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GLOBAL ENVIRONMENT FACILITY  
INVESTING IN OUR PLANET

# Land, Water, and Forests:

ASSETS FOR CLIMATE RESILIENT DEVELOPMENT IN AFRICA





# Foreword

*A dirt road passes through the grasslands in Nigeria.*



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Global Environment Facility

Africa is a continent rich in natural resources. Its land, water, and forests underpin the sustained productivity of food crops and livestock on which millions of Africans depend directly for their livelihood and survival. These resources are major assets on which most countries depend for economic growth and sustainable development. In the face of growing climate change threats, such as temperature rise and frequent drought and flooding, African leaders recognize the crucial need to address vulnerability as a development priority.

But the threat of climate change in Africa is not just a concern for its people. It is also a matter of immense importance to the global community. Undoubtedly, the risk of expanding land degradation and desertification, increased deforestation, and water scarcity threatens to hasten a major global environmental crisis. African leaders are therefore counting on commitment of the global community to help tackle these environmental challenges as part of a broader agenda to enhance climate-resilient development on the continent.

In this context, the Global Environment Facility (GEF) is well aware that helping African countries tackle these environmental challenges will deliver global benefits while enabling them to pursue climate-resilient pathways to sustainable development. This publication outlines three programs that the GEF has catalyzed in response to demand from African leaders for a robust and integrated approach to tackling environmental challenges in Africa. The three initiatives are located in the Sahel, Lake Chad Basin, and Congo Basin and are designed to introduce measures that will not only address emerging environmental challenges, but radically change the trajectory of the continent's key natural resources — *land, water, and forests*.

Toward this end, the GEF has provided grants totaling US\$168 million and generated co-financing of US\$2.18 billion from various sources, including national governments, bilateral, and multilateral agencies. The funds will assist countries of the three regions in strengthening management of the natural resources and the institutional framework so as to build resilience in the face of climate change.

The Sahel program supports countries in that region to pursue their collective vision of a Great Green Wall to signify integrated management of land, water, and vegetation for improved livelihoods, ecosystem resilience, and environmental sustainability. The Lake Chad Basin program will enable five affected nations to preserve and protect the Africa's second largest wetland — Lake Chad. Due to declining rainfall, Lake Chad has been reduced to just one 20th of its original area in less than 45 years. GEF financing of projects that focus on sustainable land management and integrated water resource management give us the best chance of preserving and protecting the vital wetlands and groundwater of the Lake Chad Basin.



The Congo Basin program focuses on improved governance and sustainability of the world's second largest tropical rain forest, covering an area the size of India and home to 60 million people who depend on forest resources for their livelihood. The Basin also contains an enormous variety of biodiversity and vast quantities of carbon below and above-ground. The program will enable the affected nations in implementing programs that engage local populations, regional entities and international organizations in a coordinated approach to safeguarding the forest resources.

The nature and scale of these three programs are evidence that Africa is poised to embrace climate-resilient development for a sustainable and prosperous future. However, additional investment and technical assistance are still needed to ensure that appropriate policies and institutional frameworks are in place for long-term sustainability. The time is therefore right for all development partners to join forces in further strengthening these initiatives as models for the entire continent. Success of these programs not only means the protection of natural resources but the fostering of climate-resilient development in a manner that will be relevant for other regions on the

continent. Among the broader benefits to be gained are the integrated management of lake and river basin systems for environment and development benefits, the safeguarding of ecosystem services (e.g. biodiversity, carbon stocks) in all types of forests, and climate-smart agriculture.

A fundamental concept underlies everything that the GEF is doing in these unprecedented efforts in Africa: The idea that economic growth and environmental health are, in fact, inseparable. Some argue that the fiscal and economic challenges facing so many nations make environmental initiatives a luxury we cannot afford. At GEF, our view is that these challenging economic times – and the linkage between economic and environmental health — make these initiatives all the more important. The three programs highlighted in this publication will serve to open new opportunities for delivering resilient development in Africa that cut across multiple sectors, including agriculture and energy. It is our hope therefore that the global community will embrace this approach as a response to the call by African leaders for commitment and partnership to help build a resilient and prosperous future for the continent and its people.

*Making a fishing net with branches in Lagos, Nigeria.*







## Climate Change and the Development Imperative of Africa

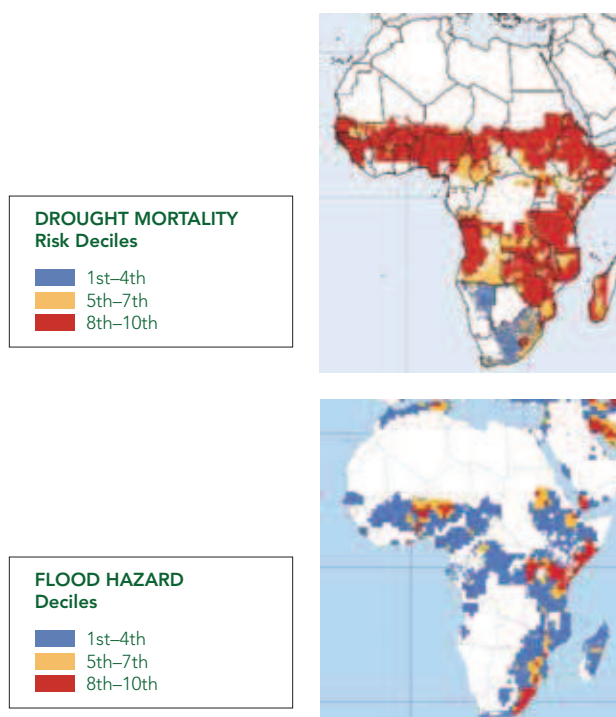
One third of all African people live today in drought-prone areas, and 250 million are exposed to drought every year.<sup>1</sup> This means that the already existing livelihood challenges of Africa are being compounded by the current climate variability of the continent, undermining development options.

The environmental decline of Africa's natural systems such as the Sahel, the Lake Chad Basin, and the Congo Basin has tremendous repercussions for future generations. Worryingly, the depletion of natural resources — *land, water, and forests* — further exacerbates the declining trends in crop and livestock productivity, and these trends are intimately associated with increasing food insecurity and health risks.

The impacts of climate change and variability in Africa are profound. Experts project these impacts will pose increasing threats to human survival across many parts of the continent. Widespread disruption from floods and droughts can impact the same area repeatedly and over short time spans, reducing the adaptive response capacities of human and ecological systems.<sup>2</sup> On the other hand, these trends are highly heterogeneous and do not affect every region in the same way. Pinpointing the areas for greater risk is essential to effectively deploy targeted action.

Analyses of drought risks show that across vast areas of the continent, particularly in sub-Saharan Africa (SSA), populations are extremely vulnerable to drought-related mortality (Figure 1a, areas in red). Similarly, flood hazard risk distribution reveals parts of the Sahel, Eastern Africa and Southern Africa that are also highly vulnerable (Figure 1b, areas in red). It is within these areas that targeted attention is needed.

**FIGURE 1: A) TOP-DROUGHT MORTALITY RISKS AND DISTRIBUTION IN AFRICA, 2000;  
B) BOTTOM-EXTREME FLOOD EVENTS IN AFRICA, 1985-2003**



Source: Top: (Data from CHRR, 2005); Bottom: (Data from CIESIN and World Bank, 2003)

<sup>1</sup> UNFCCC, 2007  
<sup>2</sup> UNFCCC, 2007



In addition to the elemental risk to survival, these climate-related risk factors significantly impede the development aspirations of the African people, especially in the Sahel, Lake Chad Basin, and the Congo Basin. In these regions, national economies are tightly linked to natural resources. Overexploitation of land, water, and forest resources, coupled with increases in population, amplify climate-related threats and undermine future development options.

Tackling these challenges will deliver global environmental benefits while enabling African countries to pursue climate resilient pathways to sustainable development. This publication lays out a roadmap for pursuing this course of action, leveraging and strengthening programs already under way, and laying the foundation for a global partnership to emerge in support of the aspirations of the African people for economic prosperity.

*In Burkina Faso, students take part in a national tree-planting day.*







Kenyan women load up precious water for the journey home.

## Land, Water and Forests in the Context of Climate Vulnerability in Africa

Climate change projections converge on one conclusion: 30% of the land base in Africa is under threat of desertification, and the continent as a whole is on a path to be hit hard by deforestation and drought, together with reduced fresh water availability and greater food insecurity. The agriculture and livestock sector face acute risk, with the livelihoods of millions in rural areas at stake. Understanding these vulnerabilities in terms of both socio-economic and ecological realities is essential for climate-resilient development on the continent.

Agricultural systems in Africa are vulnerable to variability in climate, whether natural or man-made, and crop production is expected to become increasingly risky.<sup>3</sup> Roughly 70 percent of the population lives by farming, and 40 percent of all exports are agricultural products.<sup>4</sup> This poses a major development challenge for many countries that depend on the natural resources sector for economic growth.

In the semi-arid regions of Africa, such as the Sahel, agriculture is based on small-scale, climatically-vulnerable systems. It is estimated that, by 2100, countries in these regions are likely to emerge as the most vulnerable, showing likely agricultural losses of between 2 and 7% of GDP.<sup>5</sup> In the developed world, agricultural producers can employ a range of strategies in managing or adapting to the impacts of climate variability on food

production, for example, crop science and modern irrigation systems. Land users in Africa, by contrast, face the reality that a large fraction of the continent's crop production depends on rainfall, which poses greater challenges for adaptation.

### LAND

Land is the most important asset in agricultural production. Sub-Saharan Africa has an estimated 2.4 billion hectares, of which only 8% is arable and permanent cropland.<sup>6</sup> The sustained productivity of existing cropland is essential for meeting current and future development needs while addressing climate change risks. Land degradation and desertification, pervasive throughout the continent, are major factors affecting agricultural productivity and food security in sub-Saharan Africa.

Climate change is set to increase the area susceptible to desertification in SSA. Under a range of climate scenarios, it is projected that there will be an increase of 5-8% of arid and semi-arid lands in Africa. Unless addressed in an integrated manner, land degradation and desertification will undermine the development aspirations of most of the countries on the continent.

Land degradation is a widespread trend in SSA, and affects at least 65% of the African population.<sup>7</sup> It is estimated that two-thirds of African land is already degraded to some degree, and land degradation is especially severe in the semi-humid and humid tropics where approximately 360 million hectares are subject to serious soil erosion risk.<sup>8</sup> The primary mechanisms of land degradation are erosion by water and wind, nutrient loss, chemical degradation, and soil organic carbon depletion.

<sup>3</sup> Challinor et al 2007

<sup>4</sup> WRI 1996

<sup>5</sup> Mendelsohn et al., 2000

<sup>6</sup> IAASTD

<sup>7</sup> Semazzi and Yi, 2001

<sup>8</sup> Vagen et al 2005







*Aerial view of a village in Niokola-Koba National Park, Senegal.*





Desertification is the extreme form of land degradation pervasive in drylands, such as the Sahel. Roughly half of the nearly 100 countries in the world affected by deforestation and desertification are in Africa, or more than 80% of all African countries. The region that has the highest propensity is located along the desert margins and occupies about 5% of the continental land mass. Desertification on margins of the Sahara stands out as an alarming example of the global environment crisis. An estimated 22 million people (2.9% of the total population of Africa) live in this region.

## WATER

Climate change severely impacts both the availability of and access to water resources, and many parts of Africa are already experiencing highly variable precipitation, with significant year-to-year variations within regions. SSA represents about 60% (14.3 million ha) of the total land area in Africa on which water is used for the purpose of agricultural production (i.e. water managed areas)<sup>9</sup>. National percentages for water managed land in agriculture range from less than 1% of cultivated land (Democratic Republic of Congo, Uganda, Ghana, Togo and Comoros) to 100% in the most arid countries, e.g. Djibouti, where agriculture is impossible without irrigation. Nigeria, Angola, Sudan, South Africa, and Madagascar hold most of the water managed areas in SSA.<sup>10</sup>

Increased water stress will have a direct, adverse impact on agricultural production and food security across the continent. Smallholder farmers in Africa rely overwhelmingly on low-input rain-fed agriculture. Most of sub-Saharan Africa already suffers from economic water scarcity, a condition where people lack the means to access enough water to meet their basic needs.<sup>11</sup>

Projected reductions in crop yield in some countries could be as much as 50% by 2020, and by 2080, sub-Saharan Africa is expected to lose some 75 million ha of land that is currently suitable for rain-fed agriculture.<sup>12</sup>

It is through water, more than any other resource, that the effects of climate change on Africa's extremely poor will be felt. By the 2020s, 75-250 million Africans will be at risk of increased water stress. By the 2050s, the number is expected to reach between 350 and 600 million.<sup>13</sup> Even in the absence of climate change, present population trends and patterns of water use indicate that more African countries will exceed the limits of their "economically usable, land-based water resources before 2025."<sup>14</sup> Africa's poor are ill-prepared to withstand the growing strain.

<sup>9</sup> Ragab and Prudhomme, 2001

<sup>10</sup> Ragab and Prudhomme, 2001

<sup>11</sup> Comprehensive Assessment of Water Management in Agriculture 2007

<sup>12</sup> IPCC UNFCCC 2007

<sup>13</sup> Arnell 2004

<sup>14</sup> Ashton, 2002

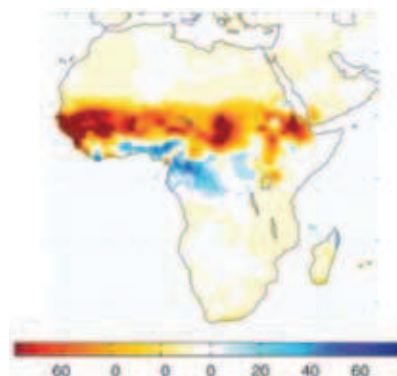
## FORESTS

Forests cover at least 19% of the total land area in SSA, although with much variation based on tree cover. The forests in Africa are renowned for their rich biodiversity, with those of West Africa (Guinean forests), Eastern Africa (Albertine Rift and Eastern Arc Mountains), and Southern Africa (Miombo and Mopane woodlands) considered among the world's most threatened ecosystems. The Central Africa region, with the vast Congo Basin, has the largest extent of forest on the continent.

Covering nearly 300 million hectares, the Congo Basin forest is second only to the Amazon in area and represents a major asset for development in eight countries – Burundi, Cameroon, Central African Republic, Republic of Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, and Rwanda. Despite the vast area covered, only 37.3 million hectares of this forest is designated for protection. As a result, a significant area is predisposed to unregulated exploitation, often at the expense of nearly 60 million people who depend on forest resources for their livelihood.

Deforestation, especially to meet energy needs and expand agricultural land, is a major contributor to climate vulnerability throughout SSA. More than 15 million hectares of tropical forests are depleted or burnt annually in order to provide for small-scale agriculture and for fuel wood. For example, in Ghana, 70 percent of the firewood and charcoal burned annually comes from the savanna zones, resulting in the loss of 20,000 hectares of woodland.<sup>15</sup> In Uganda, where 90 percent of the population depends on land for agriculture, forest areas shrank from 45 to 21 percent of the country's surface area, between 1890 and 2000.<sup>16</sup>

**FIGURE 2. OBSERVED AND MODELED RAINFALL TRENDS: LINEAR TREND FROM 1950-2000. BLUE AREAS CORRESPOND TO A TREND TOWARD WETTER CONDITIONS AND BROWN AREAS TOWARD A DRIER CLIMATE**



(Source: Held et al., 2005)

<sup>15</sup> Semazzi and Yi, 2001

<sup>16</sup> Semazzi and Yi, 2001





*In Kenya, Masai cows cross Lake Amboseli, which is dry 11 months of the year.*

## Vulnerability Trends in Key Regions

Climate change trends and effects are not uniform across the African continent. Indeed, projections under different scenarios have shown that some parts of the continent are among the most vulnerable to severe climate change. These include some of the mixed rain-fed systems, arid-semiarid systems in the Sahel, rangeland, and arid-semiarid systems in parts of East Africa.<sup>17</sup> Coastal systems in eastern and southern Africa and live-stock and some mixed systems in southern Africa are also vulnerable. Forest-based systems in Central Africa (the Congo Basin) are projected to experience moderate climate change impacts as are some mixed systems in southern Africa.<sup>18</sup>

### THE SAHEL REGION

The Sahel, the transition zone between the Saharan desert and the rainforests of Central Africa, has experienced a severe drying trend since the 1950s.<sup>19</sup> Continuation of the drying trend would have far-ranging implications for the economy and ecology of the region. In the 20th century, the Sahel region experienced three major drought periods: 1910–1916, 1941–1945, and the long period of sustained declining rainfall (the ‘desiccation’) that spanned the 1970s and most of the 1980s and continued with some interruptions into the 1990s.

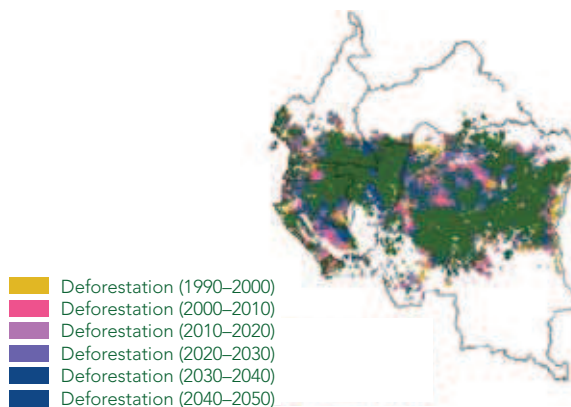
In the Sahel, agricultural drought is not always linked to low rainfall; 20–40 percent of annual rainfall is lost as runoff, resulting in agricultural drought and massive soil erosion. Furthermore, the loss of rain water through runoff, soil evaporation and drainage is often considered as the major cause of

moisture stress. Soils in the Sahel are inherently fragile, low in carbon, and poor in plant nutrients. Maintaining soil fertility, whether through organic or inorganic sources, is the key to sustainable agriculture in the region.

### THE CONGO BASIN

The Congo Basin forests represent the most important forest block in Africa. The roughly 300 million ha of existing forests, in the region, are a valuable resource for national governments, private companies, and rural populations. A recent study found that forest products can account for approximately 44% of the annual income of rural populations in the region.<sup>20</sup> Timber export from the Congo Basin is a major contributor to the GDP of some of the countries. Although deforestation is taking place in the region, the land cover of Central Africa is still very much dominated by forest and therefore represents a major opportunity for climate change mitigation.

**FIGURE 3. MAP OF MODELED FOREST EXTENT FROM 1990–2050**



*(Source: Justice et al. 2001)*

<sup>17</sup> Thornton, et al, 2008

<sup>18</sup> Thornton, et al, 2008

<sup>19</sup> Held et al., 2005

<sup>20</sup> Tieguhong, 2008



With only a small proportion designated for protection, however, the Congo Basin forests are exposed to unregulated exploitation and the threat of deforestation from various forces (see Figure 3). As a result, these forests are an important source of greenhouse gas emissions from deforestation and a potential contributing factor to climate change vulnerability for the region. Estimated carbon emissions from Central Africa range from 0.02 to 0.41 Pg per year for the time period 1980–1990<sup>21</sup>. Estimates also show that deforestation occurred at a rate of 0.43% per year, and carbon emission would be equivalent to 0.14 Pg per year<sup>22</sup>.

During the decade 1981–1990, the deforestation rate in countries of the region was estimated to be within 0.2% and 0.6%. Recent estimates show that from 1990–2000, gross deforestation, net deforestation and net degradation rates in the Congo Basin were respectively 0.27, 0.19 and 0.10%. This rate is very low compared to most other tropical regions, but the absolute figures are considerable, and deforestation intensity varies greatly within the region with hotspots of deforestation in DRC and Cameroon.

**TABLE 1. EXTENT OF FOREST AREA (HA), AVERAGE CARBON (T C/HA), TOTAL CO<sub>2</sub>E STORAGE (T CO<sub>2</sub>E) AND ASSOCIATED LOSSES/GAINS IN CO<sub>2</sub>E (T CO<sub>2</sub>E)**

COUNTRY	FOREST AREA IN 2000	MEAN CARBON (T C/HA)	TOTAL CO <sub>2</sub> E (THOUSAND T CO <sub>2</sub> E)	ANNUAL FOREST CHANGE RATE 2000–2005 (%/YEAR)	THOUSAND (HA) THOUSAND T CO <sub>2</sub> E LOSS/GAIN PER
Burundi	151	18.3	10,139	-5.2	-527
Cameroon	33,972	101.7	12,672,873	-1	-126,729
Central African Republic	55,004	70.9	14,294,695	-0.1	-14,295
Chad	2,152	21.5	169,491	-0.7	-1,186
Congo	25,313	161.4	14,984,447	-0.1	-14,984
Congo, DRC	190,912	97.6	68,302,189	-0.2	-136,604
Equatorial Guinea	2,046	116.1	871,040	-0.9	-7,839
Gabon	22,777	168.5	14,071,813	0	0
Total (all the above countries)	332,327	—	125,376,687	—	-302,164

(Source: Sonwa et al. 2011)

Gorillas are a major attraction for Ecotourism in some Congo Basin countries.



<sup>21</sup> Justice et al. 2001

<sup>22</sup> Justice et al. 2001



## THE LAKE CHAD BASIN

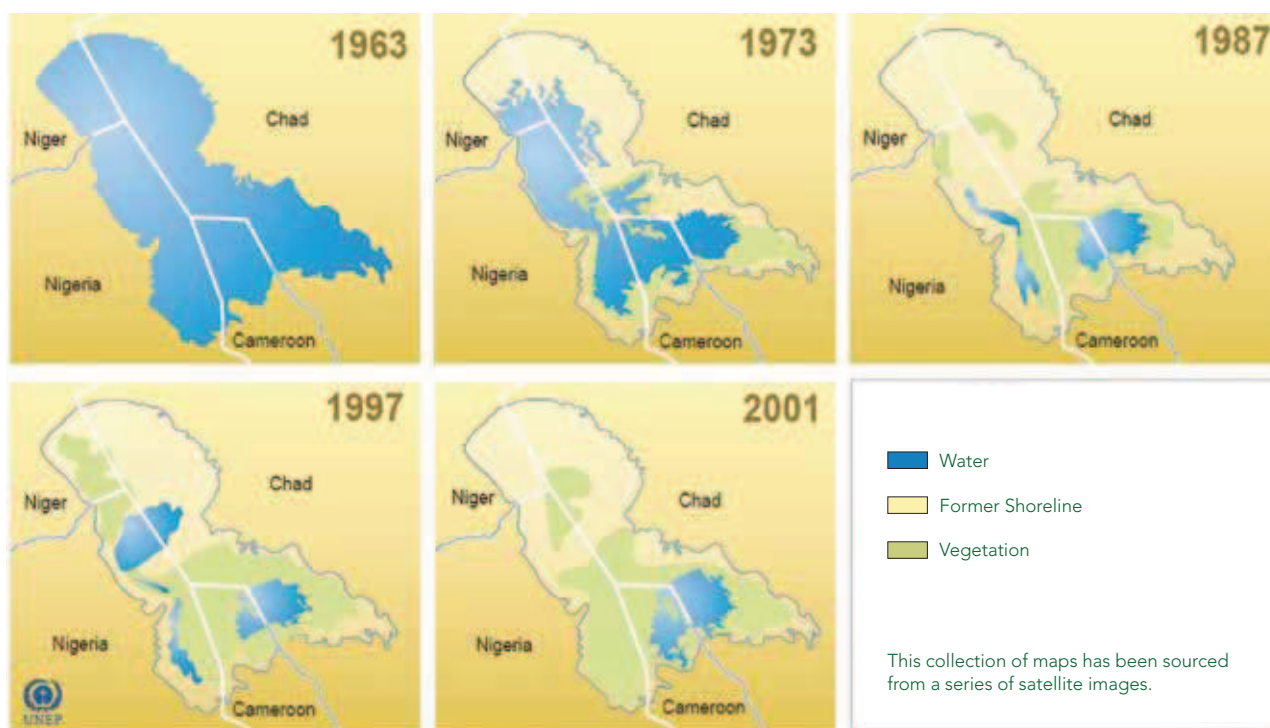
The Lake Chad drainage basin is a large closed drainage system in the northern part of SSA.<sup>23</sup> Rainfall over the Chad drainage basin has decreased greatly since the early 1960s, largely because of a decrease in the number of large rainfall events. Concurrently, in response to changing climate, the use of water for irrigation has increased dramatically. Altogether, climate variability and increased human consumption have caused large changes to the water balance of the Chad drainage basin.

Lake Chad responds rapidly to precipitation and runoff changes in part due to the shallowness of the lake (less than 7 m). As a result, Lake Chad has been reduced from an area of open water covering approximately 25,000 km<sup>2</sup> in 1963 to a small area covering 1,350 km<sup>2</sup> today<sup>24</sup> (see Figure 4). This desiccation has led to enormous changes in the lives and livelihoods of the 750,000 people living in the area. For the foreseeable future water demands in the Lake Chad drainage basin are expected to increase, as the population becomes more dependent on irrigated agriculture.

**FIGURE 4. A SHRINKING LAKE CHAD**

### A CHRONOLOGY OF CHANGE

#### NATURAL AND ANTHROPOGENIC FACTORS AFFECTING LAKE CHAD



Source: NASA Goddard Space Flight Center, 2001(<http://www.gsfc.nasa.gov/gsfc/earth/envIRON/lakechad.html>)

23 Coe and Foley, 2001

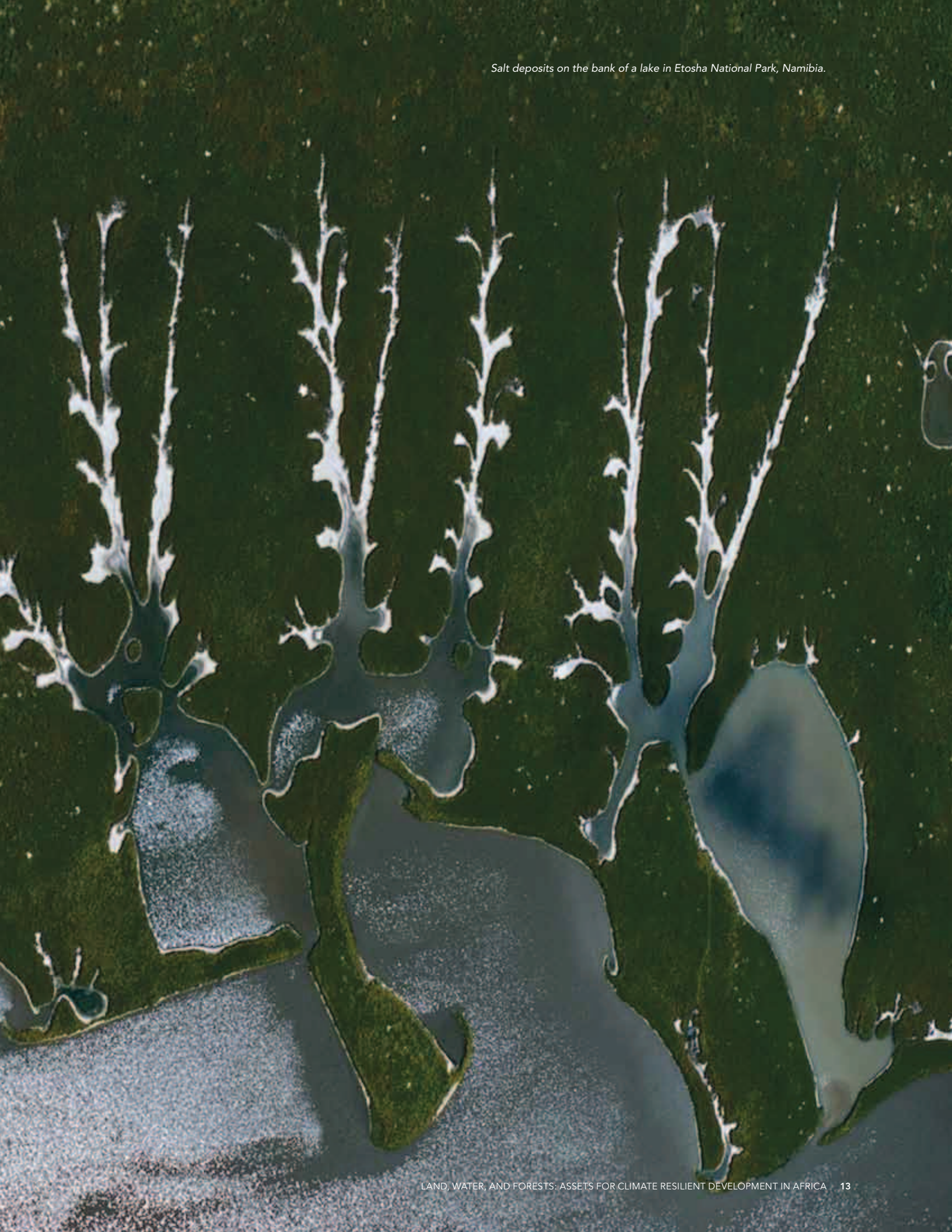
24 Coe and Foley, 2001







*Salt deposits on the bank of a lake in Etosha National Park, Namibia.*





# Land, Water and Forests

## The Foundation for Climate Resilient Development in Africa

### LAKE CHAD BASIN REGIONAL PROGRAM FOR THE CONSERVATION AND SUSTAINABLE USE OF NATURAL RESOURCES AND ENERGY EFFICIENCY

**Countries:** Cameroon, Chad, Central African Republic, Niger, and Nigeria

**GEF Agency:** African Development Bank (AfDB)

**GEF Program Grant:** US\$20.5 million

**Co-financing:** US\$172.5 million

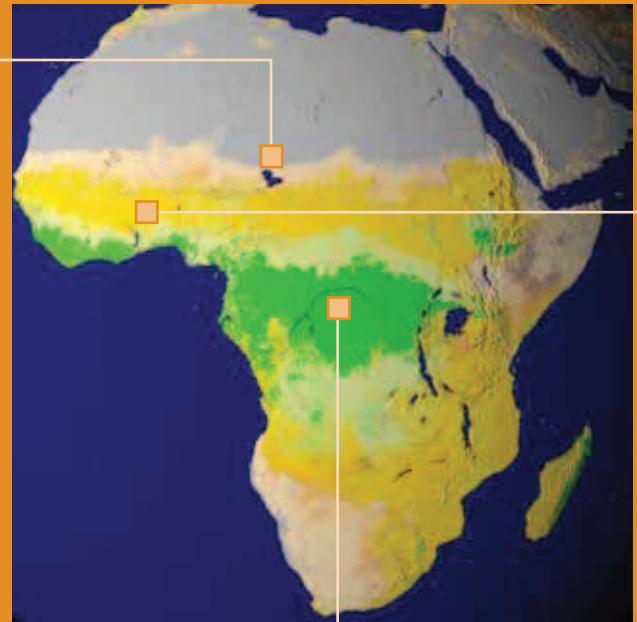
**Program Goal:** To maintain the ecosystem services in the Lake Chad Basin by conserving the water and agro-sylvo ecosystems and ensuring the sustainability of use of resources in a context of energy efficiency and food security. The program is designed to address key lessons from the Strategic Action Program developed in an earlier GEF project, notably 1) the need for demonstration activities and demonstration sites and 2) the involvement of communities in the implementation of activities on the ground through participation and capacity building at local level.

#### **GEF Contribution to Climate Resilient Development:**

The GEF program is built on the top of baseline investment projects related to poverty reduction, food security, rural infrastructures, and sustainable development in the Lake Chad Basin. Focusing on biodiversity, land, water, and forests, the program aims to improve the flow of agro-ecosystem services, including the climate resilience of ecosystems. In complement, the program promotes the demonstration, the deployment, and the transfer of innovative low carbon technologies in key sectors (agriculture, fisheries, water management, as well as the adoption of adaptation technology. The program will improve the capacity of resilience and adaptation of local communities in the Lake Chad basin.

#### **Program Outcomes:**

- Increased efficiency of approaches and tools related to the consumption of natural resources and energy
- Sustainability and resilience of productive landscapes
- Strengthened capacity and knowledge for Integrated Water Resource Management and Water Use Efficiency,
- Strengthened water and ecosystems management and improved riparian collaboration.





## GEF/WORLD BANK SAHEL AND WEST AFRICA PROGRAM IN SUPPORT OF THE GREAT GREEN WALL INITIATIVE

**Countries:** Benin, Burkina Faso, Chad, Ethiopia, Ghana, Mali, Mauritania, Niger, Nigeria, Senegal, Sudan, and Togo

**GEF Program Grant:** \$100.7 million, including US\$ 81.3 million (GEF Trust Fund); US\$ 14.8 million (Least Developed Countries Fund); and US\$4.6 million (Special Climate Change Fund).

**Co-financing:** US\$ 1.8 billion

**GEF Agency:** The World Bank

**Program Goal:** To expand Sustainable Land and Water Management in targeted landscapes and in climate vulnerable areas in West African and Sahelian countries. This program supports the implementation of a country-driven vision for integrated natural resource management for sustainable and climate-resilient development in the Sahel and broader West Africa region. The investments cover agriculture, biodiversity conservation, climate change mitigation, adaptation to climate change, sustainable forest management, food security enhancement, disaster risk management, rural development, erosion control, and/or watershed management.

### **GEF Contribution to Climate Resilient Development:**

The Program will increase the land area with sustainable land and water management practices on up to two million hectares. The GEF increment will also promote large-scale watershed planning or smaller-scale community land use planning, improve the vegetation cover, the use of renewable energy alternatives, and increase the adaptive capacity to reduce risks and response to climate variability. The whole approach will help communities adapt production systems to climate variability and change and generate income and livelihoods. The improvement of information base will also improve climate and water monitoring networks to fuel further policy development.

### **Program Outcomes:**

- Policies, institutions, and financing for scaling up sustainable land and water management and other adaptive responses improved at national and regional level
- Knowledge generated and disseminated in countries on Sustainable Land and Water Management and other adaptive responses
- More secure provision of services from the landscape mosaic in targeted areas, including livelihoods, genetic resources, soil health and water resources
- Biodiversity conservation integrated into landscape management
- Payment for Ecosystem Services adopted as an incentive mechanism to implement Sustainable Land and Water Management
- Increase in community based ecotourism activities.
- Strengthened adaptive capacity to actual or potential climate change risks

## GEF STRATEGIC PROGRAM FOR SUSTAINABLE FOREST MANAGEMENT IN THE CONGO BASIN

**Countries:** Cameroon, Central African Republic, Republic of Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon

**GEF Agency:** The World Bank

**GEF Program Grant:** US\$48 million

**Co-financing:** US\$218 million

**Program Goal:** To reverse the current rate of deforestation and degradation of ecosystems, to maintain ecosystem functioning, and to conserve ecosystem values such as the biodiversity and carbon-based capital of the Congo Basin for the benefit of local communities and indigenous people, whose livelihoods depend on the forest resources.

### **GEF Contribution to Climate Resilient Development:**

The Program supports the development of financial incentives structures to protect forest for its carbon value. As a basis for accessing financing from the carbon market, the Program would support the development of a reliable monitoring methodology of carbon fluxes from land use, land use change, and forestry (LULUCF) and build country capacity to apply such methodology in a standardized manner across the Congo Basin. The Program will strengthen the overall terrestrial protected area network across the different countries, and support the mainstreaming of biodiversity conservation in national forest policy and related sectoral regulatory framework, including the harmonization of such framework across the sub-region. It will contribute to protect a vast carbon sink of an estimated 24-39 Gt of carbon, impacting the regional and local weather patterns, and ensuring the cycling of water critical for a large area of Africa.

### **Program Outcomes:**

- Central African Governments and civil society effectively implementing the Plan de Convergence, with COMIFAC serving as a regional coordination mechanism for sustainable forest management across the region.
- Long-term sustainability of a representative and well-managed system of protected areas in the Congo Basin.
- Availability of financial resources to conserve biodiversity in the Congo Basin through sustainable financing mechanisms such as payments for environmental services, trust funds, private-public partnerships, etc.
- Improved capacity of Central African Governments to catalyze investment in sustainable management of forests and freshwater ecosystems by the private sector, financial institutions and donor community.
- Capacity of all stakeholders strengthened, particularly in protected areas and buffer zones, to effectively manage forest and freshwater ecosystems and conserve biodiversity assets.
- Adoption of best practices for trade in the commodities driving land use practices to ensure reduced impact on forest ecosystems.
- National capacities strengthened for evaluating carbon stocks in forests and monitoring of GHG fluxes from land use and land use change.
- Reliable models for REDD implemented and shared with the international community.
- Adoption of adaptation measures to better manage the impacts of climate change.
- Rights of local people and communities recognized and empowered through community-based natural resources management systems.





A village in Benin with access to safe, clean water

## Toward Climate Resilient Development in Africa — the Catalytic Role of the Global Environment Facility

Africa's combined challenge of environmental degradation and climate change calls for urgent, integrated action. Robust measures to enhance the resilience of human and natural systems are fundamental to securing Africa's development in the face of a changing climate. The Global Environment Facility (GEF) is now responding to the call and to the commitment by African leaders to introduce measures that will not only address these emerging challenges, but radically change the trajectory of the continent's key natural resources — *land, water, and forests*.

In support of this goal, the GEF has launched three landmark initiatives focusing on priority regions in Africa. These initiatives are The Great Green Wall, the Forests for Climate in the Congo Basin, and the Lake Chad Basin Regional Program. These well-funded, multi-institutional programs will assist African countries in strengthening their natural systems and institutional framework so as to build resilience in the face of the impacts of climate change.

Through strategic partnerships involving the national governments, development agencies, and multilateral donors, all affected countries in these regions can build on achievements over recent decades while leveraging new opportunities for climate-resilient development. Since 2006, the GEF has been catalyzing such strategic partnerships with countries of the Sahel, Lake Chad Basin, and Congo Basin to pursue

transformative impacts through integrated management of land, water, and forests as assets for climate resilience and sustainable development.

### INVESTING IN NATURAL RESOURCE MANAGEMENT AND RESILIENCE

Throughout the Sahel, there are excellent examples of how grassroots innovations and government-driven actions for improved agricultural production, livestock management, biodiversity conservation, and sustainable forest management can be achieved with global environmental and development benefits. Moving these impacts to scale is possible because all Sahelian countries have expressed an explicit desire to implement integrated environmental and development initiatives. This interest is inherent in the Great Green Wall Initiative of the Sahel and Sahara (GGWISS), a bold vision of African leaders to address desertification and development in the Sahel and the southern margins of the Sahara Desert.<sup>25</sup>

Working together under this unified vision positions participating countries to pursue development pathways that will increase the resilience of the Sahel — both its ecosystem

<sup>25</sup> The GGWISS was originally conceived by the former President of the Federal Republic of Nigeria, Chief Olusegun Obasanjo, who proposed it to the Community of Sahel-Saharan States (CEN-SAD) Conference of Leaders and Heads of State (June 2005) and to the Fifth Ordinary Summit of the African Union (July 2005). Following the presentation and discussion of a concept paper at the Food Security Summit in Abuja, Nigeria (December 2006), countries adopted a Declaration and Decision urging the African Union Commission to proceed with facilitating the implementation of the initiative. A Plan of Action was subsequently developed and adopted by African Union Summit in January 2009, which paved the way for countries to engage in activities to pursue the vision.



and human communities — to climate change and variability. This is consistent with the principle of integrated ecosystem management, which enables countries to harness synergies in environmental programs by aligning investments in land, forests, water resources, and climate change for long-term sustainability.

Investing in natural resource management will enhance solutions to threats posed by land and soil degradation, desertification, deforestation, water scarcity, and loss of biodiversity. Addressing these biophysical challenges will ensure sustainability of the resource base as a foundation for climate-resilient development.

**Improving land productivity:** The GEF invests in sustainable land management (SLM) as a means of arresting and reversing land degradation, specifically desertification and deforestation. SLM affords the Sahel and Lake Chad Basin countries an invaluable opportunity to improve ecosystem services in production systems. Because more than 70% of the people in these countries depend on agriculture, livestock, and agroforestry; GEF's investment will translate into direct benefits for food security and livelihoods. The fragile nature of production landscapes and the complex social-ecological systems of the Sahelian ecosystems means that the SLM provides a crucial anchor for GEF support to the GGWISS and Lake Chad Basin.

**Biodiversity Conservation:** GEF financing for biodiversity conservation offers an opportunity for countries to improve ecosystem function and diversify livelihoods at multiple scales. The Sahel, Lake Chad Basin and Congo Basin countries will harness GEF resources for strengthening protected area systems, mainstreaming biodiversity in production landscapes and sustainable use. These investments will enable countries to improve biodiversity conservation within production sectors, especially in relation to reducing pressure on the fragile ecologies. GEF resources will enhance sustainability of protected area systems through expansion or rehabilitation of existing protected areas, development of biological corridors, support to protected area management, and fostering strong links between economic sectors and protected areas.

**Climate Change Mitigation:** Climate change mitigation financing by the GEF focuses on supporting developing countries and economies in transition toward a low-carbon development path. Emissions from deforestation and forest degradation represent a significant negative impact of poor land use practices. In the Sahel, where this impact is particularly severe, GEF resources will support activities grouped under the banner LULUCF, or land use, land-use change and

forestry.<sup>26</sup> LULUCF aims at reducing forest emissions and promoting forest conservation, afforestation, deforestation, and sustainable forest management. By supporting low carbon technologies, GEF resources will enable countries to follow a low-carbon development path, for example, through increased use of renewable household energy sources as alternatives to traditional approaches.

**Sustainable Forest Management:** The GEF advocates a landscape approach, embracing ecosystem principles as well as the connectivity between ecosystems. Hence, GEF investments under the Sahel and Congo Basin programs build on the widely accepted forest landscape restoration approach. A key element of this includes ensuring that local livelihood objectives are part of the management planning for forest ecosystems. In supporting an integrated approach to managing forest ecosystems, the GEF strives to achieve global as well as regional environmental benefits. These include the protection and sustainable use of biodiversity, climate change mitigation and adaptation, and combating land degradation. The GEF funding will enable countries to invest in practices that reduce pressures on forest resources and generate sustainable flows of forest ecosystem services.

## SAFEGUARDING WATER RESOURCES

Experience with management of Lake Chad Basin underpins the desire by countries to implement the Great Green Wall initiative, encompassing several important trans-boundary basins and aquifers. Given projected rainfall reductions, a future with less shared water rather than more water is looming. The GEF has been a strategic partner for the Lake Chad Basin countries and is prepared to support joint actions related to integrated water resources management and groundwater utilization and protection.

The GEF approach to water resource management explicitly includes climatic variability. Drought management and water use efficiency will be crucial to fostering sustainable development in this region, and to ensuring access to water for communities and plant and animal life. Especially for Lake Chad, wetlands, and the groundwater sources that sustain them, are critical. GEF investment will make a difference in the conservation and sustainable use of wetlands within the framework of national policies and the Lake Chad Strategic Action Plan.

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<sup>26</sup> **Land use, land-use change and forestry (LULUCF)** is defined by the United Nations Climate Change Secretariat as "A greenhouse gas inventory sector that covers emissions and removals of greenhouse gases resulting from direct human-induced land use, land-use change and forestry activities."





## ENHANCING ADAPTATION TO CLIMATE CHANGE

The GEF climate change adaptation strategy has three overarching objectives: (i) reduce vulnerability to climate change (ii) improve adaptive capacity to address the impacts of climate change, including variability, and (iii) promote the transfer and adoption of adaptation technology.

The GEF is managing two independent funds established under the United Nations Framework Convention on Climate Change (UNFCCC) with a priority on adaptation: the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF).

The LDCF addresses the special needs of Least Developed Countries (LDCs) under the UNFCCC. Adaptation has been identified as the most relevant issue, and the fund is specifically designed to support projects addressing urgent and immediate adaptation needs of LDCs. As identified and prioritized in their National Adaptation Programs of Action (NAPAs), the focus is on reducing the vulnerability to climate change of sectors and resources central to human and national development. Among these are water, agriculture and food security, health, disaster prevention and response, and infrastructure.

The SCCF is designed to finance activities, programs and measures related to climate change that are complementary to those funded by GEF under the climate change focal area in the areas of: (a) Adaptation to climate change; (b) Technology transfer; (c) selected sectors including Energy, Transport, Industry, Agriculture, Forestry and Waste Management; and (d) Economic diversification.

Clearly, the Sahel and Lake Chad Basin countries are well-positioned to harness the LDCF and SCCF resources to address urgent and immediate needs for adaptation as identified in NAPAs and in accordance with the guidance from the UNFCCC Conference of Parties. GEF financing under these two funds will enable participating countries to reduce vulnerability and increase capacity to adapt to actual or potential impacts of climate variability. LDCF/SCCF resources can also help countries become climate resilient by promoting both immediate and longer term adaptation measures as part of their development. Examples of actions to address vulnerability include: a) knowledge activities related to improvement of information for planning and identification of impacts on agriculture and forests; b) policy decisions to incorporate adaptation issues in agricultural and forestry policies; and c) technical investments to reduce vulnerabilities in the relevant sectors.





Water retrieved from a borehole near Juba, South Sudan.

## Delivering Climate Resilient Development in Africa

*So what would a climate resilient development pathway look like for Africa?* Because of the crucial importance of land, water, and forests as assets for development; a strategic approach to investing in these resources in the context of climate change adaptation is key to the livelihood of millions on the continent. Investing in this approach requires a focus on securing ecosystem services by promoting sustainable practices that lead to local and regional resilience and global environmental benefits.

From a land and water perspective, these include soil and water conservation practices such as shelterbelts, multi-purpose trees on production land, small-scale irrigation, and water harvesting. Complementary approaches could include large-scale watershed planning or smaller-scale community, land-use planning to address open access of wood fuel and livestock, biological corridor development and management, and ecotourism development.

### SUSTAINABILITY OF NATURAL RESOURCES

As noted previously, the GGWISS offers an integrated environment and development pathway for the Sahel, to which the leaders of all countries involved have expressed commitment. As a result, GEF partnership with the countries of the region will generate global environmental benefits while realizing sustainable development aspirations for the entire Sahelian region. The benefits include: sustainable management of land, water and vegetation resources in croplands,

rangelands, and forest landscapes; protection of threatened biodiversity; prevention and control of erosion and desertification; and the potential for sequestering millions of tons of carbon per year. In the long-term, these benefits will deliver increased resilience of the region's ecosystems and human livelihoods to climate change and variability.

### POVERTY-REDUCTION AND LIVELIHOOD DIVERSIFICATION

All three programs outlined in this publication represent opportunities for improving livelihoods and providing concrete benefits to poor land users, including smallholder farmers and pastoralists, indigenous forest communities, and fishing communities. Direct engagement of these grassroots communities is a key factor for achieving resilience and generating global environmental benefits from such ambitious programs.

For example, implementation of sustainable land and water management practices in the Sahel and Lake Chad Basin has the potential to enhance yields, soil fertility, and fodder availability for livestock, and to shorten wood collection time for women. Local communities will benefit from increased production and access to forest products especially firewood, lumber and ligneous and non-ligneous products such as gum, resins, roots, leaves, barks, fruits and pharmacopeia. In addition, the implementation of sustainable land and water-management practices will enable farmers and communities to adapt, and become more resilient to climate change by increasing food production, enhancing food security and restoring productive natural resources.



## ENVIRONMENTAL SECURITY

Beyond the smallholder farmers, sustainable management of natural resources could create new sources of employment and stable incomes for local communities, including the thousands of young people increasingly driven to migrate. In the long-term, such an investment will also help to reduce the risk of environmental conflict contribute to improving the overall security in the Sahel. Engaging local communities in on-the-ground activities can build social capital in the region and demonstrate that sustainable management of natural resources represents a long-term strategy for increasing options for improving livelihoods. Social capital can be strengthened through the involvement of local, grassroots and traditional organizations as well as non-governmental organizations with expertise in the areas of intervention.

## ECOSYSTEM CONNECTIVITY

For all three programs, the regional approach will enable countries to address ecosystem processes that extend beyond borders. For example, the entire Sahel region is connected across borders through migration, transhumance, and land use change. At the same time, the ecosystem includes important tracts of natural habitat such as parklands, wetlands, and gallery forests. Some of these have been formally designated as protected areas for safeguarding native biodiversity or for community-based natural resource management. Through the Sahel and Lake Chad Basin programs, there are opportunities for strengthening the management of these areas in landscape context to accommodate the livelihood needs of communities. Similarly, management of the Congo Basin forests will improve the sustainability of ecosystem services through increased connectivity across national boundaries. The programs bring with them the potential to protect vast areas of forest, which will translate into protection of carbon stocks. In addition, the potential for landscape connectivity will help countries increase the resilience and sustainability of the ecosystem. As a result, the conservation of flagship and threatened species will be greatly enhanced.

## ENTERPRISE DEVELOPMENT

Other development opportunities for the regions, such as community-based ecotourism, alternative livelihood options, and payment for ecosystem services can offer new and sustainable sources of income for local communities. Harnessing these options will require certain conditions to ensure empowerment, equity (including gender), and rights of the communities. For this to be achieved, the programs will consider tools and mechanisms to empower communities hobbled by high illiteracy rates (which are often higher for women). Success depends on the design of incentive mechanisms towards the implementation of sustainable land, water, and forest management practices. The different needs and interests of women and men are taken into account, as well as the need to secure both short and long-term economic and social benefits for all participant groups.

## CLIMATE CHANGE ADAPTATION BENEFITS

The entire geographical area of the GGWISS and Lake Chad Basin, consisting primarily of dryland ecosystems, faces many challenges related to climate change and variability. Essential for any major investment in the area is a focus on increasing adaptive capacity, enhancing resilience to climate change, and reducing vulnerability. Major climate vulnerabilities include those with the largest negative potential for the countries' economies and the stability of critical agroecosystems. Potential adaptation benefits in the Sahel include protection of livelihoods from the effects of climate change on water, land resources, and improved adaptive response to water scarcity through irrigation and water-saving techniques. These benefits can be enhanced by mainstreaming climate change considerations into sectoral investment plans and policies regarding water and land use management, enhanced understanding of climate change implications for different sectors, and increased knowledge dissemination and awareness regarding the causes and impacts of climate change as well as suggested mitigation/adaptation measures. As a result, countries in the Sahel will have increased technical capacity to implement adaptation-oriented measures, and capacity for disaster risk management in a changing climate.





*Namibia promotes the conservation of indigenous plants and trees.*

## The Way Forward

The three major programs outlined in this publication are evidence that Africa is poised to embrace climate resilient development for a sustainable and prosperous future. The time is right for all development partners to join forces in further strengthening these initiatives as models for the entire continent. The total GEF grant of US\$168 million and co-financing of US\$2.18 billion invested in the programs highlighted in this publication sends a strong signal that the donor community stands ready to do its part. Investment and technical assistance are still needed to ensure that appropriate policies and institutional frameworks are in place for long-term sustainability.

Collaboration across national boundaries can play an important role in disseminating best practices and experiential learning. Existing regional institutions can serve as platforms to share knowledge and lessons-learned from formulation to implementation of specific interventions. This will improve impact at the regional scale and increase possibilities for replication among and within countries. At the same time, it will improve monitoring and benchmarking of key indicators and systems through an adaptive management system, which can support evidence-based decision-making on long-term investments by the countries.

In addition to specific deliverables, the programs highlighted in this publication will serve to open new opportunities for delivering resilient development in Africa that cut across multiple sectors, including agriculture and energy. This is particularly relevant for addressing integrated development of lake and river basin systems for multiple benefits, and safeguarding ecosystem services in all types of forests, and climate-smart agriculture.

## INTEGRATED DEVELOPMENT OF LAKE AND RIVER BASINS

Investment approaches in the Lake Chad Basin will inform, on a broader scale, how appropriate policies should be developed for integrated management of transboundary water systems in the face of the impacts of climate change. Lessons could be shared on deployment of the most efficient low-carbon technologies to support the fisheries industry and agricultural production. This includes improved access to renewable energy technologies such as solar power, small-scale hydropower, and biomass for efficient pumping of water, power processing, and storage facilities. These will in turn create incentives for the countries to trigger effort in technology transfer with the aim of building resilience to climate change.

Sustainable land-management in lake and river basins also plays a crucial role in safeguarding water resources by combating the degradation of natural resources in production systems—agricultural, rangelands, and forest landscapes. From the Lake Chad region, with its shrinking water resource, to the Sahel region, with its susceptibility to severe drought, to the Congo Basin, with its vast carbon stocks; sustainable management of land, water, and forest enables countries to harness ecosystem services for improved livelihoods while at the same time generating global benefits. The global benefits of this approach, such as reduced pressure on natural habitats, maintenance of agrobiodiversity, diversification of production landscapes, protection of carbon stocks, and sustained flow of ecosystem services are ultimately the hall marks of climate-resilient development.



## SAFEGUARDING ECOSYSTEM SERVICES OF AFRICAN FORESTS

The GEF support to the Congo Basin forests is aimed at encouraging greater synergies with other activities being undertaken by the countries to help deliver global environmental benefits in terms of biodiversity conservation, reducing risks related to climate change, prevention of land degradation, and protection of international waters. At the local level, the program will contribute to secure livelihoods for several millions of people depending on the use of timber and non-timber products, including action to address adaptation to climate change.

Harnessing the experience of countries collaborating to sustainably manage such a vast natural resource for economic, social and environmental values is crucial for climate-resilient development. This will be invaluable for all other forests on the continent for which such a collaborative approach is essential. Countries would be supported to access payments for ecosystem services including carbon markets to secure long-term financing support for sustainable forest management. With an inventory of the forest ecosystem and its status, countries could be better positioned to manage the resources more effectively, including monitoring and managing export more proactively. Areas traditionally occupied by indigenous people would be acknowledged and secured for their societal and cultural benefits.

Ultimately, the interventions will generate interest and open up real opportunities to focus on increasing adaptive capacity, resilience to climate change, and reducing vulnerability which is essential for any major investment in Africa. It is hoped that benefits can be enhanced by mainstreaming climate change considerations into sector investment plans and policies regarding water and land use management, disaster risk management. This, in turn, will enhance our understanding of climate change implications for different sectors, fostering increased knowledge dissemination and awareness regarding the causes and impacts of climate change together with the proper adaptation measures.

## CLIMATE-SMART AGRICULTURE

Finally, African countries are ready to embrace the call for climate-smart agriculture, which will also help them engage more effectively in a global “green economy”.<sup>27</sup> Clearly, the programs in the Sahel, Lake Chad Basin, and the Congo Basin exemplify the partnerships and the level of investment needed to deliver the triple-win of increased productivity, enhanced climate resilience, and greenhouse mitigation. Through these programs, African countries have demonstrated that they are capable of coalescing around a common agenda that unifies their vision of environmental sustainability and economic prosperity. The focus on land, water, and forests is particularly crucial given the vital importance of these natural resources on the continent.

All across sub-Saharan Africa, land is where the struggle to adapt to climate change will be won or lost by the poorest of the poor. This reality reinforces the importance of sustainable land management on the continent, which underpins agricultural development and food security for nearly all of the countries. At the same time, practices that integrate land, water, biodiversity, and environmental management into agricultural landscapes ultimately generate “adaptation” and “mitigation” benefits for society, including emission reductions and sequestration of greenhouse gases. As a result, investing in climate-smart agriculture will also position African countries to more effectively implement to global environmental conventions.

Embracing sustainable land management as a practical option for climate-smart agriculture, therefore, offers African countries a unique opportunity to mainstream a wide range of successful interventions that can maximize impact at scale. This is particularly crucial in light of growing demands for efficiency and intensification of agricultural production as a response to the recent global food crisis.<sup>28</sup>

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27 UNEP, 2011.

28 Nellemann et al., 2009



*Mangroves on the Saloum River, Senegal.*





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## ABOUT THE GEF

The Global Environment Facility unites 182 member governments—in partnership with international institutions, nongovernmental organizations, and the private sector—to address global environmental issues. As an independent financial organization, the GEF provides grants to developing countries and countries with economies in transition for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants. These projects benefit the global environment, linking local, national, and global environmental challenges and promoting sustainable livelihoods.

Established in 1991, the GEF is currently the largest funder of projects to improve the global environment. The GEF has allocated \$9 billion, supplemented by more than \$40 billion in co-financing, for more than 2,600 projects in more than 165 developing countries and countries with economies in transition. Through its Small Grants Programme, the GEF has also made more than 12,000 small grants directly to nongovernmental and community organizations.

The GEF partnership includes 10 Agencies: the UN Development Programme, the UN Environment Programme, the World Bank, the UN Food and Agriculture Organization, the UN Industrial Development Organization, the African Development Bank, the Asian Development Bank, the European Bank of Reconstruction and Development, the Inter-American Development Bank, and the International Fund for Agricultural Development. The Scientific and Technical Advisory Panel provides technical and scientific advice on the GEF's policies and project.



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