institutional segmentation between agricultural services and forest services have made agroforestry an orphan of public policies. Much evidence of the positive impact of these practices, which appear compatible both with the conservation of biodiversity and ecosystems, but also with subsistence or commercial agriculture, has finally convinced policy makers and the practice is now becoming increasingly prominent in SLM activities.

The Sahel hosts large national parks and biosphere reserves. These areas are places for biodiversity conservation, water recycling and migration corridors for wildlife. These parks are home to many of the rare and endangered species cited by the International Union for Conservation of Nature

(IUCN) and recorded in national forest codes. Their management allows in situ conservation of genetic diversity that serves as seed sources for reclaiming degraded lands. It is important to note that with accelerated land degradation, people use these parks and reserves for production activities and often come up against conservation services.

Examples of successful land restoration, reforestation and water preservation measures in the Sahel include the management of water bodies for animal and plant production; reduction and control of bush fires; improvement of wood extraction plans; increase in renewable energy production; planting trees in agricultural landscapes; the use of traditional methods such as Zai and half-moons; water recovery techniques; small-scale irrigation; land rehabilitation through organic modification; pasture management; and planting trees for fodder (Mbow, 2018).

**Table 2:** Examples of good practices to be disseminated

Examples of good practices to be disseminated	Description
<p data-bbox="358 957 899 1020"><b>Management of water bodies for animal and plant production (Cassou, Burkina Faso)</b></p> 	<p data-bbox="933 1056 1466 1304">Improvement of water supply during dry periods; creation of additional production in the dry season, such as micro-irrigation; water recovery for livestock and sustainable management of water resources; and development of tree plantations around water bodies, etc. This activity, very apparent in the GGW strategy, demands a long-term investment.</p>
<p data-bbox="358 1470 857 1497"><b>Bush fire management (Cassou, Burkina Faso)</b></p> 	<p data-bbox="933 1535 1466 1850">Excessive fire use adversely affects biodiversity and ecosystem services. Populations rely on fires to create a patchwork of habitat areas suitable for certain practices such as hunting, harvesting of savanna products and grazing. At the local level, fires can produce irreversible changes which, accumulated over large areas, can alter land cover at the regional scale. With increasing temperature and uncertain rainfall, the frequency and impacts of fires are likely to increase.</p>

Examples of good practices to be disseminated	Description
<p data-bbox="365 199 743 256"><b>Exploitation of wood energy</b> (all throughout the Sahel countries)</p> 	<p data-bbox="938 296 1446 541">In numerous regions, the extraction of timber for local and international markets has had very serious consequences for forest cover. With the increase in population mainly in urban centres and the high dependency on traditional energy systems based on wood or charcoal, this activity requires more attention from the GGW to reduce overexploitation of wood.</p>
<p data-bbox="365 709 870 737"><b>Promotion of agroforestry (Khombole, Senegal)</b></p> 	<p data-bbox="938 772 1459 1115">Various agroforestry practices, mainly nitrogen-fixing trees, can be very successful in the Great South region given their adaptation to traditional farming systems and the region's potential. Agroforestry systems range from silvopastoral systems to vegetable gardens, intercropping alleys and biomass plantations. The resulting benefits can help reduce poverty. Agroforestry can prevent soil degradation by supplying organic matter for its biomass while producing firewood and environmental services.</p>
<p data-bbox="365 1186 672 1213"><b>Zai technique (Burkina Faso)</b></p> 	<p data-bbox="938 1249 1459 1558">This technique falls under the category of water collection. It actually offers much more, as it can increase soil fertility when mulched with crop residues or harvested biomass. Its ability to retain water and increase soil moisture will not only mitigate the effects of the long dry periods during the short rainy season, but will also recharge the water table, providing an increased global tree cover. Zai farm yields always exceed those of non-Zai farms.</p>

Examples of good practices to be disseminated	Description
<p data-bbox="365 199 868 220"><b>Erosion reduction (Ouahigouyah, Burkina Faso)</b></p>  <p data-bbox="344 520 360 634" style="writing-mode: vertical-rl; transform: rotate(180deg);">© ABN-Sofreco</p>	<p data-bbox="938 262 1453 508">Most of the Sahel's water is quickly lost due to heavy runoff. The lack of trees will limit the ability of hard terrain to retain water, which will flow rapidly into rivers. To reduce this effect, farmers draw parallel ploughing lines on soil outcrops to retain water for longer. This effect is also pursued with stone lines set along the elevation isolines to increase infiltration.</p>
<p data-bbox="365 676 917 697"><b>Management of livestock rangeland (Ferlo, Senegal)</b></p>  <p data-bbox="344 1543 360 1648" style="writing-mode: vertical-rl; transform: rotate(180deg);">© ABN-Sofreco</p>	<p data-bbox="938 739 1453 1018">Rangeland management involves many actions such as zoning grazing areas, creating transhumance corridors, ensuring livestock water bodies and reducing impacts on fodder. The full consideration of pastoral systems in the GGW will be a critical success criterion, not only for revegetation activities, but also for poverty reduction and the establishment of resilient socio-environmental systems.</p>
<p data-bbox="365 1152 803 1173"><b>Planting of fodder trees (Dahra, Senegal)</b></p>  <p data-bbox="344 1543 360 1648" style="writing-mode: vertical-rl; transform: rotate(180deg);">© ABN-Sofreco</p>	<p data-bbox="938 1215 1453 1495">The Sahel receives rainfall only for three months of the year, and mostly in the northern part. In this region, small ruminants that are rarely involved in long-distance transhumance depend on fodder trees for food. Many acacias provide outstanding nutritional value for animals. These fodder trees prove advantageous because of their evergreen life form and their ability to tap into groundwater to survive the drought.</p>



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## THE GREAT GREEN WALL: A PAN-AFRICAN INITIATIVE FOR THE RESTORATION OF DEGRADED LANDS

For several decades, Sahelian countries have faced persistent rainfall shortages which, combined with anthropogenic factors, have seriously upset major ecological balances and trapped the region in an inexorable process of desertification. The persistence of climate change, characterised by high rainfall variability and frequent droughts, is one of the main vulnerability factors suffered by the population. Sahelian communities struggle against serious land degradation and extreme productivity loss. What is more, this situation undermines their livelihoods and places them among the world's poorest and most vulnerable to climate change. In the face of serious land degradation, eleven countries in the Sahel have decided to work together to remove the political, financial and institutional obstacles to implementing a soil restoration programme that takes climate change and land degradation into account. The Great Green Wall programme is based mainly on the identification and promotion of SLM practices and the strengthening of basic socioeconomic services at the rural level. It includes a coherent package of multi-sector actions and interventions to reposition the Sahel as a catalyst for inclusive development, with a view to eliminating poverty and food insecurity (Dia and Duponnois, 2013). The initiative aims to help end desertification and land degradation in the Sahelian zone,

improve the livelihoods and living standards of smallholders and pastoralists in the region, and help these populations develop effective adaptation strategies and measures through tree-based development programmes. For the GGW initiative to be successful, member countries have implemented a coordinated and integrated effort involving governments, local authorities, and numerous stakeholders. Planning, decision-making and field actions must be guided by knowledge-based participation and engagement to deal with all evolving land restoration practices and land-use change drivers in various human and environmental contexts. Over the past five years, many countries have launched specific activities to meet the goals of the GGW.

The Great Green Wall is aligned with the African Forest Landscape Restoration Initiative (AFR100), which is a pan-African initiative implemented at the country level to restore 100 million hectares of land in Africa by 2030.

AFR100 contributes to the Bonn Challenge, the African Resilient Landscapes Initiative (ARLI), the African Union Agenda 2063, the Sustainable Development Goals and other strategic goals for sustainable development.





## 10. PROGRESS IN THE FIELD OF LDN

As mentioned in the conceptual scientific framework, LDN promotes the following objectives: (i) maintain or improve the sustainable provision of ecosystem services; (ii) maintain or improve land productivity in order to strengthen food security; (iii) increase land resilience and populations dependent on them; (iv) seek synergies with other social, economic and environmental objectives; (v) strengthen responsible governance, including land tenure (Orr et al. 2017).

In this context, the Global Mechanism of the UNCCD has established an LDN target-setting programme in cooperation with the UNCCD secretariat and 18 international partners. The programme currently supports 122 countries globally and has enabled all West African countries to formulate LDN targets for 2030 at the national and sub-national levels. While some countries have already mainstreamed LDN targets in many policies and initiatives, significant investments are still needed to support such measures. The development and implementation of further transformative projects and programmes remains necessary, including those generating multiple benefits related to poverty reduction, food and water security, and other livelihoods issues such as gender equality, improved ecosystem services, access to energy, the creation of green jobs, conflict reduction and migration. The aim is to combine public and private funding, both national and international, to achieve these objectives.

LDN transformative projects and programmes seek in particular to generate and sustain positive changes seen as fundamental and sustainable in the coupled human-environment systems in which interventions are targeted. This positive transformation can be pursued through sustainable and inclusive interventions on a large scale (e. g. in landscapes) by putting in place technologies, practices and mechanisms before and during implementation. The synthesis of progress in LDN is measured against national goals set out in the national commitment documents (Table 3).

**Source:** <https://knowledge.unccd.int/knowledge-products-and-pillars/access-capacity-policy-support-technology-tools/checklist-land>

**Table 3:** Land restoration objectives in the framework of LDN.

Country	Opportunities and constraints	LDN Projects and Progress
<p><b>Burkina Faso</b></p>  	<ul style="list-style-type: none"> <li>▪ Large workforce (young people under 20 years of age represent 56.46 per cent of the population).</li> <li>▪ Techniques for recovering degraded lands (soil management, mini dams, CLE (water police), CES/DRS, water collection, Zai, Half-moons, etc.).</li> <li>▪ Structural and financial challenges for scaling up good practices.</li> <li>▪ Security challenges.</li> <li>▪ Strong population growth, high demand for timber energy, overgrazing, artisanal mining (gold panning).</li> <li>▪ Uncontrolled use of chemical products and fertilisers.</li> <li>▪ Poor access to land for women, limited access to credit, markets and inputs, and lack of support to farmers' organisations (FOs) are all factors that limit investments in support of SLM (Paul et al., 2016).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reduce the average deforestation area by 360,000 ha per year between 1992 and 2000 (Burkina, 2010), and by 59,900 ha per year between 2001 and 2015 (FAO-FRA, 2015).</li> <li>▪ The COSOP-IFAD project (2005-2012) resulted in 247 boreholes, the management of 72,560 ha of cropland including 2,247 ha of lowlands, and the use of improved techniques by 229,123 small farmers.</li> <li>▪ Objective to restore 5.16 million ha or 100 per cent of degraded land by 2030 compared with the reference period (2002-2013), corresponding to 19 per cent of the country's area (Burkina Faso, 2018)</li> </ul>
<p><b>The Republic of Mali</b></p>  	<ul style="list-style-type: none"> <li>▪ Large workforce (young people under 15 years of age represent 46 per cent of the population).</li> <li>▪ Niger's office is the oldest irrigated area in West Africa.</li> <li>▪ The irrigable land potential is 2.2 million ha, but less than 400,000 ha are developed today (PNAE).</li> <li>▪ Important water resources with the Niger River (1,700 km).</li> <li>▪ 113 classified forests with a total area of 992,241 ha; only 42 classified forests have management plans.</li> <li>▪ 500,000 ha of forests disappear each year, 400,000 due to timber exploitation and 100,000 for cropland extension.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Traditional techniques (Zai, stone barriers, earth bunds, half-moons, dune fixation, etc.) and agroforestry have been tested and disseminated by NRM programmes (CMDT, OHVN, ONG, etc.).</li> <li>▪ "Operation for a Green Mali" and the development of a National Reforestation Strategy in 2000.</li> <li>▪ A total of 44,430,796 seedlings (compared with 36,388,290 seedlings in 2011) were produced from all species combined, against a forecast of 60,822,977 seedlings, i.e. an achievement rate of 73.05 per cent. In the 2000-2012 period, 260,689 ha of degraded lands were reforested.</li> </ul>
<p><b>The Islamic Republic of Mauritania</b></p>  	<ul style="list-style-type: none"> <li>▪ Nearly 80 per cent of the population lives in the southern third of the country, in the Senegal River Valley.</li> <li>▪ Land suitable for agro- and silvo-pastoral activities is estimated at 20,000,000 ha. The arable land covers an area of 502,000 ha including 137,000 irrigable hectares along the Senegal River. Only 50,000 to 220,000 ha are exploited annually.</li> <li>▪ Forest resources cover an area of 4,385,000 ha, including 30 classified forests.</li> <li>▪ The underground renewable groundwater is estimated at 0.3 km<sup>3</sup>/year and the total renewable surface water at 11.1 km<sup>3</sup>/year, of which 0.1 km<sup>3</sup>/year is generated in the interior of the country (MHA, 2012).</li> </ul>	<ul style="list-style-type: none"> <li>▪ The vegetation cover has experienced a significant regeneration, with several hundred hectares restored and protected in a participatory manner. Reforested areas increased from 4,530.78 ha in 2000 to 74,666.27 ha in 2012, a 1.752 per cent growth in 13 years</li> <li>▪ There has been production of 44,430,796 seedlings on the basis of a forecast of 60,822,977, i.e. an achievement rate of 73.05 per cent.</li> <li>▪ There has been plantation of 74,666.27 ha against a forecast of 117,877 ha (63.34 per cent achievement).</li> <li>▪ There has been fixation of 31.0 ha of dunes.</li> </ul>

Country	Opportunities and constraints	LDN Projects and Progress
<p data-bbox="310 201 542 226"><b>The Republic of Niger</b></p>  	<ul style="list-style-type: none"> <li>▪ 15 million hectares of arable land of which only five million are cultivated.</li> <li>▪ Only 10,000 ha have been developed out of 270,000 potentially irrigable hectares.</li> <li>▪ The future Kandadji dam and the possibility of exploiting certain irrigable valleys and basins offer great potential for irrigable land.</li> <li>▪ Underground water resources are immense, albeit insufficiently exploited (with the exception of parts of the Liptako-Gourma plateau).</li> <li>▪ The Niger River and Lake Chad, drain annually 24 to 30 billion m<sup>3</sup> of water of which only one per cent is exploited.</li> <li>▪ Three quarters of the country's populations lives in one quarter of the territory.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The 3N Initiative (Nigeriens Nourish Nigeriens) under the Priority Investment Programme (PIP) aims to improve the productivity of agro- and silvo-pastoral systems through the expansion of sustainable management practices of land, vegetation and water.</li> <li>▪ The recovery of 254,536 ha over 260,000 ha of degraded lands planned, i.e. an achievement rate of 97.9 per cent.</li> <li>▪ 39,771 ha were stabilised over 65,000 ha expected within five years (62.1 per cent achievement rate).</li> <li>▪ 40,020,359 tree seedlings were produced against a forecast of 48,000,000 (83.4 per cent achievement) in the framework of the ecosystem regeneration, which allowed coverage of 140,807 ha of plantation against a forecast of 148,000 ha (95.1 per cent achievement rate).</li> <li>▪ The completion of approx. 105,861 km of firebreaks over the 2011-2015 period.</li> <li>▪ The area subject to assisted natural regeneration (ANR) in 2015 amounted to 48,091 hectares against 21,938 hectares in 2014, i.e. a 119.2 per cent increase, which shows the importance of assisted natural regeneration, mainly in the Maradi Region.</li> <li>▪ The country's protected areas, which covered 6.6 per cent of its surface in 2011, have increased to 14.29 per cent of the national territory.</li> </ul>
<p data-bbox="310 1266 537 1320"><b>The Federal Republic of Nigeria</b></p>  	<p data-bbox="617 1266 1036 1381">There are nearly 70 million hectares of arable land, 40 per cent of which would be used for agriculture. The agricultural sector employs over two thirds of the labour force.</p> <ul style="list-style-type: none"> <li>▪ Traditional local land law is complex and not very accessible.</li> <li>▪ Irrigation infrastructure benefits only one per cent of agricultural land.</li> <li>▪ Input availability is insufficient, while farming techniques have changed little, and credit access remains limited (only 1.4 per cent of banking activity).</li> <li>▪ Mechanisation levels are also very low, storage infrastructures (silos, etc.) and transportation are insufficient and lead to huge harvest losses (40 per cent).</li> </ul>	<ul style="list-style-type: none"> <li>▪ The country has undertaken to restore over 84 million hectares of degraded lands, as part of the African Forest Landscape Restoration Initiative (FAO-FRA, 2015) / Bonn Challenge.</li> <li>▪ In 2017, there was restoration of 1,056 hectares of degraded land and planting of 500 hectares of land with six local species.</li> <li>▪ Four native grass species have been introduced to provide fodder for livestock (FAO, 2018).</li> <li>▪ AID-funded Fadama-III project-built wells, boreholes, increased irrigated area (153.92 ha) and trained more than 338 people in remediation techniques for degraded lands, as well as in seed treatment and planting by direct seeding.</li> </ul>

Country	Opportunities and constraints	LDN Projects and Progress
<p data-bbox="334 201 597 226"><b>The Republic of Senegal</b></p>  	<p data-bbox="643 201 1062 285">60 per cent of the working population live in rural areas and two thirds are under 25 years old.</p> <p data-bbox="643 317 1062 369">The irrigable potential is 350,000 ha, of which only 130,000 ha have been developed.</p> <p data-bbox="643 401 1062 548">Water resources are estimated at 35 billion m<sup>3</sup> divided into 31 billion m<sup>3</sup> of surface water (including mainly Senegal, Gambia, Casamance and Kayanga rivers), and 4 billion m<sup>3</sup> of groundwater (PRACAS, 2014).</p> <p data-bbox="643 579 1062 632">Groundwater mobilisation is approx. five per cent.</p> <p data-bbox="643 663 1062 747">There is a decline in soil fertility and deterioration of ecosystems, with only a low value of agricultural products.</p>	<ul data-bbox="1081 201 1469 1020" style="list-style-type: none"> <li>▪ The country has adopted a national strategic investment framework for SLM (CNIS/SLM), which is a framework for consultation and pooling efforts of various structures in the fight against land degradation.</li> <li>▪ A popularisation programme for improved stoves was introduced.</li> <li>▪ Resources from the promotion of carbon credits are estimated at 25 billion CFA Francs. Implementation efforts, projects and programmes have allowed the storage of 27,967,500 tonnes of carbon, and deferred grazing has managed to create a wood capital of 30 m<sup>3</sup>/ha, or 900,000 m<sup>3</sup> of wood on land that was initially bare (Senegal, 2010).</li> <li>▪ Three regions (Thiès, Louga and Kolda) have been selected for the formulation of the LDN voluntary targets that Senegal has set for itself by 2035 (UNCCD, 2018).</li> <li>▪ This LDN process will impact approx. 317,127 ha in Tivaouane (Thiès) Department, 1,573,914 ha in Linguère Department (Louga) and 470,201 ha in Medina Yoro Foula (Kolda) Department.</li> </ul>
<p data-bbox="334 1056 565 1081"><b>The Republic of Chad</b></p>  	<p data-bbox="643 1056 1062 1203">The country offers a notable agricultural potential, with 39 million cultivable hectares, of which 2.2 million are cultivated annually, and 5.6 million ha are potentially irrigable, of which, in turn, 700,000 ha are irrigated today.</p> <p data-bbox="643 1234 1062 1318">Two thirds of the country's area are potential rangelands (84 million ha) and there are 23.5 million ha of natural forest.</p> <p data-bbox="643 1350 1062 1497">The country has a large hydrographic network, including 12,720 km<sup>2</sup> of lakes, two permanent rivers, i.e. the Chari and the Logone, and an important source of renewable underground water (20.6 billion m<sup>3</sup>).</p>	<p data-bbox="1081 1056 1442 1203">Major projects of soil conservation and restoration, reforestation, hydraulic development, fight against silting, community development are being undertaken.</p>



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## CONCLUSION

Land degradation directly affects tens of millions of people in West Africa, particularly in the Sahel where two-thirds of the land is arid. The increasing number of vulnerable people suffering the negative effects of land degradation is a major concern for the region. Aggravated by climate variability, in particular the recurrence of droughts, and the increasing demand related to population growth, land degradation is mainly the result of inappropriate human activities including the overexploitation of natural resources and unsustainable water and land management practices. These misuses contribute significantly to the decline in the productivity of land resources and the concomitant loss of biodiversity and soil fertility. As a result, people's livelihoods and the economic development of rural Sahelian areas are at risk, leading to an increase in poverty and human insecurity in the broad sense. This is all the more concerning in a context where the majority of the population is made up of small farmers and herders who are highly dependent on goods and services related to the exploitation and management of natural agro- and silvo-pastoral resources.

With the background on the challenges and constraints in the region, the analysis of the case studies of 7 countries made it possible to highlight the many achievements and assets of these Sahelian countries in dealing with land degradation. Many good practices in land restoration and sustainable land management developed through projects, programmes and initiatives, both at the national and regional levels, were highlighted. Indeed, in order to ensure the sustainable management of their natural resources, West African countries have been carrying out large-scale interventions to combat land degradation and desertification for more than 40 years. The results of these programmes are variable due to many constraints such as financial and technical barriers, and those related to land tenure security and the lack of integrated approaches. Despite these limitations, the Sahel could be considered as the region where experimentation with

restoration techniques has been most prolific. Soil fertility restoration (fertilizing trees, organic amendment), erosion reduction (stone barriers, Zai, half-moons), agroforestry practices, water retention techniques (micro-dams, retention basins) and the promotion of species adapted to drought have been at the core of many projects and programmes. Major regional initiatives such as the Great Green Wall and large structural projects at the national level have made it possible to consolidate certain achievements which could, within the framework of Land Degradation Neutrality, be scaled up to reverse degradation processes.

In addition to these achievements, the region enjoys considerable natural assets, including: abundant sunshine, an inexhaustible source of energy with the appropriate deployment of technologies; significant groundwater and surface water resources capable of covering much more than needs; youth and women involved in agricultural work; the diversity of its agro-ecosystems and the products harvested; and finally, the extent of the Sahelian areas being so large, the productive potential is immense. Opportunities to create prosperous lands exist and more fully exploit this potential.

In order to capitalize on its achievements and enhance the productivity of all its assets, the Sahel must now shift from the logic of “Degradation > Abandonment > Migration” to a new paradigm based on Land Degradation Neutrality (LDN) and its hierarchy of responses “Avoid > Reduce > Reverse” to adequately address land degradation.

It is now a question of scaling up successful experiences within the framework of existing initiatives or those to be developed at regional and national levels in order to achieve LDN, in particular through the development and implementation of transformative projects and programmes.

A new path of sustainable and inclusive development for the Sahel is now emerging to create wealth for all, based on the sustainable and equitable exploitation of natural resources, provided, among other things, that adequate technical and financial resources are mobilized and access to land is secured.



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# ACRONYMS AND ABBREVIATIONS

<b>AFR100</b>	Africa Forest Landscape Restoration Initiative	<b>NDT</b>	Neutralité en matière de dégradation des terres
<b>AGRHYMET</b>	AGRo-HYdro-METéorologique	<b>SDG</b>	Sustainable Development Goals
<b>AGMV</b>	Agence de la Grande Muraille Verte (Great Green Wall Agency)	<b>OMVS</b>	Organisation pour la Mise en Valeur du fleuve Sénégal (Senegal River Basin Development Authority)
<b>CBD</b>	Convention on Biological Diversity	<b>OSS</b>	Observatoire du Sahel et du Sahara (Sahel and Sahara Observatory)
<b>CBLT</b>	Commission du Bassin du Lac Tchad (Lake Chad Basin Commission)	<b>WFP</b>	World Food Programme
<b>CCAFS</b>	CGIAR Research Program on Climate Change, Agriculture and Food Security	<b>NAPCD</b>	National Action Plan to Combat Desertification
<b>UNFCC</b>	United Nations Framework Convention on Climate Change	<b>PLECO</b>	Projet de lutte contre l'ensablement des cuvettes oasiennes (Project for Oasis Micro-Basin Sand Invasion Control)
<b>CDN</b>	Contribution déterminée au niveau national (Nationally Determined Contribution)	<b>UNDP</b>	United Nations Development Programme
<b>ECOWAS</b>	Economic Community of West Africa States	<b>PRAPS</b>	Projet régional d'appui au pastoralisme au Sahel (Project for Support to Pastoralism in the Sahel)
<b>CES/DRS</b>	Conservation des eaux du sol/ Défense et restauration des sols (Groundwater conservation / Soil defence and restoration)	<b>PRACAS</b>	Programme d'Accélération de la Cadence de l'Agriculture Sénégalaise (Programme for the Acceleration of Senegalese Agricultural Growth)
<b>CFA</b>	Communauté française d'Afrique (French African Community)	<b>PRGDT/CC</b>	Programme régional de gestion durable des terres (Regional Programme for Sustainable Land Management)
<b>CILSS</b>	Comité permanent inter-États de lutte contre la sécheresse dans le Sahel (Permanent Inter-State Committee for Drought Control in the Sahel)	<b>PRGDT/CC</b>	Programme régional de gestion durable des terres et d'adaptation aux changements climatiques dans le Sahel et en Afrique de l'Ouest (Regional Programme for Sustainable Land Management and Adaptation to Climate Change in the Sahel and West Africa)
<b>UNCCD</b>	United Nations Convention to Combat Desertification	<b>REEB</b>	Rapport sur l'état de l'environnement au Burkina Faso (State of the Environment Report in Burkina Faso)
<b>COSOP-FIDA</b>	Country Strategic Opportunities Programme	<b>ANR</b>	Assisted Natural Regeneration
<b>ECOAGRIS</b>	ECOWAS Agriculture Information System (The Regional Integrated Agricultural Information System of ECOWAS)	<b>UNCCD</b>	United Nations Convention to Combat Desertification
<b>FAO</b>	Food and Agriculture Organisation	<b>USAID</b>	United States Agency for International Development
<b>IFAD</b>	International Fund for Agricultural Development	<b>USGS</b>	United States Geological Survey
<b>SMNR</b>	Sustainable Management of Natural Resources	<b>AfCFTA</b>	The African Continental Free Trade Agreement
<b>SLM</b>	Sustainable Land Management		
<b>GGW</b>	Great Green Wall		
<b>JRC-EU</b>	Joint Research Centre - European Union		
<b>LDN</b>	Land Degradation Neutrality		

**Bold decisions and investments made today will determine the quality of Life on Land tomorrow. This Global Land Outlook thematic regional report serves as a timely reminder of the steps we can take to shape a prosperous and more secure future. A future based on rights, rewards and above all respect for our precious land resources.**

# GLOBAL LAND OUTLOOK

The United Nations Convention to Combat Desertification (UNCCD) recognizes that addressing and reversing land degradation is one of the key sustainable development priorities for many countries, particularly in the developing world. In response, the UNCCD secretariat and its partners created a strategic communications publication and platform, entitled the Global Land Outlook (GLO), to facilitate insights, debate and discourse on a transformative vision for land management policy, planning and practice at various scales.

The aim of the GLO is to communicate and raise awareness of evidence-based, policy-relevant information and trends to a variety of stakeholders, including national governments formulating their responses to commitments to better manage and restore land resources, including the SDGs and associated targets, such as Land Degradation Neutrality (LDN). The evidence presented in the Global Land Outlook thematic regional reports demonstrates that informed and responsible decision-making can if more widely adopted help to reverse the current worrying trends in the state of our land resources.



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