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LIST OF ABBREVIATIONS AND ACRONYMS

ACMAD	African Centre of Meteorological Applications for Development
AfDB	African Development Bank
AGRHYMET	AGRonomics HYdrology METeorology
BADEA	Arab Bank for Economic Development in Africa
BOAD	West African Development Bank
CCD	United Nations Convention to Combat Desertification
DB	Database
DES	Domestic Energy Strategy
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
ESMP	Environmental and Social Management Plan
ES-NBA	Executive Secretariat of the NBA
F CFA	African Financial Community Franc
FFEM	French Global Environment Facility
FOREAU	Forum for Water Users
FP-SAP	Funding Plan for the Strategic Action Program
FYP	Five-Year Plan
GEF	Global Environment Fund
GGF	Forest Management Group
GIS	Geographic Information System
ICDCS	Permanent Inter-State Committee for Drought Control in the Sahelian Zone
INGO	International Non-Governmental Organization
INSEED	National Institute for Statistics, Economic and Demographic Studies of Chad
IP-SDAP	Investment Plan for the Sustainable Development Action Plan
IRD	Research Institute for Development
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resource Management
LTEQO	Long-Term Environmental Quality Objective
NAP	National Action Plan
NAP-CD	National Action Plan to Combat Desertification
NB	Niger Basin
NBA	Niger Basin Authority
NBA-RAG	NBA Regional Advisory Group
NBO	Niger Basin Observatory
NEAP	National Environmental Action Program
NEPAD	New Partnership for Africa's Development

NFP	National Focal Point
NFS-NBA	National Focal Structures of the NBA
NGO	Non-Governmental Organization
NIA	National Implementing Agency
NNPC/Shell	Nigerian National Petroleum Corporation/Shell
NPT	National Project Team
NRC	Niger River Commission
NRM	Natural Resource Management
NTT	National Technical Team
OPEC	Organization of Petroleum Exporting Countries
OSS	Sahara and Sahel Observatory
POPs	Persistent Organic Pollutants
PRSP	Poverty Reduction Strategy Paper
RAG	Regional Advisory Group
RGA	Revenue Generating Actions
RLWDT	Reversing Land and Water Degradation Trends in the River Niger Basin
SAIR	Strategic Action related to Institutional Reforms
SALR	Strategic Action related to Legal Reforms
SAP	Strategic Action Program
SAPMU	SAP Management Unit
SCBA	Strategic Capacity Building Action
SCP	Silting Control Program
SCP-MP/NB	Silting Control Program Master Plan for the Niger Basin
SDAP	Sustainable Development Action Plan
SPDC	Shell Oil Development Corporation
SIU	Spatial Integration Unit
SWC/SDR	Soil and Water Conservation/Soil Defence and Restoration
TDA	Transboundary Diagnostic Analysis
ToR	Terms of Reference
UEMOA	West African Economic and Monetary Union
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
WRD-SEM	Water Resources Development and Sustainable Ecosystems Management Program

FOREWORD

This report is one of the major results of the implementation of the Project « Reversing Land and Water Degradation Trends in the Niger Basin" (Preject RLWDT/NB) funded by the Global Environment Facility (GEF).

Project was designed in the focal area of GEF's « International Water » and falls under GEF Operational Program 9, « INtegrated Land and Water Multiple Focal Area ». It is a regional project covering nine countries members of the Niger Basin Authority: Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger and Nigeria.

To be participatory and take into consideration the essential concerns of all stakeholders, the development of the Strategic Action Program (SAP) for the environment of the Niger river Basin, process has been initiated since 2006. In this process, technical teams at national and regional levels were formed to support the different stages of the said process..

Between 2006 and 2008, to complement and update the preliminary Transboundary Diagnostic Analysis already conducted during the preparation of the project in five countries located on the main course of the River Niger (Benin, Guinea, Mali, Niger and Nigeria), national technical teams have conducted a diagnostic analysis of the environment on the national portions in each country of Niger basin. They have benefited from the collaboration of the project. local committees of coordination and of monitoring (LCCM) The synthesis of these environmental diagnostics enabled the development of the document of Transboundary Diagnostic Analysis (TDA) with the contribution of the regional technical team. The report of this Transboundary Diagnostic Analysis has been validated under Technical and Scientific Subcommittee of the Project Regional Steering Committee in March 2009 in Bamako (Mali).

The process continued through the identification and validation, at regional, national and local levels of priority environmental issues, strategic actions to be implemented, monitoring and evaluation indicators and the vision of the environment in the Niger basin. This step allowed the formulation and validation of the National Action Plans of each national portion of the basin. The Strategic Action Program (SAP) provides a summary of the nine national reports. It has been validated by the Project Regional Steering Committee in August 2010 in Garoua (Cameroon) and endorsed by the resolution n°14 of the 29th ordinary session of NBA Council of Ministers held on November 29th, 2010, in Abuja (Federal Republic of Nigeria)

Contributions of national, regional and international consultants were necessary for the implementation of all the stages of the process, namely for animation of exchange sessions and drafting of reports.

The SAP document, identifying political, legal and institutional reforms as well as the investments necessary to solve priority environmental transboundary problems endorsed by the Council of Ministers of the NBA will be then a document of policy negotiated between the different actors,

In this respect, for the mobilization of resources and the implementation of the actions, the Strategic Action Program approved will be integrated into the Sustainable Development Action Plant (SDAP) of the Niger Basin and it's Investment Program already approved by NBA's 8th Summit of Heads of State and Government.

ACKNOWLEDGEMENTS

The Niger Basin Authority addresses its sincere thanks to the Global Environment Facility (GEF) for his invaluable technical and financial contribution to the implementation of the Project “Reversing Land and Water Degradation Trends in Niger Basin”. Financial contribution of thirteen million United States dollars helped and gave a dynamic growth on the one hand and increased the NBA credibility with other technical and financial partners at a second hand. part Enhanced with its regional and international reputation in implementing actions for the benefit of the populations and sustainable management of natural resources of International Water basin, NBA reiterated its thanks to the GEF and enquired whether still rely on this institution financing cycles to accompany it in it’s missions.

NBA seized this opportunity to thank the World Bank, lead of the NBA donors group, the United Nations Development Program (UNDP) and the United Nations Operations and Services for Projects (UNOPS) for their permanent support to the project administrative, technical and financial management.

The NBA thanks go also to the entire parties committed to the development of the Niger river Basin Strategic Action Program: local coordination and monitoring committees of the project, National Technical Teams, National Focal Structures of NBA, NBA statutory bodies, consultants, and resource persons. In particular, NBA presents its wishlist to, Société Française d’Etude et de Conseil (SOFRECO), consultant, which has been committed by the Executive Secretariat to develop nine National Action Plan (NAP) and the document of the Strategic Action Program (SAP) for Niger Basin Authority.

Finally NBA thanks the political and administrative authorities as well as national institutions for their constant availability and disposal for the purpose to provide guidance, information and data necessary for the completion of the process.

SUMMARY

The Strategic Action Program (SAP) is a negotiated policy document that should identify the political, legal and institutional reforms and the investments necessary to deal with priority cross-border problems. It establishes clear priorities for actions to be taken in order to resolve the priority problems identified by the Transboundary Diagnostic Analysis (TDA). The Strategic Action Program (SAP) is also a document of cooperation between the countries of the region for which it is elaborated.

This report is the culmination of the TDA/SAP process implemented by the GEF project "Reversing Land and Water Degradation Trends in the Niger Basin".

It is based on the Regional Summary of the TDA adopted in 2009 in Bamako and that of the National Action Plans (NAP) of the nine countries of Niger Basin Authority (NBA). Through a causality and impact analysis, the regional synthesis of the TDA identified and classified the transboundary environmental issues and problems into four major groups composed of more sectoral problems: land degradation (degradation of plant cover and degradation of soils), water resource degradation (decrease in availability and quality of water, and water pollution), the loss of biological diversity (flora, fauna and wetlands) and invasive aquatic plant species.

When the trend for change of each of these problems is projected into the future, it seems that we are moving towards an almost inevitable disaster affecting both the ecosystems and populations in the basin. It is therefore necessary to implement right now action to reverse these trends of degradation of the basin's land, water and ecosystems.

The actual Strategic Action Program (SAP) is accompanied by a financing program to cover the Niger basin wide based on the results of the Transboundary Diagnostic Analysis (TDA) and taking into consideration the Sustainable Development Action Plan (SDAP) and its Investment Program. Specifically, the SAP aims to: (a) propose the priority actions and measures to resolve the most urgent environmental problems identified in the TDA; (b) identify the roles and responsibilities of the various actors in the implementation of the selected actions; (c) define the institutional and regulatory framework and if required the necessary reforms to create a suitable environment for the implementation of the suggested measures; (d) define an investment and financial and human resource mobilization plan for the implementation of the proposed actions; and (e) set up an operational, environmental monitoring-evaluation system for the basin.

The methodology used was as participatory and inclusive as possible. All of the stakeholders in environmental and natural resource management were represented in the working groups on the identification of transboundary environmental problems, and the definition of the vision, of the long-term environmental quality objectives, and the activities to be implemented to effectively fulfill the vision.

The vision, whose foundations are drawn from the Shared Vision and Water Charter of the NBA, provides a clear representation of the desired characteristics for the future environment, and has made it possible to give a harmonious definition of the LTEQOs for each of the priority problems previously identified. Consequently, the vision underlying the SAP is as follows: **"By 2007, the countries of the basin will use and manage its natural resources in a coordinated and sustainable manner in an environment conducive to human development."**

On the basis of this vision, 12 LTEQOs were defined on the basis of the environmental problems selected in the priority, average and low categories and the site-specific environmental problems.

LTEQO 8 relating to climatic variability and change, briefly examined during the process at regional level as a cross-cutting problem on the scale of the basin, has been clearly set out in the NAPs and is, consequently, treated in this summary as a priority environmental problem whose resolution will greatly contribute to achieving the environmental vision for the basin by 2027.

For the full set of LTEQOs, 44 strategic actions subdivided into 118 activities have been identified to ensure their fulfillment.

Effectively fulfilling these different activities to achieve the LTEQOs will require a reform of the institutional and legal framework for environmental and natural resource management, in addition to measures to build the capacities of the stakeholders. Eight actions subdivided into 45 activities have been identified for this purpose.

Many activities identified and selected are already listed in the SDAP and their financing partially or fully taken into account in the investment program
To estimate the costs of the SAP the following steps were followed: (1) determination of the parameters; (2) estimation of the activities; (3) estimation of the costs of the priority actions; (4) estimation of the LTEQOs and areas of intervention (reforms, capacity building).

The overall cost of the SAP is estimated at F CFA 686 742 840 000, i.e. EUR 1 046 932 711 (Table 3).

The funding of the preparatory phase for integration of the SAP into the IP is estimated at F CFA 270 000 000.

The funding of the activities to be conducted in the short-term is estimated at F CFA 239 065 952 000. The cost of FYP1 of the PAS is higher because it requires the establishment of benchmark situations and preliminary studies. It accounts for 35% of the funding.

The medium-term and long-term funding is estimated at respectively F CFA 224 038 794 000 and F CFA 223 368 094 000.

To move towards implementation of the IP of the SDAP as the Niger Basin's single investment program, in line with the Shared Vision process and the recommendations made during the GEF's mid-term review of the Project, it will firstly have to be updated to fully integrate the SAP. The final document will then have to be presented to the Technical and Financial Partners and finally explained in workshops, in order to foster strong support from all of the stakeholders.

The monitoring and evaluation (M&E) of the Unique Program will use the NBA's S&E system.

INTRODUCTION

The Project" Reversing Land and Water Degradation Trends in the Niger Basin" (RLWTD/NB) project aims to foster a regional integration effort, by encouraging coordination and dialogue between the NBA member countries, and by encouraging the participation of all stakeholders concerning the basin's shared resources.

The project's objective is to achieve global environmental advantages through the sustainable development and integrated management of the River Niger Basin's water resources and land. It aims to encourage integration and coordination between Member States concerning the shared natural resources. It provides decisive capacity building to the NBA and its main partners (governments, local authorities, civil society, etc) with a view to achieving a common goal.

The implementation of the project must lead to the formulation of the Strategic Action Program (SAP) for the whole of the Niger basin and contribute to the general objective of the Shared Vision, which is to ensure on the basis of regional cooperation, economic, social and environmental security, through the establishment of global and integrated water resource management and the optimal and sustainable use of all of the basin's resources.

The SAP must complete the Sustainable Development Action Plan (SDAP) and its Investment Program (IP), a strategic reference framework for interventions in the basin, regarding the "Resource and Ecosystem Protection" section, through the establishment of clear priorities for the actions to be led with a view to resolving the priority problems identified in the TDA and not taken into account or insufficiently dealt with by the SDAP and above all by the Master Plan for Silting Control in the Niger Basin (MPSC/NB).

The actual Strategic Action Program (SAP) accompanied by a Funding Plan (FP) for the Niger basin has as basis the Transboundary Diagnostic Analysis (TDA) results and the National Action Plan (NAP) reports, and taking into account the SDAP and its Investment Program. It's formulation follows the following process:

- The recruitment of a consultant to prepare and monitor the elaboration of different reports at local, national and regional levels;

- The use of documentation to substantiate the results of the TDA, at both the national and overall regional levels, via the identification of priority issues and their fundamental causes in order to formulate a vision and long term objectives for the environment in the basin, and to identify the shortcomings of the SDAP and of the SCP-MP/NB, in order to fill them;

- Consultations and interviews with the key resource people concerned by the study at the regional, national and local levels;

- Institution of the participatory approach through appropriate targeting of participants for the NAP and SAP launch and validation workshops (people most representative of the stakeholders), in addition to consultations and interviews with key resource people;

- Linking of the regional approach with the national approaches: as the regional SAP report is merely a summary of the Member States' NAP reports, the national approaches have been prepared by a regional approach, established in advance on the basis of various workshops held at the regional level; these workshops have served in part to produce the tools required to develop the NAPs (with a single framework

and sample plan);

- The determination of strategic actions whose implementation will help achieve the vision the long term environment quality objectives (LTEQO) and propose indicators of success of the actions;Linking of the SAP with the SDAP, through the identification (during processing of the documentation) of the differences in terms of content between the TDA and the SDAP (particularly, differences with the SCP-MP/NB), so as to avoid any needless repetitions of the content of the SAP (recommendations and proposals for actions and funding) in relation to the SDAP, and to produce a SAP that will complement, extend and expand on the SDAP;

- This participatory and inclusive approach helped reformulating and specify priority transboundary environmental problems identified in the TDA and determine specific concerns to complete priority cross-border issues, because having a current impact or potential on the environment in the basin.

The present Strategic Action Program, resulting from this process focuses on the context, namely biophysical, in which is currently the Basin is set, priority transboundary environmental issues, restoration and sustainable management of the environment of the environmental problems, environment restoration and management strategic actions of the Niger Basin, financing needs arising from these actions and device monitoring and evaluation to ensure a real reverse of natural resources degradation trends in the Niger Basin.

1. CONTEXT OF THE NIGER RIVER BASIN

The river Niger is the third longest river in Africa (4200km), after the Nile and the Congo, and the largest in Western African. It is the 14th longest river in the world. Its basin covers a surface area of almost 2.2 million km² including approximately 1.5 million km² of active hydrological basin. It is the ninth largest river system in the world.

The Niger basin is located in the heart of Western Africa. The river Niger and its tributaries have the major advantage of constituting vital links between the nine riparian countries: Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Guinea, Mali, Niger, Nigeria and Chad.

The Basin is traditionally divided into four different physical-geographical zones (figure 1):

- The Upper Niger, which covers a surface area of approximately 140 000km², should offer the possibility of partial regulation of flows along the whole length of the river. The river Niger (from the river's primary branch sources to Ké-Macina) subdivides into five major affluents: the Tinkisso, the Milo, the Niandan, the Sankarani and the river Niger itself. The annual average volume of water passing the Koulikoro station is 45 billion m^3 with significant rises in the water level in September and October of around 5 to 6000 m^3/s.

- The Inner Delta, which covers a surface area of 84 500 km², stretches from Ké-Macina, on the Niger to 200 km downstream from Bamako, to San on the Bani in the south and Timbuktu in the north. It includes a complex system of tributaries, distributaries, lakes and flood plains. The Delta sustains variations both over the course of a single year and from one year to the next. Annual water flow volumes range from 45 billion m³ in Koulikoro to 30 billion in Diré, due to the effects of flooding and evaporation in the Delta. The December and January floodwaters reach 2000 m^3/s on average.

- The Middle Niger stretches from Timbuktu in Mali to Malanville in Benin, and covers a

surface area of 900 000km², including an inactive basin of 230 000km². Upstream of Niamey, large tributaries enter the river from Burkina Faso, in particular the Gorouol, Dargol and Sirba. The presence of rapids makes navigation difficult. Between Niamey and Malanville (336 km), the tributaries Goroubi, Diamangou and Tapoa enter the river, contributing to a maximum level in September/October. The Middle Niger flows are affected by the Inner Delta flows. The average annual flow rate of the river at the Niamey level between 1971 and 2000 was only 697 m³/s, compared to 1050 m³/s between 1929 and 1970.

- The Lower Niger is located in humid to very humid zones. Several large tributaries flow into the river in this section, such as the Sokoto, Kaduna and especially the Bénoué, whose basin has a surface area of 450 000 km². The average annual flow rate of the river at the Jebba level, downstream of the Kainji and Jebba dams, is 1454 m³/s. The river Niger has a flow rate of 5590 m³/s where it is joined by the Bénoué. This flow rate is comparable with its rate at its mouth, with losses offset by contributions from other tributaries.

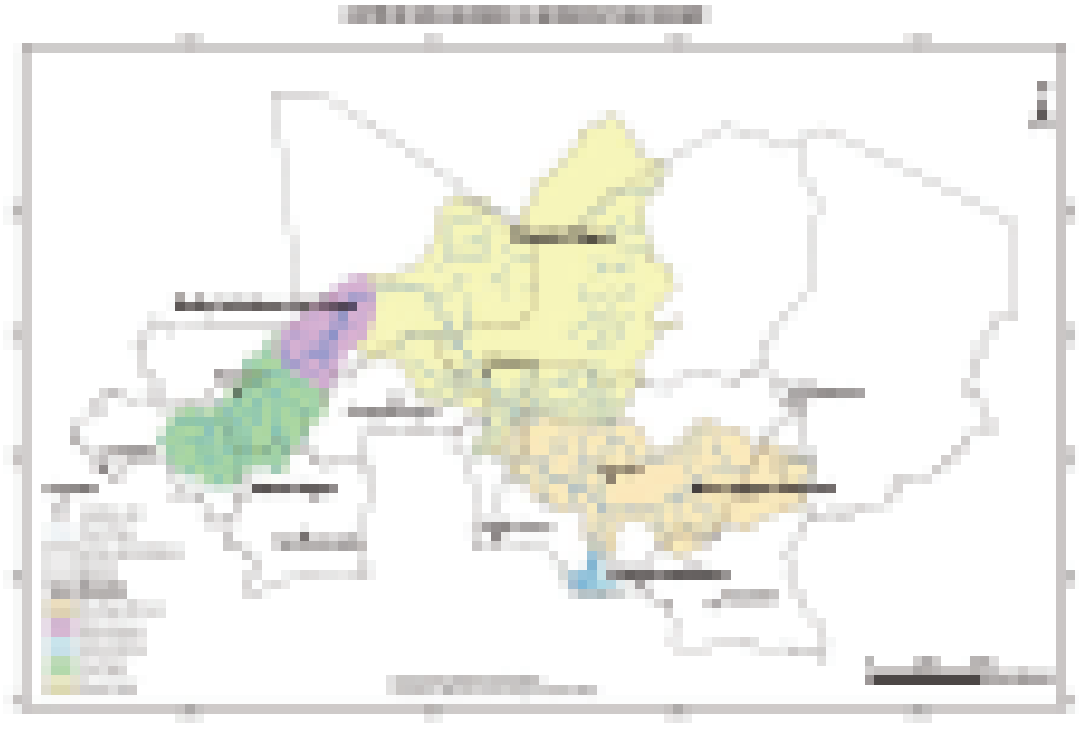

Figure 1: Map of sub-basins of the River Niger Basin (Source: AGRHYMET)

1.1 Climate and climatic variability

Four climatic zones in the form of parallel bands are usually distinguished, from south to north:

- The humid tropical zones, with more than 1200 mm of average annual rainfall and an average annual temperature of 25-26°, enables the establishment of dense humid tropical forest and covers the south of Guinea and Nigeria.

- The subtropical dry season zone, known as “Sudanian”, with average annual rainfall of between 1200 mm and 600 mm and an average annual temperature of 27-28°,

covers all the countries, in particular the largest part of Nigeria.

- The subtropical zone with a long dry season, known as “Sahelian”. Its rains are characterized principally by their scarceness, irregularity in time and space and their stormy, violent and short-term nature. It covers all the countries except Guinea and Côte-d’Ivoire.

- The subtropical desert zone, known as “Saharan”, with very irregular or absent annual rainfall, less than 100 mm and an average annual temperature of 29°, covers only two countries in the basin: Mali and Niger.

Studies on climate variation throughout Western Africa and information provided by the various national reports (NAP) show a significant decline in the volume of annual precipitation and the duration of rainy seasons. This insufficient rainfall situation even in forest or coastal regions of the basin has led, since 1970, to a serious hydro-ecological imbalance characterized by a reduction in surface flow of approximately 20 to 50%, with sometimes severe low-water levels, going as far as the stopping of flow, for example from Bani to Douna (Mali) in 1983, 1984 and 1987 and from Niger to Niamey in 1985.

Due to the aridity prevailing over the majority of the basin, the availability of water and its distribution in time and space play a major role in the changes to ecosystems and to the development of the basin. It is in response to this drought and its implications that the major development program for the River Niger Basin was developed through the planned construction of three new, large multi-use dams: Fomi (Guinea), Taoussa (Mali) and Kandadji (Niger). Whilst it is undeniable that these structures secure water availability and support the low-water level, a permanent system for monitoring their impact still needs to be implemented to support the Environmental and Social Management Plan (ESMP) for each dam. In addition to this pressure on water resources, in recent years climatic variability and change have come into play in a context of high population growth and varied productive activities, leading to repercussions on the basin’s natural environment and its ecological diversity.

1.2 Biodiversity

The major zones remarkable for their biodiversity and defined based on areas grouped together as being favorable to certain taxons (water fowl, fish and other vertebrates) and hydrological and ecological processes, are as follows:

The Guinean drainage basin of the Niger is a very important zone from the ecosystem and biology point of view. The valley of the river, and of most of its tributaries (Tinkisso, Sankarani, Fié, Milo), form wetlands of international importance, of which 4.5 million ha (including over 100,000 ha of shallows) have been classified under the Ramsar Convention. These wetlands are the refuge of thousands of Palearctic migrating birds, and certain sites, such as the Niger/Mafou zone (which includes the Upper Niger National Park) or the Sankarani/Fié zone (which includes the Kankan fauna reserve) are migration corridors for large mammals, between Guinea and neighboring countries, where water resources are abundant year-long.

Amongst the protected areas of the basin, Mali has the vast humid zone of the Inner Delta of the river Niger which has been fully registered as a Ramsar site since 2004, and where approximately 350 bird species are present, 108 of which are Palearctic migratory birds. These sites are excellent locations for eco-tourism.
Another significant location for biodiversity is the Ayorou-Tillabéry-Téra triangle, which

constitutes one of the largest wetland areas of the state of Niger (Kokorou-Namga Ramsar site). In addition to the river's floodplain, a complex of four ponds, Kokorou and Namga (permanent), Zoribi (semi-permanent) and Tida (semi-permanent) located in the bend of a fossil tributary of the Niger river on its right bank, and separated from each other by sand bars, constitute a significant habitation unit for aquatic bird fauna. The complex contributes to maintaining the biological diversity of the Sahelian region of the Niger and has a definite scientific and economic value. More than 50,000 birds representing 56 species, including over 35,000 white-faced whistling ducks and a significant quantity of species of birds under threat, such as the black crowned crane, live there.

Photo GEF-RLWDT/NB Project (Niger, 2010)

Another important location for biodiversity is the W Park straddling Benin, Burkina Faso and Niger, created as the Transboundary Reserve of the Biosphere of the W. 52 species of mammals have been recorded, including the elephant, buffalo, western buffon's kob, defassa waterbuck, bohor reedbuck, damaliscus, antelope, giraffe, hippopotamus, sable antelope, lion, cheetah and a wide range of monkeys. The species under threat are the cheetah, African wild dog, elephant and manatee. Around 360 species of birds of African or Palearctic origin have been identified.

Although heavily populated in some locations, North Cameroon still has three large zones with international interest for the conservation of large wild animals. The Sudanian Bénoué east-west zone covered in wooded savannah covers 50,000km² and is still home to abundant fauna traditional to this environment (elephant, buffalo, Derby elk, etc.). Three national parks are intended to conserve this large fauna and their habitats.

The Liptako/Gourma region, shared by Niger, Mali and Burkina Faso could be an opportunity for cross-border cooperation concerning protection of biodiversity. The region is completely surrounded by the Sahel, with ecosystems typical of dry zones. This area has rich flora, and mammal fauna: elephants, red-fronted gazelles, spotted hyenas, warthogs and its Afro-tropical and Palearctic migratory bird fauna. An extension towards the Niger Liptako and its

wetlands rich in Afro-tropical birds is certainly potentially possible.

Nigeria's biodiversity is rich in fauna and flora. There are almost 7895 species of plants identified into 332 families and 2215 types. There are 22,000 vertebrate and invertebrate species, including almost 20,000 insect species, 1000 bird species, 1000 species of fish, and 247 mammal and 123 reptile species. It is estimated that approximately 0.14% of these species are under threat and 0.22% are endangered. All these animals and plants are distributed over the natural territory between the coastal mangrove of the south and the Sahelian zone of the north. However, in all countries, a loss has been noted, to a greater or lesser extent, of diversity of flora and fauna, habitats and ecosystems.

1.3 Socio-economic aspects

The River Niger Basin occupies the heart of Western Africa and covers nine countries. Due to the significance of its natural resources, it constitutes an important reference point for the demographic and economic dynamics at work in the region of Western Africa.

The demographic data collected (**Table 1**) indicates that the basin represents a significant population area, being home to approximately 45% of the population of Western Africa and over 48% of the total population of the Member States of the NBA. Its population represents over twice the total population of the CILSS countries (50 million), 1.5 times the total population of the UEMOA (80,340 million) and approximately 60% of the population of ECOWAS (260 million).

Table 1: Demographic data on the Niger basin (Source: compilation of data from the national TDA reports 2009 and INSEED 2009 for Chad)

Country	Total population (millions)	Annual growth rate (%)	Population of the national portion of the basin (million)	Urban population (million)	Rural population (million)
Benin	7.6	3	2.228	0.95	1.3
Burkina Faso	14.2	3	2.856	0.219	2.678
Cameroon	16.4	3	6.9	1.4	4.6
Côte d'Ivoire	16.0	2.8	0.449	0.143	0.306
Guinea	10.21	2.6	1.77	0.23	2.6
Mali	11.700	2.7	10.15	3.929	6.221
Niger	10.5	3.4	3.22	1.5	1.72
Nigeria	131.9	3	82.1	32.5	49.8
Chad	10.9	2.9	1.009	0.115	0.894
NBA	229.4	3	110.682	40.986	70.119

The population is young; with the age range of 5-49 years representing over half of it. Average demographic growth is close to 3% per year. The majority of the basin's population works in the agriculture sector and lives in rural areas, but urbanization is taking hold.

The current urbanization rate in the basin is approximately 25%. The highest urbanization rates in the basin are recorded in Nigeria, Mali, Côte-d'Ivoire and Cameroon. The largest urban areas are located mainly in the south, in the Nigerian part of the basin. Undoubtedly, the basin's population will be characterized by high levels of urbanization in the long term, at around 50%, with predominantly semi-urban centers (population over 5000 inhabitants). However, the rural component of the population will remain a constant in the human settlements in the basin, following an uneven distribution profile in spatial terms. The lower part of the basin will be more heavily urbanized than the Sahelian and upper parts of the basin where the population living in rural areas should remain high. In fact, accelerated urbanization has not managed to prevent the rural population from doubling over the last four decades. This population will continue to increase for at least 20 years. This growth is accompanied by high levels of migration from the most fragile zones towards areas which have both higher potential and are closer to urban markets. Consequently, the River Niger Basin will continue to constitute one of the focal points, attracting large swathes of the population, who live in increasing poverty. It is a given fact that the new structures of the basin's populations are increasingly regional in nature. As they become denser, national urban networks connect to each other and their communication infrastructure requirements are ever more similar. In rural areas, mass migratory movements have led millions of Sahelians to coastal areas.

Agriculture constitutes a key sector in the basin's economy both for generating jobs (between 30 and 92% of the active population) and for food security in connection with rural densities. With 80% of the total population living in rural areas, agriculture represents the basis of sustainable development for the basin. It constitutes a major issue for the Niger basin, as agriculture is the main activity and largest income source for the population. Agriculture still has low levels of mechanization, whilst animal-drawn plowing has a majority presence in the region. The use of inputs is low due to the population's poverty level. Thus, extensive agriculture is standard in the region. In the basin, irrigated surface areas account for less than 1% of the cultivated surface area of each country, which demonstrates the low level of general facilities in the basin and countries for using their surface water resources and therefore the low level of intensification. Only Mali, which has approximately 1700 km of the course of the Niger on its territory, with the large inner delta, has made a real effort to intensify, with 3% of land actually irrigated.

The basin region is a livestock area which has experienced significant expansion. In total, the zone has approximately 162,864,666 sheep, 27,290,133 head of cattle, 43,611,043 goats and 2,539,068 pigs, which shows the significance of the basin in terms of livestock farming in Africa generally. However, this production remains variable according to the country. In Burkina, livestock farming is an important activity in the economy. It provides slightly more than 10% of the country's export income and constitutes an important source of income in particular for rural populations. The basin portion also constitutes an excellent livestock area in Benin. The grasses and leguminous plants comprising its bottom stratum are an important food source for both wild and domestic herbivores. Although the figures show a relatively significant livestock industry in Nigeria, the significance of the livestock load in Sahelian countries is much higher as the productivity of forage is proportionally much lower there and the desertification process and the strong land use pressure contribute to making the natural ecosystems more fragile. Nomadism and transhumance constitute the dominant livestock raising system in the basin. This system is based on cyclical movements linked to the condition of pasturing and water points on the basis of determined itineraries.

In recent years, a reduction in grazing land has been noted, not only following long periods of drought, but also the reduction in grazing areas linked to demography and failure to respect traditional transhumance circuits. Transhumance circuits often cross country borders and in certain countries of the sub-region lead to interdependences with respect to health issues for livestock and management of their space. In all seasons, the river is a refuge area for herds and particularly for Sahelian livestock. With the decrease in pastureland and water points following a series of droughts, this trend has become more pronounced and caused many conflicts between livestock and crop farmers. Furthermore, in many locations, the concentration of herds has led to a very high degree of destruction of natural pasturage (herbaceous cover, bourgu pastures) and sylvo-grazing resources (successive trimming).

The River Niger Basin contains significant fishing potential, a traditional activity generally practiced by fishing ethnicities (particularly the migrant or sedentary Bozos of Mali). However, drought and reduced flows have meant a trend for this activity to become a secondary activity alongside agriculture and artisanal industries. Fishing and fish farming are practiced in the Niger alongside traditional fishing methods. Smoked or dried products are in part exported towards neighboring countries, in particular Ghana, Burkina Faso and Côte d'Ivoire. Traditional fish smoking is carried out by women and selling the product constitutes a non-negligible source of income for populations living in poverty. However, this activity which, in the past, sustained the people, is now facing enormous difficulties, such as: the use of methods and fishing vessels which endanger the survival of halieutic resources (keep-all, cross-river nets, fishing dams, cast nets, stretched nets, etc.), long-term climatic variations, excessive fishing which takes place against a background of conflicts relating to land use claims, the invasion of water courses, rivers and lakes by aquatic plants, etc.

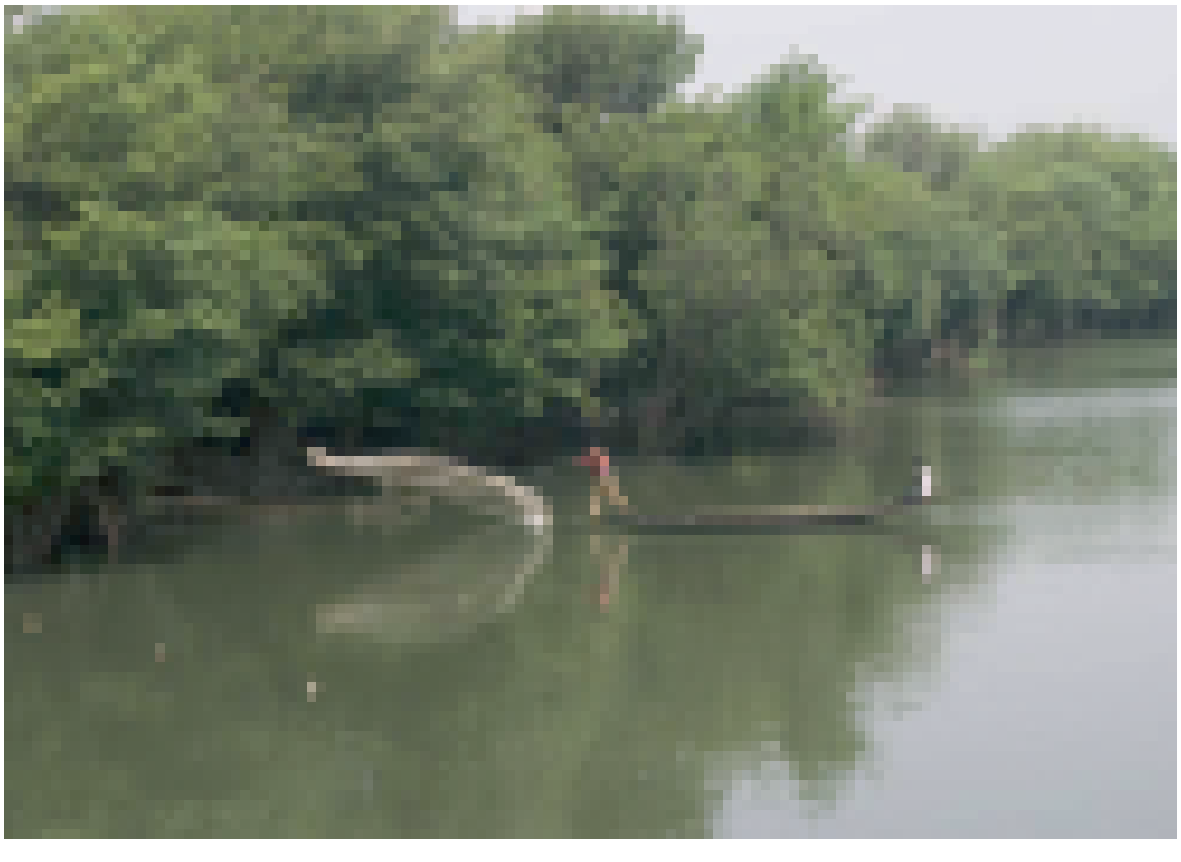

Photo GEF-RLWDT/NB Project (Mali, 2010)

The total plant cover of all NBA Member States was assessed at 835,000 km² in 2001. Almost 5% of the active part of the Niger basin, or approximately 75,000 km², is covered by classified forests or reserves. The basin's forest resources are comprised of steppe, shrub savanna, savanna with trees, woodland and gallery forests. In Niger, there were over 16 million hectares of forest, or 11,600,000 ha of marginal forestland and 4,400,000ha of useable forestland in 1989. In Chad, the surface area covered by woody vegetation was 822,298 hectares in 2001, with a rough estimation of a total volume of 16,446,000 m3 of standing timber. In Mali, the forest potential generally estimated at 100 million ha concerns 3.4 million ha, or approximately 26% of the surface area of the country, including 1.3 million ha of classified forests and 3.9 million of protected areas (1.5 million ha in Mopti and 1.75 million in Gao) to which human or agricultural (crops or fallow) plant formations estimated at 15.7 million ha are to be added. Unfortunately, this potential is under severe threat of disappearing under human and animal pressure combined with climatic factors. In fact, wood constitutes an essential economic product for the populations as it represents the principal source of energy in the River Niger Basin (85% in Burkina), including in cities, where it is also consumed in the form of charcoal. The wood production/consumption assessment shows that the situation has an overall negative effect on the basin and with striking contrasts, depending on the countries. The role of energies as alternatives to wood will mainly depend on the improved incomes of populations, who will be able to better access them.

The Upper Niger and Middle Niger contain a significant potential for mining resources (gold, diamond, uranium, phosphates, hydrocarbons, etc.). In Mali, investigation work has highlighted the existence of significant mining resources and deposits, including: gold, diamond, copper, lead, iron, phosphate, bauxite, manganese, uranium, calcium, gypsum and bituminous schists. In Chad, marble and cipolin have been flagged. The recent sale of mining permits to international mining companies, such as in Guinea (Ashanti Gold field), ADB in Niger, brings with it considerable risks of contamination of surface and/or ground waters by undesirable trace elements. Furthermore, close to urban centers, the extraction of sand and other substances useful for construction, with the assistance of heavy machinery and trucks, is contributing to eroding the river's banks. Unfortunately, the exploitation of these resources is most often artisanal and leads to very high levels of environmental damage (gaping holes left, destruction of plant cover, diversion of water course, contamination etc.). Downstream, watercourses may be heavily contaminated by the effluents used for washing and processing the minerals with highly toxic products, or plugged by the sedimentation of fine particles from gritty effluents. In Nigeria, the exploitation of oil and natural gas is causing serious damage to the marine and coastal environment. It is giving rise to biodiversity pollution (the mangrove), impoverishment of agricultural land by oil exploitation activities, gas fires, etc. It is important to develop strategies to balance the economic development of the mining sector with consideration for the basin's environmental and social aspects.

1.4 Institutional and legal frame analysis

The Niger Basin Authority (NBA) already had recognized experience in the management of studies within the framework of the Shared Vision. Through the implementation of the PDREGDE project, its capacities were strengthened in terms of the management of feasibility studies for large developments and works (for rehabilitation in particular). The different institutional reforms over the last years have led to:

- The reorganization and capacity building of the Executive Secretariat, which resulted in the creation of the Permanent Technical Committee and of the Regional Advisory Group. This capacity building process of the Executive Secretariat also led to the recruitment of 24 managerial staff members in accordance with the decision of the 26th Council of Ministers;

- The transformation of the Focal Points into National Focal Structures;
- The establishment of two new institutional actors:
  - the Permanent Technical Committee,
  - the Sub-Basin Committees;

- The establishment of the NBO with, in parallel to external expertise, the concentration of the on-site team on two crucial activities: definition of the zero condition and the establishment of procedures for updating the databank on withdrawals.

The Niger Basin Observatory (NBO)

Its creation was decided upon during the extraordinary session of the Council of Ministers of Yaoundé (Cameroon) in January 2004, with the following main purposes:

- Monitor hydrological, environmental, socio-economic changes in the basin (natural and human);

- Produce periodic information on the basin's development through the analysis of the data gathered;

- Implement a system for the dissemination of useful and reliable information for political decision-makers and development actors.

The NBO's capacities were strengthened through the recruitment of several managerial staff members at the end of 2006 and the funding of the project "Support for the creation of an Environmental Observatory for the River Niger Basin" with the financial backing of the French Global Environment Facility (FFEM). This project, of a 3-year duration, revolves around three components:

1. Strategic evaluation and feasibility study: of a six month duration, involves conducting a diagnosis of needs in terms of information and data for the sustainable development of the basin on the one hand, and on the other, to detail and specify the conditions necessary for operationalization of the basin's Observatory;

2. Baseline study for operationalization of the Environmental Observatory: lasting 12 months, mainly focuses on the evaluation of the existing systems and strengthening the capacities of the NBA in terms of its environmental information system;

3. Establishment of the Environmental Observatory and initial action program: lasting 18 months, consists in launching the actions of the Observatory with an action program and related financing plan.

National and Regional Coordination Bodies for Niger Basin Natural Resource Users

During the 25th ministerial meeting held in Niamey in September 2006, a resolution was adopted on the involvement and participation of civil society in the NBA's actions. The objective is to set up mechanisms for the effective participation of users and civil society in the various stages of the processes: decision making, planning, implementation of projects and programs, evaluation, etc.

National administrations involved in environmental management

They must pay special attention to certain crucial aspects such as:

- The coordination role of the NFSs and their operational means;

- The involvement of the national administrations in the sub-basin committees;
- The creation of “basin agencies” at national level.

The scientific community

The process for formulating the ADT and the SAP greatly benefited from the expertise and experience of high ranking scientific personalities. It is important that the SAP continues to benefit from their invaluable support.

The capacity building actions of all the players must be continued to encompass the priority environmental problems identified on the scale of the basin and for the resolution of which by 2027, 12 LTEQOs have been formulated. To achieve these objectives, concretized through the Long Term Vision for the basin’s environment, these groups of actors should play their respective roles effectively.

Within the framework of phase 1 of the Study on Appendix 1 to the Niger Basin Water Charter pertaining to environmental protection, a diagnosis was conducted on the legal and institutional framework for environmental protection in the NBA Member States, and within the NBA, the sub-regional integration organizations, and the NEPAD.

Environmental protection in the States of the Niger Basin Authority

The analysis of the legal framework for environmental management in the NBA States makes a certain number of observations:

- There is no single definition of the concept of environment in the NBA Member States;
- The States are at different levels in terms of ratification of international environmental conventions;
- No national legislation recognizes all of the general principles of environmental protection.

The study then proposes a typology of the legal fields pertaining to the environment in the NBA Member States according to their degree of implementation (see figure 2 below).

Environmental protection within the framework of the Niger Basin Authority

This is addressed through several legal documents, including the revised Convention, the Declaration of Paris and the Niger Basin Water Charter.

The main regulatory instruments of this organization (the Convention and the Statutes of 1964, and in particular the Niger Basin Water Charter of 2008) offer a significant legal framework for environmental protection. The Water Charter constitutes the main legal foundation of the future Appendix on environmental protection in the basin. It devotes significant provisions to environmental protection.

Environmental protection within the framework of the regional integration organizations (ECOWAS and ECCAS)

The legal framework for environmental protection in the Member States, despite its insufficiencies, provides a favorable framework for the harmonization of policies, legislation, regulations and institutional mechanisms for environmental protection in the Niger basin. This is the challenge which the future Appendix must rise to by helping to achieve this harmonization.

Environmental protection within the framework of the NEPAD

In 2003, the New Partnership for Africa’s Development (NEPAD) developed its Environmental Initiative Action Plan. This action plan is a coherent, strategic, long-term action program, which aims to promote the continent’s sustainable development.

Figure 2 : Analysis of the legal framework for environmental protection in the NBA Member States (Source: Study on Appendix 1 to the Niger Basin Water Charter)

Domains that are well organized in legal terms in all the NBA States	**Domains that are only legally organized in certain NBA States**
Legislative and regulatory sectoral texts supporting framework acts on the environment	Protection of the oil environment
Environmental impact study	National environmental policy
The fight against pollution	Framework act on the environment
Protection of biological diversity	Ratification of international environmental conventions
Protection of soils against degradations	Traditional environmental law (customary)
Protection of water resources	Cross-border environmental issues
Environmental impact study of hydraulic projects	Social impact study
Quantitative protection of water resources	Strategic environmental evaluations
Specific protection of water points intended for human consumption	Environmental audit
Regulation of pollutant discharges in water	Environmental fees and taxes
Waste management	The protection of national genetic resources
Management of harmful or dangerous chemical substances	Health security of plants and animals
Natural and technological risks and disasters	Institution and delimitation of the public water domain
Environmental conflict management	The protection of aquatic ecosystems
	The regulations on establishments listed for the protection of the environment
	Environmental protection within the framework of pastoral activities
	Protection against biotechnological risks
	Legislation on the involuntary relocation/resettlement of populations
	Promotional actions concerning the environment
	Environmental responsibility
	Prevention and management of biotechnological risks

2. PRIORITY TRANSBOUNDARY ENVIRONMENTAL PROBLEMS

The regional TDA considered as a transboundary environmental problem any form of human damage to the natural state of an environment concerning more than one country. The problem therefore comes from one country and can affect another and its impact can damage the natural environment and/or human well being in one or more countries.

In the causality and impact analysis, it was deemed more convenient to put transboundary environmental problems into the following major groups composed of more sectoral problems: land degradation (degradation of plant cover and degradation of soils), water resources degradation (decrease in availability and quality of water/water pollution), the loss of biological diversity (flora, fauna and wetlands) and invasive aquatic plant species.

It is clear that each of these environmental problems is not equally serious and that they do not require the same level of urgency in seeking solutions. They have therefore been compared and classified according to the criteria herein below:

- Scope and severity of the impact of the problem on the River Niger Basin's ecosystem;
- Scope and severity of the impact of the problem on socio-economic activities and human and animal health;
- Level of interaction between the problem and other environmental and socio-economic factors;
- Extension of the problem through the basin's countries.

Table 2 summarizes, on the basis of the score obtained, the priority level of each of the transboundary environmental problems analyzed.

Table 2: Classification of transboundary environment problems by priority order (Source: TDA Regional Summary, 2009)

Global environmental problem	**Sectoral environmental problem**	**Criteria 1 Impact on the environment**	**Criteria 2 Socio-economic consequences**	**Criteria 3 Effects on other environmental problems**	**Criteria 4 Extent of the problem**	**Total score**
Land degradation	Degradation of plant cover	3	2	3	3	11
	Soil degradation	2	3	2	3	10
Water resource degradation	Drop in availability	2	2	3	2	9
	Decline in quality/pollution	2	3	2	2	9
Loss of biodiversity	Land-based	2	2	1	3	8
	Wetlands	2	2	2	1	7
Invasive species of aquatic plants		2	1	2	1	6

It emerges from the classification hereinabove that the priority transboundary environmental problems can be grouped into three categories:

- **High-priority transboundary environmental problems** (i.e. environmental problems of the most worrying scope): degradation of plant cover and soil degradation. Consequently, land degradation at the basin scale is the cross-border environmental problem with the highest priority;

- **Medium-priority transboundary environmental problems** (with a broad scope): first, the degradation of water resources through the decline in the quality and availability of the hydrological regime, and its modification, and, second, the loss of biological diversity in land-dwelling plant life and wildlife;

- **Low-priority transboundary environmental problems** (with a small scope): degradation of biological diversity in wetlands, and invasive species of aquatic plants. However, it should be mentioned that these problems, although localized, will tend to spread and become more pronounced, rather quickly, in line with the pace of the construction of dams, the development of intensive irrigated agriculture, and the increase in the urban population and in industrial activities along the main branch of the river.

It is also clear that the extent of environmental problems varies according to country and also according to the specific ecosystem types in the basin, in particular the hot points of biological diversity.

The regional preparatory workshops for the development of the SAP and the national workshops for the development of the NAPs highlighted the existence of a **cross-cutting environmental problem** which had a non-human cause (natural), but whose environmental impact and socio-economic consequences are exacerbating environmental problems of a human origin: climate variability/change. Thus, the SAP considered this problem as a priority and added it to those identified by the TDA.

Examination of the regional TDA also enabled the regional SAP preparation workshops to identify four major priority environmental problems specific to particular ecosystems considered as hot points of biological diversity in the basin. These issues specific to sites concern ecosystems which have remarkable biological diversity and wealth of natural resources, but that are threatened by one or more specific environmental problems (degradation of plant cover, degradation of water quality, lowered hydraulicity of the river, etc.).

The site-specific issues identified are as follows:

- The loss of biological diversity: (1) wetlands of the Inner Delta, the Middle Niger and the Maritime Delta, (2) protected areas of the Niger W, Chad and in North Cameroon;
- Deforestation of the mountain forest ecosystems in Upper Guinea, the Sikasso region and Bani basin in Mali, the Adamaoua in Cameroon and north Benin;
- Silting of the river in the inner Delta in Mali, the Niger belt, the Middle Niger up to Kainji in Nigeria, and the Chad portion of the Bénoué basin.

Land degradation

The degradation of land in arid, semi-arid and sub humid dry areas is defined by the United

Nations Convention to Combat Desertification (CCD) as being the "decrease or disappearance of biological or economic productivity or the biological complexity of cultivated land (both rain-watered and irrigated land), of livestock routes, forests or wooded surfaces due essentially to man's activity". This definition is close to that given by the same CCD to the concept of desertification except that the latter is seen as being the degradation of land under the effect of various factors, including climatic variations and human activities. In this document, the degradation of land therefore means the decrease or disappearance of the land's capacity to produce biomass due to human activities. In the basin's arid, Sahelian and Sudanian areas with long dry seasons, the process is similar to desertification.

Land degradation results from phenomena which combine to degrade plant cover opening the soils to actions of erosion (water and wind), physical processes (destructuring and rearrangement of particles), chemical (salination and alkalinization) and biological (decrease in organic matter and activity of micro-organisms). Thus, when bad agricultural or grazing practices, or other types of activities, lead to the gradual disappearance of this plant cover, the soils sustain mechanical and chemical degradations which are often irreversible.

The major problem of land degradation can be examined under the sectoral plans for plant and soil degradation.

2.1.1. Degradation of plant cover

The agricultural or grazing practices which lead to the gradual disappearance of plant cover are:

Agriculture

Agriculture constitutes the largest economic sector in all the Niger basin's countries, except Nigeria, and in any case involves the majority of the population in all countries. Extensive agriculture is in fact the principal activity and source of income for the basin's inhabitants. It is essentially focused on subsistence production to meet the family's food needs and secondarily for sale on local markets. In all of these countries, the general trend is towards increased crop production. However, the increased production over the last 30 years has taken place by increasing surface areas at the cost of natural plant formations, savannas with trees or former fallow land with, generally, good yields on "new" soils. Improved tools, the development of draught farming and the possibility of access to some income through the sale of firewood resulting from tree clearance have favored this extensification.

Today however, with demographic growth and therefore food needs to be met, the pressure on land is such that in most parts of the basin, land use saturation is being experienced: fallow land is tending to disappear and where it still exists its duration has been reduced to less than 5-7 years for example in Guinea, 2-4 years in Niger and 0-2 years in Chad, a period which does not enable the fertility of the soils to be restored. Moreover, marginal land, rangeland and forest reserves are increasingly being used for crop growing, leading to ever-lower yields.

Cotton, one of the main cash crops in the Niger Basin, constitutes a significant economic sector in many countries in the basin (Benin, Burkina Faso, Cameroon, Guinea, Mali and Chad). Today, "traditional" cotton regions, where the land is saturated and soils have lost their fertility, are experiencing lower productivity in favor of other regions previously covered with forests, which are now becoming much more likely to be subject to this kind of crop, due to the "descent" of isohyets towards the south. Several regions of the Niger basin are thus subject to intense pressure through migrants from Sahelian areas that are undergoing

desertification. The States are currently making efforts in this area to grant subsidies and to develop partnerships between producers and micro-credit institutions to facilitate loans for emerging cash crops, including cotton and rice. This particularly applies to the upper basin of the Bani in Mali and Côte d'Ivoire, the Upper Basin of the Niger in Guinea, and the southeastern zone of Burkina Faso (Fada N'Gourma region).

Photo GEF-RLWDT/NB Project (Cameroon, 2010)

Fire and construction wood

The basin's plant cover also constitutes the main source of heating and construction wood as well as forage, but it no longer meets demand from the quantitative point of view. In fact, the countries in the Niger basin depend largely on wood and charcoal as an energy source. Heating wood constitutes the main energy source; 90% of overall primary energy needs are therefore met by firewood and charcoal. Over 80% of the energy consumed in the Sahel countries comes from wood and charcoal. In the Niger, this consumption represents over 2 million tonnes of wood per year. In Mali, studies have demonstrated that the consumption of wood and charcoal has increased at the same rate as the population has grown. There is therefore heavy pressure on wood resources, which is contributing to impoverishment of the plant and forest cover, already affected by the extension of crop growing.

In areas with a population density of more than 30 inhabitants/km², the exploitation of wood has taken on the extent of systematic deforestation in rings around cities and in strips along communication routes. Thus, it is difficult to find wood in a radius of 15 to 30 km around Kankan in Guinea or for more than 100 km around Niamey in Niger. Thus, the constant increase in demand for wood-energy in urban areas (firewood but above all charcoal) is a large problem insofar as the increase in demand is markedly faster than the increase in supply, despite the introduction of DES (domestic energy strategies) in Mali and Niger, and GGFs (forest management groups) for the management of forest "sites" in Burkina Faso and rural wood markets in Niger.

Overgrazing

Throughout the part of the basin with a pronounced dry season (Sahelian and Sudanian), the main feeding source of livestock is comprised of 80% natural pasturage. The productivity of this pasturage varies according to the characteristic rainfall regime of the region. However, each year, a forage deficit occurs during the dry season where bush fires burn all grass straw and where most natural watercourses are dry. During this dry season, in the most favorable locations (floodplains of the river and its tributaries, Inner Delta, ponds and reservoirs), an excessive concentration of livestock is experienced, particularly through transhumance, which far exceeds the seasonal load capacity: this results in overgrazing. The continual grazing of pastures and the lopping and pruning of trees to enable herds to access aerial forage are leading to the disappearance of the plant cover which, combined with the intense and repeated movement of the livestock, increases the soil's sensitivity to wind and water erosion.

Thus, in all the basin's countries, faced with, on the one hand, the increase in livestock numbers, in particular thanks to the beneficial effects of veterinary prophylaxis measures (including vaccination of animals), and, on the other hand, the reduction of pasturage due to drought and the increase in cultivated surface areas at the expense of natural plant formations and range areas, in the coming years livestock farming will constitute a real challenge.

Bush fires

The practice of bush fires is ancestral and widespread in Africa. With respect to crop-growing agriculture, these fires are generally practiced to prepare fields before seeding, before the start of the rainy season. For livestock farmers, the fires, by burning old herbaceous stems, encourage the growth of young shoots for livestock, provided a little humidity remains in the soil. Bush fires are also used in hunting, to flush out game. So long as the fires remained an isolated and early phenomenon, the effects on plant cover were not dramatic. Unfortunately today, fires course through certain rural areas every year, sometimes at the end of the dry season, which does not allow the herbaceous vegetation to be reconstituted and leaves the soil bare, subject to the first storm rains, which are generally violent. The soil then undergoes wind erosion phenomena at the end of the dry season, and water erosion when the first rains come.

2.1.2. Soil degradation

Soil degradation can be defined as being the reduction, to a greater or lesser degree, of the soil's capacity to contribute to the needs of human life following disturbance to one or more of their essential functions, such as: support and storage of nutritive elements for plants, reservoir for water, biological factory and purifier.

The principal forms of soil degradation can be mechanical (erosion by digging and transportation of particles), physical (destructuring and reorganization of particles in one place), chemical (excess of salts) and biological (disappearance of organic matter). At the basin level, the most significant form of transboundary degradation is erosion (caused by wind and water). Erosion refers to the removal (lifting out) and transportation of mineral particles of the soil and associated organic matter by water and wind.

Wind erosion

The phenomenon is particularly serious in the whole of the North-Sahelian area of the basin,

in the Mali Gourma, alongside the river in the meander of the Niger, in the Zarma Ganda and the region of Tahoua in Niger where dunes that were formerly fixed, either naturally or by reforestation, have today been remobilized. The sands spread out at the foot of the dunes, sometimes over long distances, and are deposited in the riverbed or floodplains where they make agricultural soils sterile. A perfect example is the silting-up of the river at the Niger Belt. In this region in Mali, it was estimated in 2001 that 20,000 ha of homes, watercourses, water points and agricultural land were directly threatened by silting from mobile dunes.

Water erosion

This results from the soil being attacked by drops of rain, whose kinetic energy causes the clumps (aggregates) to be broken up and the run-off action to transport the freed particles; this capacity for the run-off to transport particles is due to the slope. Thus, any action contributing to reducing the soil's protection from plant cover or to breaking up the soil could, with the slightest slope, cause a massive exodus of earth and fertilizing elements, in particular the organic matter contained in the most exposed surface layer.
The River Niger Basin is undergoing intense water erosion but the extent varies from one zone to another within the basin:

The humid tropical zone, with more than 1200mm of average annual rainfall and an average annual temperature of 25-26°, enables the establishment of dense humid tropical forest which, like a bandage, protects the soils from water erosion.

- In the subtropical zone with a dry season, known as "Sudanian", which covers all the countries, in particular the majority of Nigeria, we can find Isoberlinia woodland and an herbaceous carpet of perennials in the south, as well as annuals in the north, which normally provide good protection for the soil against water erosion. However, in recent years all parts of the Sudanian zone have experienced very high rates of clearance for crop-growing, particularly cotton, and the cutting of wood for energy to supply urban centers, and despite the absence of reliable data, it does not appear that this trend is lessening. In all cases, the decrease in plant biomass, reduced by bush fires or destroyed by agricultural clearing, also leads to a decrease in the natural inputs of organic matter to the soil, which normally contribute to structuring it and making it cohesive (clay-humus complex). The absence of organic matter leads to clumps of earth being destructured and the internal disintegration of the soil, which becomes sensitive to erosion by run-off and the action of the wind.

- In the Sahelian zone, in addition to the wind erosion in the dry season, it can be observed, particularly at the start of the rainy season, that intense water erosion develops through the run-off generated by the high intensity of rain on set bare surfaces with a very low infiltration rate. This is particularly the case of the duricrust on the cuestas of Zarma Ganda, Ader-Doutchi-Maggia and the region of Tillaberi in Niger. Indeed, through these catchment areas, run-off increases, gathers speed over the slopes of the plateaus and makes deep incisions in the form of koris in the sandy top layers of cultivated glacis.

2.1.3. Immediate and in-depth causes of land degradation

There are multiple causes of plant cover and land degradation, which can accumulate depending on the regions. Other than the recent climatic phenomena, the two most significant causes are linked to populations' lifestyles and their degree of poverty. The latter makes them heavily dependant on natural resources, resulting in poor agricultural practices and overgrazing. Other causes, which are just as important, are more or less related to the

first two causes here above: bush fires (especially when they are late), and deforestation for fuel wood or building, and bad use of pesticides, etc.

The immediate causes are:

- Bad agricultural practices;
- Increase in cultivated surfaces at the expense of forest cover and rangeland;
- Tree removal;
- Overgrazing;
- Bush fires;
- Erosion.

The fundamental causes are:

- Population growth;
- Lifestyles of populations;
- Poverty of populations who depend mainly on natural resources;
- Climate variability/change;
- ailure to effectively implement forest management texts and policies.

Photo GEF RLWDT/NB Project (Guinea, 2010)

2.2 Degradation of water resources

The degradation of water resources covers the following sectoral problems: fall in availability of water, fall in quality/contamination of water, modification of hydrological regime.

2.2.1. Fall in availability of water

Surface water

The availabilities of surface water vary from one section of the river to another, depending on flow rates, evaporation losses and withdrawals. The critical periods for availability of surface water generally correspond to low water level volumes.

In the Upper Niger, it has been observed that the average interannual flow volume at Koulikoro (Mali) of 1,350 m^3/s (average 1929-1970) or 42 billion m^3/year is now only around 1,039 m^3/s (average 1971-2002) accounting for approximately 33 billion m^3/year, or a decrease of 23%. This trend for flows to decrease on all tributaries is closely correlated with the fall in rainfall observed since the 1970s.

The hydrological functioning of the Inner Delta is largely dependant on the flows from the basins of the Upper Niger basins, its tributary Bani and its own morphological and hydro-climatic conditions. The significant losses of water, in particular to the ecosystems of the Inner Delta (principally by evaporation and infiltration), reach approximately 20 billion m^3 in a wet year, 13 billion m^3 in an average year and 11 billion m3 in a dry year. The contributions of the zone itself, which are extremely modest (direct precipitation into lakes and run-off), do not offset the zone's natural water losses. The average loss is 38% of input (calculated using the stations of Ké-Macina, Douna and Diré over the period 1953-2005). Average annual agricultural withdrawals in the zone are currently 3.2 billion m^3, (2.7 billion m^3 for the Niger Office), or almost 12% of the flow volume per year in a dry decade.

In the Middle Niger, most tributaries have a temporary regime (exception: la Sota), which is a very considerable restriction, aggravated by low rainfall, particularly in the north of the zone. The Niger's average interannual flow rate at Niamey between 1971 and 2002 was 704 m^3/s only compared to 1062 m^3/s for the period of 1929-1970, that is, an overall fall of around 34%. The flow is permanent but can reach very low values at low-water times. We can mention the complete halt of surface flow of the Niger for one week in June 1985 at Niamey; the population of Niamey was supplied with water through a small temporary dam constructed in the bed of the river.

In the Lower Niger, the problem of availability of surface water arises mainly in the Upper Bénoué, where severe water shortages are recorded. In fact, the Mayo Kébi basin (3 billion m^3), has zero flow rate on its tributaries: for 4 to 6 months on the Mayo Louli (which also has violent floods), for 4 to 5 months (from December to May) on the Mayo Oulo; zero flows can also be observed on the Mayo Kébi, but its low water levels are generally sustained by the emptying of lake Léré. Like the Upper Niger and Middle Niger, the Lower Niger is experiencing significant falls in flow. The average for 1929-1970 was 6,055 m^3/s compared to 5,066 m^3/s (1971-2001), that is, a decrease of approximately 17%.

Ground water

The little-known ground water resources are currently an important issue for the Niger basin, where less than 60% of the population has sufficient access to drinking water. Currently,

over 75% of the basin's drinking water comes from ground water, which therefore properly supplies approximately 45% of the population. The data on ground water relating to national portions of the basin are almost non-existent.

Village water supply essentially uses aquifers in intermittent environments in the zones concerned. As the water depth and average flow rate for drill-wells tends to be heterogeneous, the specific flow rates and the failure rates of drilling are highly variable (30 to 70%).

Generally in the Niger basin, ground water, with few exceptions, has acceptable physical and chemical characteristics. The large majority of the population uses it, not only for their own supply, but for supplying livestock and in some cases for small-scale irrigation.

2.2.2. Lower quality/pollution of water

Water pollution is defined as the contamination of water by foreign bodies such as micro-organisms, chemical products, industrial waste and others. These substances and foreign bodies degrade the quality of the water and make it unfit for the desired uses.

The pollution of the basin's waters has various sources:

Industrial and artisanal pollution

Industrial and artisanal activities are booming in the basin (dyeing factories, tanneries, etc.). Industrial and artisanal units are mainly established in Bamako and in some urban riverside locations along the Niger. These units often discharge their effluents and waste into the river without pre-treatment, which presents a serious danger of pollution for the environment and more particularly the river.

Mining Pollution

Although the mining industry is booming in many countries in the basin, it is particularly in the upper basin of the Niger in Guinea that mining pollution of the water is a concern. This is principally due to the presence of the mining industry with the chemical products used in mineral treatment procedures (most notably cyanide for treating gold).

Pollution from discharge of petroleum products

The discharge of petroleum products is a major problem in the maritime delta. In the recent past, many problems of oil spills on a large scale have been reported. The most significant was certainly the Mobil spill at Idoho in 1998, which stretched as far as Lagos, and the accident with the Shell Oil Development (SPDC) tanker in 2000. According to the data available from NNPC/Shell, between 1991 and 1994, approx 10,000 barrels of crude oil have been discharged every year.

Agricultural pollution

Due to the inability to use less polluting organic fertilizers, the mass use of chemical fertilizers is becoming widespread in cotton-growing areas, rice-growing areas and other cash crop zones (groundnut, tiger nut, etc.) in addition to pesticides. In Mali, agricultural development companies use high quantities of pesticides and mineral fertilizers, a large proportion of which end up in the river.

2.2.3. Immediate and deep-rooted causes of degradation to water resources

The reasons behind the drop in the availability of surface water are both natural and anthropogenic. Among the natural causes, the insufficient rainfall across the basis has led, since 1970 to a reduction in surface flow of approximately 20% to 50%, with sometimes severe low-water levels, going as far as stopping flow.
The second natural cause of the drop in available surface water is the high evaporation affecting the water bodies. For example, of a water loss of 13 billion m3 in an average year, it is estimated that more than half is due to evaporation.
A man-made cause of the drop in surface water availability is the poor design of certain dams whose active volume is superior to the input, leading to a lack of downstream flow. Another anthropogenic factor that can affect surface water availability is related to withdrawals for future needs in drinking water, and water for livestock and irrigation, which were estimated in 2005 at 6.4 milliards m3, of which 80% were for irrigation.
As for groundwater availability, this varies significantly from one type of substratum to the next, and, for the same geological conditions, from one region to the next, as the rain, infiltration and the river system determine how the ground water is reloaded.

The main causes of the alteration of the quality of surface and groundwater through pollution are:

- Insufficient collection and treatment of rubbish, insufficient or absent management of latrines, low awareness on sanitation and water-borne diseases, and low funding allotted to this sector by the States;
- Direct discharge into waterways by industries and mines of waste water containing toxic products, in particular by gold mines (mercury used in artisanal mines and cyanide used in the heap leaching of lateritic gold ore);
- Poorly controlled use of fertilizers and pesticides (quantities, periods and conditions of spreading, etc.).

The immediate causes are:

- Lower frequency and duration of flooding of alluvial plans;
- Poor agricultural and grazing practices:
- Less rainfall;
- Proliferation of invasive plants;
- Increased pollutant discharges.

The deep-rooted causes are:

- Reduction of water levels by dams;
- Limited knowledge of resources;
- Non-rational management of irrigation networks;
- Insufficient sanitation infrastructures and basic services;
- Insufficiently coordinated water resource management;
- Failure to apply regulatory frameworks and legal instruments;
- Lack of legislation and strategy including protection of biodiversity;
- High demographic growth;
- Genetic erosion;
- Over-exploitation of resources in wetlands.

2.3 Loss of biological diversity

The Niger basin contains almost all of the natural habitats present in Africa, from the desert dune areas of the large Saharan ergs and the Gourma to dense humid forests. In addition to this wide diversity of landscapes and environments there is also an equally diverse range of flora and fauna, although it is under serious threat and/or degraded in certain locations.

2.3.1. Loss of land biodiversity

In all countries, a loss has been noted, to a greater or lesser extent, of the diversity of flora and fauna, habitats and ecosystems.

With respect to habitats, in general over the whole basin there appears to be a trend towards reduction, fragmentation and even disappearance.

In Benin for example, a comparative analysis of the satellite images of the portion of the basin showed that from 1972 to 2006, the principal forest formations, that is, gallery forest, dense dry forest, woodland and wooded savanna, as well as savanna with trees and brush, have significantly receded. For flora diversity, almost everywhere in the basin, a serious threat of migration, or even disappearance of certain plant species, has been reported. In the classified forests of Ouémé–Bénou, Alibori Supérieur and Trois–Rivières, the most threatened species are *Khaya senegalensis, Milicia excelsa*, and *Isoberlinia doka* to a lesser extent.

In Niger for example, on the basis of the observations by the direct users of biodiversity, isolated studies and mission reports, it appears that certain species with medicinal uses such as *Securidata longepedonculata* have disappeared and others are becoming rare (*Commiphora africana, Prosopis africana*, etc.). The IUCN's red list has identified two vulnerable tree species, *Khaya senegalensis* and *Afzelia africana*. It gives no information on the tree species under serious threat. Perennial grasses such as *Andropogon gayanus, and Cymbopogon giganteus*, which stretched to the edge of the desert, have all migrated towards the south and well beyond the national borders.

With respect to land fauna, the species found in the basin vary according to the climatic zone. They are most often concentrated in protected areas (parks, reserves and classified forests). The animals found include: ostriches, gazelles, hyenas, leopards, elephants, lions, hippopotamuses, antelopes, warthogs, etc. However, as for flora and habitats, in recent years land fauna has experienced population decreases whilst many species are threatened, have become rare or have simply disappeared.

Thus, currently, throughout the basin, several mammal species are under threat of extinction, such as the addax (*Addax nasomaculatus*), Barbary sheep (*Ammontragus lervia*), giraffe (*Girafa cameleopardis*), of which the Niger is home to the last West African specimens, ostrich (*Struthio camelus camelus*), etc.

In the Binder reserve in Chad for example, amongst the large species, the damaliscus and Derby elk have disappeared, but the sable antelope and antelope are well represented. Large predators (lion, leopard, cheetah) can be considered to have disappeared, although the last two species have been spotted on several occasions.

2.3.2. Loss of biodiversity in wetlands

For wetland and aquatic ecosystems in the Niger basin, which are home to one of the most

important ecological riches of the world, this abundance should not hide the very fragile nature of these ecosystems, in particular those of the wetlands, the most important of which in terms of biological diversity are the Inner Delta, the wetlands of the Middle Niger and the Maritime Delta. In fact, their sensitivity is linked to their dependence on the river's hydraulic conditions (water height, flow volume, duration and period of submersion) and also the development of the economic and social human activities they support. Thus, any action to develop the water resources can directly or indirectly impact these ecosystems.

There currently are and will continue to be ever increasing serious threats to these wetlands due to this great sensitivity to fluctuations in the river's hydrological regime and above all the very intense pressure they are sustaining for exploitation of their resources.

2.3.3. Immediate and deep-rooted causes of the loss of biological diversity

With the climatic conditions, the anthropogenic activities behind the loss of biological diversity include the following:

- the degradation of forest cover through deforestation, land clearance, tree felling, fires, overgrazing and poor practices in the removal of plant cover are direct causes of the reduction in the diversity of flora and of land habitats;
- poaching and domestic livestock diseases are direct causes of the loss of land-dwelling wildlife diversity
- the reduction of flooding in wetlands due to silting, withdrawals and flood-peak reductions reduce biotopes and the related fauna and flora
- the overexploitation of wetland resources through agriculture, deforestation, tree felling, grazing, fishing and hunting are direct causes of the loss of biotopes and of species of fauna and flora of the wetlands;
- the proliferation of aquatic plants is a direct cause of the reduction and extinction of native plant species.

The immediate causes are:

- Tree removal and deforestation;
- Bush fires;
- Mining exploitation;
- Increased poaching in protected areas;
- Reduced frequency and duration of flooding of alluvial plains;
- Silting of water courses;
- Encroachment of agricultural land onto wetlands;
- Proliferation of invasive aquatic plants.

The deep-rooted causes are:

- Over-exploitation of resources in wetlands;
- Exponential increase in population and industrial activities;
- Ignorance of values of wetlands and very low level of environmental awareness of communities;
- Little consistency in institutional and legal framework concerning environmental management;
- Little integration of environmental management into the overall development process;
- Poverty of populations and dependence of rural populations on natural resources.

2.4 Invasive aquatic plants species

The principal channel of the river Niger is strewn with patches of aquatic vegetation such as water hyacinth (*Eichornia crassipes*) and water lettuce (*Pistia stratiotes*). These plants have a high capacity for production of biomass at dizzying speeds, which enables them to colonize shallow zones very quickly. They are perceived as precursors (or initial colonization stage) for other more resistant and more sophisticated plants, including in particular reeds such as *Typha australis*. The latter has been observed in inextricable colonies in the permanent ponds lining the beds of the fossil tributaries of the left banks of Niger and Nigeria.

In Mali, water hyacinth (*Eichornia crassipes*), a floating aquatic weed, was introduced around Bamako in approximately 1990 and is becoming a growing source of concern. This is also the case in Niger and Nigeria.

Despite the increasingly acute seriousness of the problem, there is very little information on the specific conditions of proliferation, the location of these species, their scope and their effects on the environment.

The immediate causes of proliferation of aquatic plant species:

Fall in precipitation;
Dams/regulation of river flow volume;
Nutrients (organic matter and fertilizer), pesticides and chemical substances entering the river;
The introduction of exotic species
Direct discharge of pollutant effluents into the principal riverbed.

The deep-rooted causes of proliferation of aquatic plant species:

Absence of quality standards, laws and standardized regulations concerning water;
Failure to apply regulations on water pollution;
Urban growth along rivers;
Lack of education and awareness of populations;
Insufficient monitoring/rigorous and coordinated control of quality of river water;
Inexistence of administrative structures responsible for managing the sources of diffusion of pollution in agriculture.

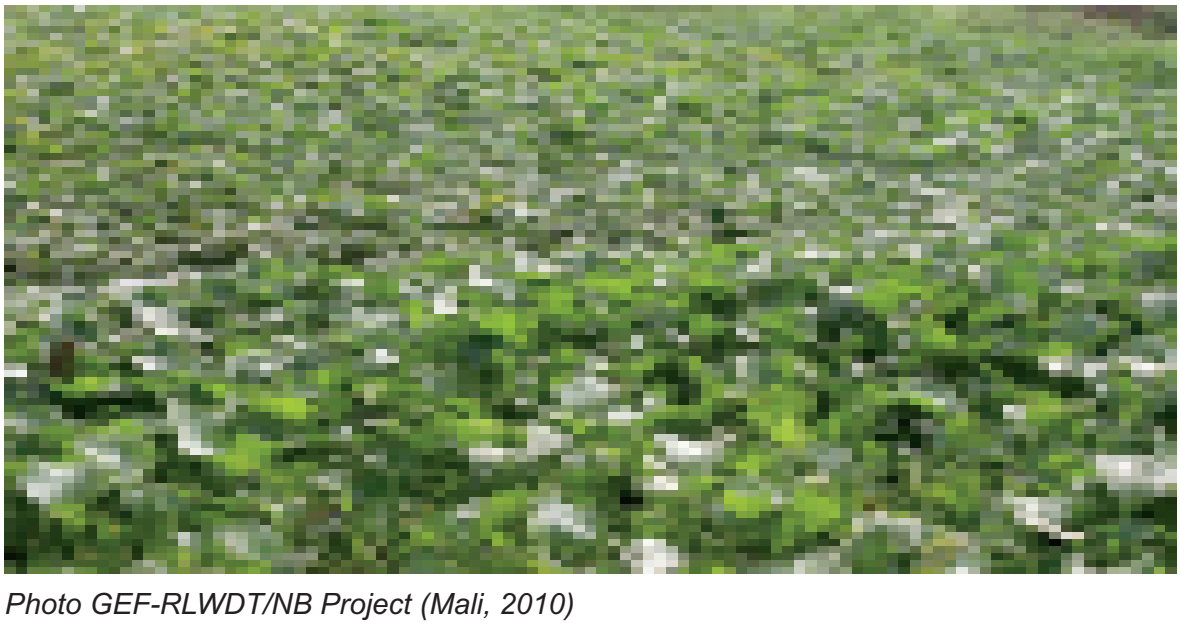

Photo GEF-RLWDT/NB Project (Mali, 2010)

3. STRATEGIC ACTIONS FOR RESTORATION AND SUSTAINABLE MANAGEMENT OF THE BASIN'S ENVIRONMENT

This chapter describes the strategy that will be implemented to resolve the priority environmental problems in the River Niger Basin. The main components of this strategy are:

- The Long-Term Environmental Vision, which forms the link between what the region "is now" and what we "hope it will be in the future, i.e. by 2027". It is therefore a clear representation of the characteristics desired by the stakeholders for the future environment of the basin;
- The Long-Term Environmental Quality Objectives (LTEQO), which represent the tangible results of long-term change. They are the answer, for a given environmental problem, to the following question: "What would be the acceptable environmental state as a sign of a solution to this problem?" Strategic actions have been broken down into activities to be carried out to each achieve each LTEQO;
- The institutional and legal reforms and the stakeholder capacity building measures necessary for the operationalization of the SAP.

A table presents all of the actions and activities in two main sequences: a 2-year preparatory phase (2011 and 2012) and a phase involving three successive five-year plans (2013 - 2017; 2018 - 2022; 2023 - 2027) for the implementation of the SAP corresponding to the short-, medium- and long-term respectively.

3.1 Long-term vision for the basin's environment

After identifying the priority transboundary environmental problems and site-specific issues, the formulation of a long-term vision for the basin's environment constituted the second stage in the process of drawing up the SAP. To formulate the Long-Term Vision, the participants in the preliminary regional SAP preparation workshops took into consideration different concerns, including the need for consistency with the Paris Declaration, the Shared Vision and the SDAP.

The Paris Declaration (April 2004) lays down the "Principles for management and good governance for the sustainable and shared development of the Niger basin". The environmental principles of this strategy concern: (1) the sharing of water resources with sustainable development objectives; (2) enjoyment of a reasonable and equitable share of water resources by each Member State; (3) prior consultation of States by the intermediary of the Executive Secretary of the NBA for activities that significantly affect the water regime; (4) immediate mutual briefing of Member States of any situation likely to have an impact on riparian countries. This Declaration clearly places the Integrated Management of Water Resources (GORE) at the heart of the development process.

The Shared Vision, whose implementation constitutes one of the principles of the Paris Declaration, was adopted by the Council of Ministers of the NBA in Abuja in May 2005. The wording of the Shared Vision is as follows: ***"The Niger basin, a common space for sustainable development through the integrated management of water resources and the associated ecosystems, to improve the living conditions and prosperity of populations by 2025".*** This Declaration, focused on a common space for sustainable development based on the integrated management of water resources and the associated ecosystems, positions the NBA within the Shared Vision process (phase 2), including the development of the Sustainable Development Action Plan (SDAP).

As the SAP must complement and expand the environmental plan of the SDAP, it must therefore be completely consistent with the Shared Vision process.

Taking these fundamental texts of the NBA as a basis, whilst recognizing that each country already has its own strategic vision as expressed in its National Action Plan, the stakeholders have chosen the following Vision Declaration for the River Niger Basin: "**By 2027, the countries of the basin will use and manage its natural resources in a coordinated and sustainable manner in an environment conducive to human development".**

This vision, whilst taking into account the concept of integrated management of the Shared Vision, also remains specifically focused on the quality of the environment, the ultimate purpose of the SAP.

3.2 Long-term environmental quality objectives (LTEQO) and priority actions

For each of the priority problems identified (12, including 4 site-specific), an LTEQO has been made to correspond, which reflects the acceptable state of the environment in the long term for the problem concerned, for which a monitoring indicator has been defined.

For each LTEQO, the stakeholders have defined the priority actions whose fulfillment should enable the achievement of the objective targeted for 2027. These actions, which come from the proposals of the NAPs, have been summarized and ordered chronologically in order to enable, through their implementation, not only easier monitoring, but also and above all, to appreciate at any point the extent to which each LTEQO has been fulfilled. As for the activities within a given action, they also follow the same chronological logic and their total fulfillment constitutes the completion of the action concerned.

The table in Appendix 1 summarizes the LTEQO, the priority actions and the activities, in addition to the target zone (country, group of countries, water bodies).

Degradation of plant cover

LTEQO 1. The basin's plant cover is restored and a system for the sustainable management of plant formations is set up

Since the 1970s, all of the northern part of the basin has been subject to a process of desertification, accentuated by climatic variability/change. Moreover, in the whole of the basin unprecedented demographic growth has been recorded, complicated by growing and grazing practices that are not generally very environmentally friendly, all of which is exacerbating the intense pressure that was already affecting the plant cover. The stakeholders in the basin, by posing degradation of plant cover as being the highest-priority problem, therefore undertake to rise to a true challenge that all the strategies deployed since the United Nations Conference on the Environment and Development (1992), followed by the formulation of other instruments such as the United Nations Convention to Combat Desertification (CCD), the NAPs and other NAPs/LCDs, have not been able to resolve. The following priority actions will consequently be implemented in all of the countries of the basin.

Priority actions

Action 1.1. Monitor evolutionary trends in forest cover and rangeland:
- Activity E1.Activity E1.1.1 Produce baseline maps of the state of forest stands and rangeland;
- Activity E1.Activity E1.1.2 Repeat the mapping process every 5 years

Action 1.2. Develop and implement programs and projects to restore degraded ecosystems
- Activity E1.2.1. Identify and locate highly-degraded forest stands and pastoral rangeland
- Activity E1.2.2. Capitalize on experience in the restoration of degraded forest stands and rangeland
- Activity E1.2.3. Implement the most appropriate restoration actions

Action 1.3. Capitalize on domestic energy strategy experience based on participatory forest development with a view to sustainable supply of fuel wood and other sources of alternative energy
- Activity E1.3.1. Strengthen research on new and renewable energies
- Activity E1.3.2. Conduct a capitalization study on experience in participatory forest development
- Activity E1.3.3. Create community forests
- Activity E1.3.4. Promote the use of solar energy
- Activity E1.3.5. Promote the use of bio-gas
- Activity E1.3.6. Make electrical power more accessible
- Activity E1.3.7. Promote the sale of carbon sequestration credits within the framework of the Clean Development Mechanism

Action 1.4. Develop and implement reforestation programs and projects
- Activity E1.4.1. Experiment with the use of reforestation methods and techniques that take the characteristics of the environment into account
- Activity E1.4.2. Implement reforestation operations on land that is the most vulnerable to erosion

Soil degradation

LTEQO 2. Productivity of agricultural and pastoral systems improved and system for the sustainable management of soil resources set up

When it starts, erosion is very selective, as it particularly affects fine particles (silt and clay) and the elements associated with them, that is, fertilizing elements and organic matter. Thus, erosion very quickly leads to soil becoming sterile and its fertility dropping sharply. When erosion then intensifies, it causes the mass movement of earth. One of the main impacts of soil degradation in the basin is therefore, and risks continuing to be for some time in a context of high demographic growth of a poor population dependent on natural resources, the fall in crop and livestock production, and therefore lack of food security and increase in poverty.

In the countries, extensive efforts are made locally to improve land, stabilize soils and the banks of watercourses and replant eroded areas, but the SCP/NB can take most of the credit for restoring degraded soils at the regional level. However, in the face of the ever-increasing impact of soil degradation, in particular falling fertility and its corollary of food insecurity and silting up, this phenomenon has been taken by the stakeholders as one of the high priority environmental challenges to be tackled.

Consequently, the priority activities identified below will be conducted in all the countries of the basin so that LTEQO 2 has been achieved by 2027.

Priority actions

Action 2.1. Review the existing situation in terms of type and extent of soil degradation
- Activity E2.1.1. Create maps of land use units
- Activity E2.1.2. Cross-reference different criteria to classify soil by severity of degradation

Action 2.2. Develop and implement soil development programs based on their aptitudes, constraints and purpose/ affectation
- Activity E2.2.1. Classify soil by its aptitudes, constraints and planned farming system
- Activity E2.2.2. Test development methods for each of the major soil types cultivated and major types of rangeland, in the form of pilot projects

Action 2.3. Capitalize on and promote the best practices, techniques and modern technology for water and soil restoration and conservation
- Activity E2.3.1. Conduct a capitalization study on SWC/SDR methods and techniques
- Activity E2.3.2. Using the experience of the SCP as an example, develop and promote integrated catchment area protection actions
- Activity E2.3.3. Conduct extension work on agroforestry and conservation agriculture practices on farms

Action 2.4. Develop a regional soil reference system and ensure it is regularly supplied with data
- Activity E2.4.1. Create a regional group of cartographers and soil specialists to design a soil reference system for the basin and feed it with data
- Activity E2.4.2. Ensure that the think tank for the soil reference system is operational

Drop in water availability

LTEQO 3. Water needs of all users, including ecosystems, covered sustainably and system for the sustainable management of water resources set up

From the creation of the NBA in 1980 until the pronouncement of the Shared Vision in 2005, the coordinated management of water resources in the basin constituted the central strategic axis of the development and cooperation policy of the countries in the basin. Through the Shared Vision process, of which the SDAP, its IP and the Water Charter are the results, the NBA continued its strategy of managing water in the River Niger Basin whilst integrating into it the management of natural resources and the protection of ecosystems. At the same time, the NBA also set out to introduce a suitable institutional framework for mobilization of the partners and investments required to attain these objectives. The purpose of the SAP is to continue and reinforce these efforts whilst ensuring that the availability of water resources is guaranteed, and that the natural resources and ecosystems are at the same time restored, managed and used in a sustainable manner for the well being of the basin's current and future populations. The SAP shall ensure that the implantation of new infrastructures and the management of older ones guarantee not only water availability but also that it is fairly allocated to different uses, including ecosystem needs.

The following priority actions successfully led in all the countries of the basin will enable the achievement of LTEQO 3 by 2027.

Priority actions

Action 3.1. Implement the appropriate methods for better knowledge of water resources, their renewal and the needs

- Activity E3.1.1. Study mechanisms for renewing groundwater in the basin, and the relationship with surface water
- Activity E3.1.2. Update the study of user and ecosystem water requirements, incorporating the major new structures created
- Activity E3.1.3. Extend the water allocation model to cover all the major structures of the basin

Action 3.2. Develop and implement a regional program for irrigation network management and water efficiency

- Activity E3.2.1. Experiment with efficient irrigation systems adapted to the specific features of each zone
- Activity E3.2.2. Implement pilot projects for the use of water-saving irrigation techniques
- Activity E3.2.3. Carry out extension work on the use of water-saving irrigation techniques

Action 3.3. Develop and implement a regional village and pastoral water supply program

- Activity E3.3.1. Capitalize on experience in village and pastoral water supply
- Activity E3.3.2. Implement village and pastoral water supply projects

Drop in water quality

LTEQO 4. Water resource quality at least equal to the WHO's "safe drinking water" standard

As the main objective of the SAP is to guarantee an environment conducive to human development in the long term, it is completely legitimate that the SAP aims to contribute to reverse the restriction of deteriorating water quality. In fact, as water quality is a strong indicator of the status of environmental health in the basin and for the human, animal and plant populations living there, the stakeholders have decided to position the problem of decreased water quality amongst the major environmental challenges to be tackled.
Therefore, the implementation of the priority actions below in all the countries of the basin will ensure that LTEQO 4 is achieved by 2027.

Priority actions

Action 4.1. Accelerate the assessment study of pollution sources and the mapping of major risk zones
Activity E4.1.1. Accelerate the assessment study of pollution sources and the mapping of major risk zones

Action 4.2. Develop and implement a master plan to control water pollution

- Activity E4.2.1. Perform an assessment of water quality in the basin
- Activity E4.2.2. Prepare very strict specifications for preserving water quality for the main uses (mining, agrifood industries, large irrigated perimeters, etc.)
- Activity E4.2.3. Set up pilot water quality preservation projects in a number of urban communities in the basin

Action 4.3. Develop regional water quality standards and implement a regional program for

the control and monitoring of water resource quality

- Activity E4.3.1. Define water quality standards for the whole of the basin
- Activity E4.3.2. Create a system for continuous monitoring of water quality

Loss of land biodiversity

LTEQO 5. Biodiversity, including genetic diversity, of land ecosystems restored and sustainable management system set up

To reach this LTEQO it is necessary to implement specific actions to preserve particular land ecosystems in the basin which play a vital role in safeguarding the basin's biodiversity. In all of the NBA States, protected areas, and in particular those benefiting from a classification system, were constituted before the independences. In this respect, with the human pressure on land for crop growing and livestock raising and for mining extraction, all exacerbated by droughts and climatic variability/change, the protected areas constitute the last refuge for land animal and plant biodiversity. Their degradation or fragmentation therefore constitutes a serious threat to biodiversity. Despite the ratified international conventions, the NBA Member States find it difficult or are little inclined to increase the size of these protected areas to at least 14% of the national territories. Therefore, the priority actions planned for the achievement of LTEQO 5 will be implemented in all the countries of the basin.

Priority actions

Action 5.1. Review the existing situation in terms of land biodiversity

- Activity E5.1.1. Update knowledge of biodiversity in cross-border protected areas
- Activity E5.1.2. Identify and map land-based ecosystems remarkable for their rich biodiversity and natural wealth

Action 5.2. Develop and implement a regional research program on issues related to land biodiversity in the basin

- Activity E5.2.1. Conduct research on endangered or extinct land-based plant species
- Activity E5.2.2. Conduct research on endangered or extinct land-dwelling wildlife species

Action 5.3. Develop and implement a regional program to restore the land biodiversity of seriously damaged ecosystems

- Activity E5.3.1. Establish a typology of land ecosystems with seriously degraded biodiversity
- Activity E5.3.2. Experiment with effective biodiversity restoration techniques on each type of degraded land ecosystem, in the form of pilot projects

Action 5.4. Develop and implement a regional program for the in-situ and ex-situ conservation of threatened land species and for reintroducing certain extinct species

- Activity E5.4.1. Experiment with the reintroduction of certain species that have disappeared from each major, representative type of land ecosystem, via test projects
- Activity E5.4.2. Promote the creation of a regional zoo for land-dwelling species
- Activity E5.4.3. Create and operationalize a regional gene bank for land-based species

Loss of biodiversity in the wetlands

LTEQO 6. Biodiversity, including genetic biodiversity, of aquatic ecosystems restored and sustainable development mechanism set up

Wetlands are often rare or even unique ecosystems. They are characterized by a high concentration of animal and plant species and constitute the last refuges for many species that are rare or under threat of extinction. The specific forest ecosystems of wetlands (mangrove, gallery forests) constitute important sanctuaries for biodiversity. Certain mammals depend on aquatic environments on a permanent basis (manatee, hippopotamus). The high concentration of fish which characterizes wetlands constitutes the basis of a traditional fishing industry which is often very active. The techniques and systems for managing ichthyologic resources which were designed over the course of history by many communities demonstrate an advanced knowledge of the physical and biological features of wetlands. The implementation of the priority actions identified hereunder in the countries of the basin will enable the fulfillment of LTEQO 7 by 2027.

Priority actions

Action 6.1. Review the existing situation in terms of regional knowledge on biodiversity of wetlands

- Activity E6.1.1. Update knowledge of wetland biodiversity
- Activity E6.1.2. Identify and map aquatic ecosystems remarkable for their rich biological diversity and their natural wealth

Action 6.2. Develop and implement a regional research program on issues related to biodiversity in wetlands the basin

- Activity E6.2.1. Conduct research on endangered and extinct, high-value wetland plant species
- Activity E6.2.2. Conduct research on endangered and extinct flagship wetland wildlife species

Action 6.3. Develop and implement a regional program to restore the biodiversity of seriously damaged ecosystems of wetlands

- Activity E6.3.1. Establish a typology of wetland ecosystems with seriously degraded biodiversity
- Activity E6.3.2. Experiment with effective biodiversity restoration techniques on each type of degraded wetland ecosystem, in the form of pilot projects

Action 6.4. Develop and implement a regional program for the in-situ and ex-situ conservation of threatened wetland species and for reintroducing certain extinct species

- Activity E6.4.1. Experiment with the reintroduction of certain species that have disappeared from each major, representative type of wetland ecosystem, via test projects
- Activity E6.4.2. Promote the creation of a regional zoo for wetland species
- Activity E6.4.3. Create and operationalize a regional gene bank for wetland species

Action 6.5. Develop and implement practices for the sustainable management of aquaculture resources

- Activity E6.5.1. Experiment with techniques for safeguarding and developing endangered aquatic and semi-aquatic wildlife species (hippopotami and manatees), via pilot farms
- Activity E6.5.2. Further strengthen regional cooperation in terms of fishing, through the development of a regional strategy for the integrated management of fisheries
- Activity E6.5.3. Improve the productivity of halieutic resources

Invasive aquatic plant species

LTEQO 7. Reduction of infestation of aquatic plant species to a level that does not impact negatively on aquatic ecosystems and socio-economic activities on the river

The most characteristic invasive aquatic species in the basin are the water hyacinth (*Eichornia crassipes*), the water lettuce (*Pistia stratiotes*) and reeds such as *Typha australis.* The invasion of the river by the proliferation of aquatic plants disrupts the ecological balance, restricts certain economic activities, blocks hydroelectric infrastructures and creates conditions favorable to the development of many disease-carrying aquatic organisms. However, we must not forget that before being invasive and therefore harmful, these species, whether native or introduced, participated fully in the biodiversity of aquatic environments. Thus, the SAP does not aim to eradicate them totally, but rather maintain them at a level where they do not harm either the environment or socio-economic or industrial activities in aquatic environments. As the zones infested by invasive aquatic plant species are located in the basin portions of Burkina, Mali and north Nigeria, the following actions will only concern these countries.

Priority actions

Action 7.1. Review the existing situation in terms of invasive aquatic plant species

- Activity E7.1.1. Review the existing situation in terms of knowledge of invasive aquatic species and of the environments that favor their proliferation
- Activity E7.1.2. Map the spatial distribution and the evolution of areas infested with invasive aquatic plants

Action 7.2. Develop a regional research program on invasive aquatic plant species, and the hydro-chemical and biological conditions of their proliferation

- Activity E7.2.1. Conduct biological research on invasive aquatic plant species
- Activity E7.2.2. Determine the hydro-chemical and biological conditions for the proliferation of aquatic plant species
- Activity E7.2.3. Create a framework for pooling and disseminating research results on invasive aquatic plant species

Action 7.3. Develop and implement a regional program for the integrated control of invasive aquatic plant species

- Activity E7.3.1. Hold experience-sharing workshops on controlling invasive aquatic plant species
- Activity E7.3.2. Use a combination of mechanical (clearing, water weed cutting, manual cutting, etc.) and/or biological controls

Action 7.4. Develop and implement a program to restore the ecology of the infested sites

- Activity E7.4.1. Experiment with techniques to restore the ecology of representative infested ecosystems, via pilot projects

Action 7.5. Promote the socioeconomic value of invasive aquatic plants

- Activity E7.5.1. Train and organize players in exploiting invasive aquatic plant species (compost, bio-gas, livestock fodder, crafts industries, etc.)
- Activity E7.5.2. Set up the organization of sales channels for invasive plant products

Climate variability and change

LTEQO 8. Reduction of basin vulnerability to the problems of climate variability and change

According to the United Nations Framework Convention on Climate Change (UNFCCC), "climate change" should be understand as climate changes which are attributed directly or indirectly to a human activity changing the composition of the global atmosphere and which is in addition to the natural variability of the climate observed during comparable periods. As climatic variability/change is the cause of the most serious environmental problems such as earth degradation, falling water availability and loss of biodiversity, the stakeholders have considered it necessary to include it with the priority environmental problems to be handled by the SAP. Again recently, the analysis of the potential impacts of climate change in Africa indicates that in the Sahara and Sahel drought is likely to worsen. It is also predicted that there will be continuous movements of populations on a large scale, political instability, an increase in diseases and a significant loss at the level of biological diversity.

In the face of these climatic issues, the long-term objective of the SAP is to ensure that the River Niger Basin becomes much more a carbon well than a greenhouse gas emitter, and significantly reduces its level of vulnerability to the impacts of climatic variability/change.

The various projects on a global scale demonstrate the risks linked to climate change, which cannot be neglected in a plan to renovate and develop the basin. The actions are carried out on both an international and domestic level and fulfill two objectives:

- Combat climate change (United Nations Framework Convention; carbon sequestration);
- Adapt to climate change (adaptation of water needs, production systems and economies).

Furthermore, natural risks such as the risk of flooding must be integrated from the design of developments and managed through suitable information systems. Consequently, the priority actions identified to achieve LTEQO 9 will concern all of the countries of the basin.

Priority actions

Action 8.1. Evaluate the basin's vulnerability to climate variability and change

- Activity E8.1.1. Conduct studies on the risks associated with flooding and extreme low-water levels and map at-risk zones
- Activity E8.1.2. Conduct studies on the risks associated with the rising sea level, for the maritime delta and the major coastal cities of the basin
- Activity E8.1.3. Conduct studies on the impacts of climate variability/change on the larger dams
- Activity E8.1.4. Study the vulnerability of the production systems to climate variability and change

Action 8.2. Review the existing situation in terms of the forms of adaptation to climate variability/change, developed by the basin's populations

- Activity E8.2.1. Review the existing situation in terms of the forms of adaptation to climate variability/change, developed by the basin's populations

Action 8.3. Develop and implement measures for adapting production systems to climate variability/change

- Activity E8.3.1. Study the impacts of climate variability/change on production systems
- Activity E8.3.2. Develop and implement measures for adapting to the risks associated with devastating floods
- Activity E8.3.3. Adjust the technical standards applicable to structures, to suit conditions of climate variability/change

Action 8.4. Develop and implement programs to mitigate the effects of climate variability/change

- Activity E8.4.1. Reinforce the "carbon sink" aspect of the basin's ecosystems
- Activity E8.4.2. Reverse land degradation trends by adopting exploitation practices that respect the environment

Loss of the biodiversity of specific wetlands

LTEQO 9. Biodiversity of the wetlands of the Inner Delta, the Middle Niger and the Maritime Delta restored and system for their sustainable development set up

Wetlands constitute one of the most important aspects for preserving biodiversity in the Niger basin. It is in these areas that we find the greatest wealth of species and habitats, and it is also these areas which are most under threat, both by the development of human activities and by climatic variability/change.
In effect, whilst these ecosystems are home to one of the most important ecological riches of the world, this abundance should not hide the very fragile nature of these ecosystems, in particular those of the wetlands, the most important of which in terms of biological diversity are the Inner Delta, the wetlands of the Middle Niger and the Maritime Delta. In fact, their sensitivity is linked to their dependence on the river's hydraulic conditions (water height, flow volume, duration and period of submersion) and also the development of the economic and social human activities which they support. Thus, any action to develop water resources can directly or indirectly impact these ecosystems.
A close connection between preserving these zones and the socio-economic development of the basin is therefore, beyond the SDAP, at the heart of the SAP. In this way, the impact of constructing new dams and their management regulations are the vital results of modeling tools, and in particular of the water resources management model currently being developed by the NBA. The priority actions to be conducted for this LTEQO only concern the wetlands of the Inner Delta, the Middle Niger and the Maritime Delta.

Priority actions
Action 9.1. Develop and implement a research program on the biodiversity of each site

- Activity E9.1.1. Update knowledge of the biodiversity of each wetland
- Activity E9.1.2. Conduct research on high-value endangered and extinct plant and animal species in each wetland
- Activity E9.1.3. Research and develop mitigation measures to counter the impacts of climate variability/change on each wetland

Action 9.2. Develop and implement pilot demonstration programs and projects for site restoration and/or preservation

- Activity E9.2.1. Conduct research on specific indicators addressing the health of the environment in each wetland (migratory birds, specific ichthyofauna, etc.)
- Activity E9.2.2. Identify and map areas at an advanced stage of degradation or with biodiversity under threat, for each wetland
- Activity E9.2.3. Establish a typology of wetland ecosystems with seriously degraded biodiversity

- Activity E9.2.4. Capitalize on conclusive project results and experiment with a participatory pilot project for the restoration and management of resources and biodiversity, on each wetland area
- Activity E9.2.5. Create a system for continuous monitoring of each wetland

Action 9.3. Improve the productivity of wetlands
- Activity E9.3.1. Set up organizations of fisherfolk
- Activity E9.3.2. Carry out extension work on the aquaculture of aquatic wildlife
- Activity E9.3.3. Develop the value of wetland products, including ecotourism

Loss of biodiversity of specific protected areas

LTEQO 10. Biodiversity of the protected areas of the Niger W, Chad and Northern Cameroon restored and system for their sustainable management set up

Following pressure on land for growing crops and raising livestock and poor practices in resources exploitation, along with a worsening climate, the majority of the flora, fauna and ecosystem biodiversity can be found within protected areas. However, in general over the whole basin there appears to be a trend towards reduction, fragmentation and even disappearance.

In Benin for example, a comparative analysis of the satellite images of the portion of the basin showed that from 1972 to 2006, the principal forest formations, that is, gallery forest, dense dry forest, woodland and wooded savanna, as well as savanna with trees and brush, have significantly receded. In particular, gallery forests have reduced by 35% in 34 years and 19% over the last sixteen years. Dry dense forests, for their part, have receded by 29% in 34 years and by 22% in the last sixteen years. Woodlands and wooded savannas have receded at a rate of 38% in 34 years and 26% over the last sixteen years. Savannas with trees and shrubs have receded by 33% in 34 years compared to 22% over the last sixteen years.

For flora diversity, almost everywhere in the basin, a serious threat of migration, or even disappearance of certain plant species has been reported. In the classified forests of Ouémé–Bénou, Alibori Supérieur and Trois–Rivières, the most threatened species are *Khaya senegalensis, Milicia excelsa*, and Isoberlinia doka to a lesser extent.

As for habitats and flora, in recent years land fauna has experienced population decreases whilst many species are threatened, have become rare or have simply disappeared. Thus, currently, throughout the protected areas of north Cameroon, several mammal species are under threat of extinction, such as the addax (Addax nasomaculatus), Barbary sheep (*Ammontragus lervia*), giraffe (*Girafa cameleopardis*), of which the Niger is home to the last West African specimens, ostrich (*Struthio camelus camelus*), etc. In the Binder reserve in Chad for example, amongst the large species, the damaliscus and Derby elk have disappeared. Large predators (lion, leopard, cheetah) can be considered to have disappeared, although the last two species have been spotted on several occasions.

Thus, for the stakeholders, the restoration, conservation and management of the specific protected areas of the W of Niger, Chad and northern Cameroon constitute a major issue which the SAP must tackle. Therefore, the priority actions identified below for the fulfillment of LTEQO 11 will be carried out in these areas.

Priority actions

Action 10.1. Develop and implement a research program on the specific biodiversity of each area

- Activity E10.1.1. Update knowledge of the biodiversity of each protected area
- Activity E10.1.2. Conduct research on high-value endangered and extinct plant and animal species in each protected area

Action 10.2. Operationalize the network of protected areas

- Activity E10.2.2. Create a mechanism for more effective dialogue and exchanges between the administrators, researchers and local communities of protected areas
- Activity E10.2.3. Schedule monitoring activities in a concerted manner between administrators of the same cross-border protected area

Action 10.3. Develop and implement projects for the restoration and/or preservation of each area

- Activity E10.3.1. Identify and map zones at an advanced stage of degradation or with biodiversity under threat, for each protected area
- Activity E10.3.2. Experiment with a pilot project for the participatory restoration and management of resources and biodiversity, for each protected area
- Activity E10.3.3. Capitalize on and implement conclusive project results on the sites concerned
- Activity E10.3.4. Set up a system for continuous monitoring of changes in the biodiversity of each protected area

Action 10.4. Create conditions enabling the protected areas of each site to generate revenue

- Activity E10.4.1. Promote ecotourism
- Activity E10.4.2. Equitably share the resources generated, with the local populations
- Activity E10.4.3. Experiment with the breeding of wildlife species in peripheral zones
- Activity E10.4.4. Create new protected areas for the benefit of local authorities

Deforestation of mountain forest ecosystems

LTEQO 11. Mountain forest ecosystems in Upper Guinea, the Sikasso region and the Bani Basin in Mali, Adamaoua in Cameroon and Northern Benin restored, and system for their sustainable development set up

Since they are home to the sources of watercourses and also protect soils against erosion, the preservation of mountain forest ecosystems in Upper Guinea, Sikasso region and the Bani basin in Mali, Adamaoua in Cameroun and northern Benin, constitutes a challenge for the SAP.

However, all these specific sites are undergoing increasingly acute degradation following tree clearance, bush fires, mining activities and grazing exploitation.

For example, in the northwest of Cameroun, at altitude, the vegetation is dominated by herbaceous plant species such as *Pennisetum purpureum,* leading to the name “Grassfields” generally given to this region. These formations are ideal for livestock.

In Benin, in Ouémé–Bénou, Alibori Supérieur and Trois–Rivières, forests are dispossessed of their most important resources, leaving only trees with no value remaining if they are not cut down by farmers seeking fertile land. The timber cut is then sent to the urban centers of

Kandi, Malanville, Bembéréké, Banikoara and Parakou. The implementation of each of the following priority actions for each of these mountain forest ecosystems will enable the fulfillment of LTEQO 11 by 2027.

Photo GEF-RLWDT/NB (Cameroon, 2010)

Photo GEF-RLWDT/NB (Niger, 2010)

Priority actions

Action 11.1. Develop and implement a research program on the biodiversity of each mountain forest ecosystem

- Activity E11.1.1. Update knowledge of the biodiversity of each mountain forest ecosystem
- Activity E11.1.2. Conduct research on high-value endangered and extinct plant and animal species in each mountain forest ecosystem
- Activity E11.1.3. Conduct research on the replenishment modes and evolution of springheads in each mountain forest ecosystem
- Activity E11.1.4. Conduct research on the impacts of actions to restore the biodiversity of mountain forest ecosystems

Action 11.2. Create a network of mountain forest ecosystems

- Activity E11.2.1. Create a framework for dialogue and exchanges between the administrators, researchers and local communities of mountain forest ecosystems
- Activity E11.2.2. Schedule monitoring activities in a concerted manner between administrators of the same cross-border mountain forest ecosystem

Action 11.3. Develop and implement pilot demonstration projects for the restoration and/or preservation of each mountain forest ecosystem

- Activity E11.3.1. Identify and map zones at an advanced stage of degradation or with biodiversity under threat, for each mountain forest ecosystem
- Activity E11.3.2. Experiment with a pilot project for the participatory restoration and management of resources and biodiversity, for each mountain forest ecosystem
- Activity E11.3.3. Capitalize on and implement conclusive pilot project results on the sites concerned
- Activity E11.3.4. Set up a system for continuous monitoring of changes in the biodiversity of each mountain forest ecosystem

Silting of the river in specific sites

LTEQO 12. Stabilized catchment areas and riverbanks in the Inner Delta in Mali, the Niger Belt, the Middle Niger up to Kainjin in Nigeria, and the Chad portion of the Bénoué Basin

The objective of the Silting Control Program in the Niger Basin (SCP/NB) is to contribute to stemming the process of silting up of the river Niger which hinders agricultural production. Amongst the principal results of the program, we can note the adoption of the Master Plan for Silting Control combined with an Action Plan and Investment Program. This plan was integrated into the Sustainable Development Action Plan (SDAP) for the Niger basin, where it constitutes the foundation of the environmental component. The purpose of the SAP is not to duplicate the actions of the SCP, but rather to reinforce its environmental component by capitalizing on the knowledge and expanding the scope of intervention on specific key sites in the basin, including in particular the Inner Delta in Mali, the Niger Belt, the Middle Niger until Kainji in Nigeria and the Chad portion of the Bénoué basin.

Priority actions

Action 12.1. Review the existing situation in terms of silting levels and plant cover at each site

- Activity E12.1.1. Review the existing situation in terms of basin zones severely degraded by water and wind erosion
- Activity E12.1.2. Update the situation in terms of silting levels and danger of silting of the riverbed at each site

Action 12.2. Develop and implement a program for water and soil conservation and for reforestation of the degraded zones of each site

- Activity E12.2.1. Devise an integrated development plan for water and soil conservation in degraded sub-catchment areas at each site
- Activity E12.2.2. At each site, conduct bank stabilization or dredging actions on severely silted segments and reserves, to restore their flows

Action 12.3. Develop and implement a demonstration program on the sustainable exploitation and management of the site's resources

- Activity E12.3.1. Implement agricultural and pastoral practices causing little degradation of soils and plant cover, in the sub-catchment areas of each site
- Activity E12.3.2. Organize the local communities in natural resource management structures for each sub-catchment area in the site
- Activity E12.3.3. Discourage the plundering of construction materials in the riverbed and the discharge near riverbanks of extraction residue from mines

3.3 Strategic actions and activities related to Institutional and legal reforms

3.3.1. Strategic actions and activities related to reforms to improve the legal framework

Appendix 2 summarizes the actions and activities selected to carry out the reforms of the legal framework necessary for the implementation of the SAP.

SALR-01. Updating and harmonization of the legal framework

The SAP will contribute to the establishment of a legal and institutional framework by acting at two levels: (a) taking measures enabling the effective application of the most relevant provisions of the Water Charter of the River Niger Basin and favoring political dialogue with the riparian States in order to lead them to collaborate in the harmonization, updating and application of their institutional and legal reforms in the fields of environmental protection.
One of the SAP's major challenges is to contribute to the operationalization of the Water Charter to ensure that its most relevant provisions in terms of environmental protection are

effectively applied. The other challenge of the SAP will be to mitigate the potential constraint that could arise from the fact that the texts on environmental protection are highly heterogeneous and in general rarely applied. Finally, the SAP will provide an opportunity for the Member States to complete their legal arsenal in the environmental field.

- Activity J1.1. Disseminate the Environmental Charter (IP/SDAP)
- Activity J1.2. Harmonize the legislative and regulatory texts on transhumance
- Activity J1.3. Harmonize the legislative and regulatory texts on the protection of soils against degradation
- Activity J1.4. Harmonize the legal and institutional framework for water pollution control
- Activity J1.5. Evaluate and harmonize the laws and regulations on pollution control
- Activity J1.6. Harmonize the regulatory and legislative texts on biodiversity conservation in land ecosystems
- Activity J1.7. Harmonize the regulatory and legislative texts on biodiversity conservation in aquatic ecosystems
- Activity J1.8. Develop regulatory and legislative texts on customary environmental law
- Activity J1.9. Develop regulatory and legislative texts on social impact studies
- Activity J1.10. Develop regulatory and legislative texts on strategic environmental assessments
- Activity J1.11. Develop regulatory and legislative texts on plant and animal health safety
- Activity J1.12. Develop regulatory and legislative texts on the protection of aquatic ecosystems
- Activity J1.13. Develop regulatory and legislative texts on the protection of national genetic resources
- Activity J1.14. Develop regulatory and legislative texts on the involuntary displacement/resettlement of populations
- Activity J1.15. Develop regulatory and legislative texts on the prevention and management of biotechnological risks
- Activity J1.16. Initiate in-depth participatory discussions at the basin level, on the ability of current national land laws to ensure sustainable use of the land
- Activity J1.17. Define a legal and institutional framework for the harmonious exploitation and management of forest cover and rangeland
- Activity J1.18. Define a legal and institutional framework for the harmonious exploitation and management of soils
- Activity J1.19. Develop regional water quality standards and implement a regional program for the control and monitoring of water resource quality
- Activity J1.20. Experiment with local land conventions to promote investment in activities for the conservation, protection and sustainable improvement of soil productivity
- Activity J1.21. Finalize and validate the study on the alignment of IWRM at the national and regional levels
- Activity J1.22. Develop and apply the legislation implementing the Water Charter

3.3.1. Strategic actions and activities relating to reforms for the improvement of the institutional framework

Appendix 2 summarizes the actions and activities selected to carry out the reforms of the institutional framework necessary for the implementation of the SAP.

The below proposals aim to pursue and expand on the reforms called for by the SDAP, by including environmental management concerns:

SAIR-01. Continuation and expansion of reforms stipulated in the SDAP

An analysis of players' capacities and of their changing roles was performed for the SDAP, which highlighted the need to enact a number of major institutional reforms, notably including:

- *Creation of a Permanent Technical Committee and of the Regional Advisory Group*, to take on the coordination of decision-making processes pertaining to developments, including contact with financial partners;
- *Establishment of the National Focal Structures*, the key role of which was evident throughout the analysis of the main functions;
- *Creation of the Sub-Basin Committees and support for the reinforcement of fora for user participation (FOREAU, national and regional coordinating bodies, etc.)*;
- *Accelerated set-up of the NBO* with, in parallel to work by external experts, focus of the on-site team on two crucial activities: definition of the zero condition for the basin's environment and institution of procedures to update the data bank on withdrawal information;
- Continuation of efforts to obtain *buy-in on the tools* being developed, particularly the River Management Model.

Activity I1.1. Include environmental management concerns in the SDAP's institutional reforms: Implementation of the SAP will require the continuation and intensification of these reforms, while at the same time expanding some of them to better incorporate issues relating to environmental management.

SAIR-02. Capitalization of relevant experiences

One of the priority tasks of the SAP Management Unit will be to conduct capitalization studies on relevant NBA initiatives and to identify good environmental management practices. The capitalization on and use of the experience accumulated during the GEF project will be one of the first activities performed under the SAP.

Knowledge and lessons learned from these initiatives will greatly assist with the implementation strategies for certain SAP measures, such as silting control, the recovery of degraded land, alternative energy sources to wood, and controlling invasive plants like the water hyacinth and *Sida cordifolia*.

- Activity I2.1. Conduct a capitalization study on NRM experiences in the Niger Basin
- Activity I2.2. Conduct a capitalization study on experience in water hyacinth control
- Activity I2.3. Conduct a capitalization study on experience in *Sida cordifolia* control
- Activity I2.4. Conduct a capitalization study on silting control experience
- Activity I2.5. Conduct a capitalization study on experience in using energy sources alternative to wood
- Activity I2.6. Conduct a capitalization study on experience in recovering degraded land

3.4 Strategic actions and activities related to Stakeholder capacity-building

Appendix 2 summarizes the actions and activities selected for the fulfillment of the stakeholder capacity building measures necessary for the implementation of the SAP.

SCBA-01. Build the capacities of the NBA and of the Niger Basin Observatory

- Activity C1.1. Develop the basin's capacity to obtain climate-related information
- Activity C1.2. Build the NBO's capacities to ensure ecological and aquatic ecosystem biodiversity monitoring
- Activity C1.3. Build the NBO's capacities to ensure ecological and invasive aquatic species monitoring
- Activity C1.4. Build the NBO's capacities to ensure water resource monitoring
- Activity C1.5. Provide the NBO with substantial, regular funding, so that it may fulfill all of its monitoring tasks in relation to water resources and the responses of the environment to the actions

SCBA-02. Strengthening of the framework for the participation of civil society

The SAP is a negotiated document and will be subject to periodic updates. It is therefore essential that civil society, and more broadly the water stakeholders in the River Niger Basin be constantly associated and involved throughout the process for its implementation.

- Activity C2.1. Support the National and Regional Coordination Bodies for Natural Resource Users within the framework of environmental protection and preservation
- Activity C2.2. Develop and implement training/information programs on environmental issues intended for elected officials, administrative and traditional authorities, grassroots community organizations, NGOs, etc.
- Activity C2.3. Promote environmental partnerships between NGOs, governments and the private sector
- Activity C2.4. Disseminate and support the implementation of a public participation strategy developed by the NGO *Eau Vive*
- Activity C2.5 Support the Network of Communicators set up in the States with support from the RLWDT project for its operation;
- Activity C2.6. Provide regular training for journalists, to strengthen environmental journalism and to improve media coverage of environmental topics;
- Activity C2.7. Promote environmental education in elementary, middle and high schools: i) introduction of environmental issues in teaching programs; ii) production and dissemination of teaching manuals and material; iii) training of teachers and of inspectors/educational advisors.
- Activity C2.8. Encourage environmental awareness among administrative and traditional authorities, local elected officials, grassroots community organizations, NGOs and the general public, etc, through: i) the organization of workshops; ii) the organization of debates broadcast on the radio or on television; iii) the instauration of an "Environment Day".

SCBA-03. Strengthening the capacities of the NFSs

- Activity C3.1. Ensure specific training for the members of the national structures on work organization methods (team work, conflict management, etc.).

SCBA-04. Strengthening of the process for involving the scientific community

Despite the numerous studies conducted on the Niger Basin, the TDA study and the formulation of the SAP have demonstrated that their are many gaps in terms of knowledge

in many different domains, either because these domains have not been studied, or because any existing studies are too old or only partial, or because the quality of these studies is insufficient. Consequently, it is important that scientific production in the basin increase and take account of the questions asked by decision-makers, particularly the issues covered by the TDA and the SAP.

- Activity C4.1. Accelerate the process for the setting up and operationalization of the Panel of Experts of the NBA.
- Activity C4.2. Encourage high-level scientific production through the creation of a fund for scientific research at basin level.

SCBA-05. Diversification of revenue sources for the poorest populations

The TDA study made clear the role of humans in the degradation of the Niger basin's ecosystem. It also demonstrated that in many cases, the lack of alternatives pushes the populations to overexploit the natural resources. This therefore gives cause to favor the creation of revenue generating activities as alternatives to the overexploitation of the basin's natural resources.

- Activity C5.1. Create a micro-subsidy fund for community development projects for: the production and marketing of fruit and forest plants; ii) the organization of rural wood markets; iii) the construction of farm ponds and stocking of ponds; iv) the recuperation of degraded land; v) agro-forestry.
- Activity C5.2. Promote alternative, revenue-generating NRM activities: i) recuperation and recycling of plastic packaging; ii) manufacturing of improved domestic burners.

The table in the appendix summarizes the actions and activities selected for the reforms of the legal and institutional frameworks and the capacity building of the stakeholders by 2027.

Photo GEF-RLWDT/NB Project (Cameroon, 2010)

4. SAP FUNDING PLAN

Funding of the SAP is considered via:

- the connection between the SDAP Investment Program (IP) and the SAP Funding Program (FP);
- planning;
- estimated costs;
- partnerships for use of financial and material resources.

4.1 Connection between the IP and the FP

The Investment Program, which is a continuation of the Master Plan for Development and Management under the Sustainable Development Action Plan (SDAP), is one of the main outcomes of the Shared Vision process.

The SDAP's IP, valid through 2027, includes the following three components:

- Component 1: Development of Socioeconomic Infrastructures, in three sections and 11 sub-sections, for an approximate total of FCFA 2,922 billion, some FCFA 754 billion of which for the Priority Five-Year Plan;
- Component 2: Protection of Resources and Ecosystems, in four (4) sections and nine (9) sub-sections, for an approximate total of FCFA 559 billion in total, some FCFA 103 billion of which for the Priority Five-Year Plan;
- Component 3: Player Capacity-Building and Involvement in IWRM, in four (4) sections and eight (8) sub-sections, for an approximate total of FCFA 165 billion in total, some FCFA 48 billion of which for the Priority Five-Year Plan.

The combined total of all the five-year plans is FCFA 3,645 billion.
The main SDAP actions, in budgetary terms, are as follows:

- Feasibility study of major infrastructures and master development plans: Fomi, Taoussa and Kandadji Dams, and set-up of the Niger Office;
- Water Resources Development and Sustainable Ecosystems Management Program;
- Silting Control Program (SCP): diagnostic review and definition of measures to combat the silting phenomenon in the River Niger Basin;
- Niger-HYCOS program;
- Reversing Land and Water Degradation Trends program: establishment of an action plan for cross-border environmental problems;

The SAP's FP considers the actions defined in the Investment Program for the following points, extending these actions to all of the NBA Member States:

- development of water resources and ecosystem management;
- silting control;
- reversing land and water degradation;
- capacity-building.

Focusing as it does on cross-border environmental problems, the SAP's FP does not include major infrastructure investments, such as the major dams that do, conversely, figure in the Investment Program.

4.2 Planning

The SAP's Funding Plan is based on two main concerns: correspondence of the actual launch of the SAP with that of the Investment Program's 2nd Five-Year Plan (FYP2) and creation of a series of activities set out in 3 Five-Year Plans (short-, medium- and long-term), to be completed by 2027. Thus, the last two years of the IP's FYP1 would constitute the SAP's preparatory phase.

Preparatory phase

The preparatory phase (2011-2012) will namely include the following:

- updating of the SDAP/IP integrating the SAP/FP to form the NBA's single investment program on the environment and sustainable development;
- presentation of the unified program to potential Technical and Financial Partners;
- extension of the single program to foster strong support from all stakeholders.

Short-term action plan or 1st Five-Year Plan of the SAP

Based on their chronology during the implementation period, the priority actions have been sub-divided into two groups (Appendix 3), those having to be conducted first to create the conditions that will enable the positive environmental impacts of the subsequent actions. They will be conducted in the short term or under the first Five-Year Plan (FYP1). They focus on:

- reviews of existing situations,
- classification of natural resources,
- capitalization on experience,
- site identification prior to inception operations,
- preparation, implementation and monitoring of demonstration projects,
- preparation of programs and projects.

Medium- and long-term action plans (FYP2 and FYP3) of the SAP

For the target date of 2027, two series of activities will be necessary to add a degree of flexibility to the schedule, whence the creation of the SAP's FYP2 and 3.

These medium- and long-term activities primarily aim to consolidate acquired knowledge and experience and to perform investments to either expand the geographic scope of actions or to intensify them for greater impact.

4.3 Cost estimation

Estimation of the cost of the SAP followed the below stages:

- Parameter definition;
- Estimation of activities;
- Estimation of the costs of the priority actions;
- Estimation of LTEQOs.

All of the parameters of each activity are listed in Appendix 3 with the planning cycle. The main parameters are as follows:

- fees for studies, estimated on the basis of FCFA 100,000/man-day. They concern, in particular, capitalization on experience, the establishment of typologies, capitalization on methods and techniques, reviews of existing situations and the elaboration of development plans;

- study durations varying between 30 and 60 man-days per country;
- the cost of pilot projects varying from FCFA 1 000 000 to 3 000 000 per site;
- the number of action sites;
- the number of micro-projects;
- the number of research centers requiring support;
- the cost of maps, accounting for the land area covered and expenses relating to the creation, processing, analysis, interpretation and elaboration of each map.

4.4 Cost of the SAP

The total cost of the SAP is estimated at FCFA 686 742 840 000, or EUR 1 046 932 711 (Table 3). Funding for the preparatory phase of the SAP is estimated at FCFA 270 000 000 (Appendix 4).

Funding for the three five-year plans is estimated at F CFA 686 472 840 000 (Table 4) Funding for short-term activities is estimated at: FCFA 239 065 952 000. The cost of the SAP's FYP1 is higher, due to the fact that it entails the establishment of baseline situations and preliminary studies. It represents 35% of total funding requirements (Figure 2).

Funding for the medium and long terms is estimated at, respectively, FCFA 224 038 794 000 and FCFA 223 368 094 000 (Appendix 5).

Table 3: Distribution of costs of the preparatory phase for integration of the SAP into the IP/SDAP

Headings	**Main activities**	**COSTS (FCFA)**		
		2011	**2012**	**Total**
Revision of the IP of the SDAP to integrate the SAP	Preparation of ToR	x		
	Consultant recruitment	x		
	Development of the study	150 000 000		150 000 000
Presentation of an NBA Single Investment Plan to the Technical and Financial Partners	Presentation meetings		30 000 000	30 000 000
Organization of national workshops for extension of the NBA Single Investment Plan	Holding of workshops		90 000 000	90 000 000
Total		**150 000 000**	**120 000 000**	**270 000 000**

Table 4: Summary of costs of the LTEQO, reforms and measures for implementation of the SAP

PRIORITY ACTIONS BY LTEQO	TOTAL INDICATIVE COSTS (FCFA) (short, medium and long term)			TOTAL
	FYP1	FYP2	FYP3	
LTEQO 1. The basin's plant cover is restored and a system for the sustainable management of plant formations is set up	162 282 500	160 367 500	157 667 500	480 317 500
LTEQO 2. Productivity of agricultural and pastoral systems improved and system for the sustainable management of soil resources set up	3 708 000	3 600 000	3 600 000	10 908 000
LTEQO 3. Water needs of all users, including ecosystems, covered sustainably and system for the sustainable management of water resources set up	785 000	675 000	675 000	2 165 000
LTEQO 4. Water resource quality at least equal to the WHO's "safe drinking water" standard	867500	652 500	652 500	2 172 500
LTEQO 5. Biodiversity, including genetic diversity, of land ecosystems restored and sustainable management system set up	2 682 000	1 465 000	1 465 000	5 612 000
LTEQO 6. Biodiversity, including genetic biodiversity, of aquatic ecosystems restored and sustainable development mechanism set up	6 000 000	4 962 500	4 962 500	15 925 000
LTEQO 7. Reduction of infestation of aquatic plant species to a level that does not impact negatively on aquatic ecosystems and socio-economic activities on the river	606 887	440 444	440 444	1 487 775
LTEQO 8. Reduction of basin vulnerability to the problems of climate variability and change	9 491 000	9 066 500	9 066 500	27 624 000
LTEQO 9. Biodiversity of the wetlands of the Inner Delta, the Middle Niger and the Maritime Delta restored and system for their sustainable development set	2 477 500	289 000	289 000	3 055 500
LTEQO 10. Biodiversity of the protected areas of the Niger W, Chad and Northern Cameroon restored and system for their sustainable management set up	567 000	538 500	538 500	1 644 000
LTEQO 11. Mountain forest ecosystems in Upper Guinea, the Sikasso region and the Bani Basin in Mali, Adamaoua in Cameroon and Northern Benin restored, and system for their sustainable development	6 809 000	4 675 000	5 875 000	17 359 000

set up				
LTEQO 12. Stabilized catchment areas and riverbanks in the Inner Delta in Mali, the Niger Belt, the Middle Niger up to Kainjin in Nigeria, and the Chad portion of the Bénoué Basin	17 435 000	15 250 000	15 250 000	47 935 000
Reforms for the improvement of the legal framework	2 299 465	29 450	294 50	2 358 365
Reforms for the improvement of the institutional framework	845 100	67 900	789 200	1 702 200
Capacity building	22 084 500	21 834 000	21 942 000	65 860 500
TOTAL COST	**239 065 952**	**224 038 794**	**223 368 094**	**686 472 840**

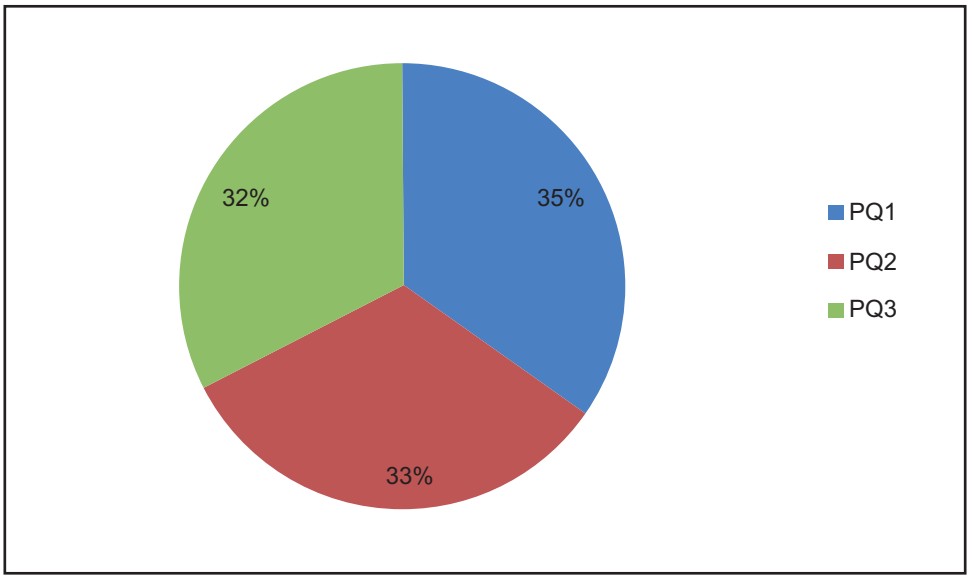

Figure 3: Distribution of the SAP's funding costs, in the short, (PQ1>FYP1), medium (PQ2>FYP2) and long terms (PQ3> FYP)

4.5 Partnership for the mobilization of the financial and material resources

As with the NAPs, this financial estimate, a summary for which is presented in the table below, mainly aims to provide an idea of the cost of the SAP, which should be clarified in a feasibility study prior to its operational implementation. For the following reasons, the estimate has been based on indicative data only:

- National reports have shown that discussions with the stakeholders on the funding requirements of the NAPs have been laborious;
- Estimates covering lengthy periods have limitations, associated in particular with uncertainties as to price fluctuations.

Efforts must be made in the short-term to respond to the urgent need to resolve environmental problems.

Funding for the actions set out in the SAP **will be raised from many diverse, yet complementary, players**, including States, the private sector in the NBA Member States, and Development Partners, including INGOs. To obtain these funds, the SAP will need to be presented at a Round Table, and then explained in workshops, in order to foster strong support from all of the stakeholders.

New funding mechanisms, such as the Carbon Fund, should also be solicited.

Fund-raising among these various sources will need to be performed in **a concerted manner** with the Niger Basin Authority.

For the sake of consistency, financial contributions from the States will be made via the NBA.

Contributions from the countries' private sectors should also be considered, to bolster State efforts to resolve costly environmental problems. NGOs active in the field of environmental

protection and the sustainable use of natural resources should be targeted in particular.

With regard to external funding, the NBA's and the States' lobbying of their Technical and Financial Partners will cover the significant progress made by all countries and the NBA toward environmental management and, especially, integrated water resource management.

The main Technical and Financial Partners that could allocate material and financial resources are the following:

- Canadian International Development Agency;
- French Development Agency;
- World Bank;
- African Development Bank;
- Arab Bank for Economic Development in Africa;
- Islamic Development Bank;
- ECOWAS Bank for Investment and Development;
- European Commission;
- Kuwait Fund for Arab Economic Development;
- OPEC Fund for International Development;
- Saudi Fund for Development;
- Abu Dhabi Fund for Development;
- Member States;
- Global Environment Fund;
- Private sector
- African Union

5. THE ENVIRONMENTAL MONITORING AND EVALUATION SYSTEM

The mechanism and system for monitoring/evaluation (M&E) of the SAP must, first and foremost, be aligned with the goals of the NBO, and in particular, Goals 1, 2 and 3:

- Goal 1: To monitor the evolution of the basin, in terms of its various components (hydrological, environmental, human, socioeconomic, etc.);
- Goal 2: To produce periodic information on the basin's development;
- Goal 3: Cross-functional goal: To build the capacities of the departments at the NBA and its partners.

As a result, they must also take inspiration from the conclusions and proposals of the report on the study for operationalization of the Niger Basin Environmental Observatory (May 2010), which addressed the following in particular:

- identification of the NBO's benchmark indicators;
- baseline positions of the NBO's indicators;
- the data underlying these indicators;
- identification of the global model for the EIS.

The study proposed a list of 117 indicators, divided into four domains:

- 19 hydrological indicators;
- 35 environmental indicators;
- 38 economic indicators;
- 25 socioeconomic indicators.

Of these 117 indicators, only 24 were deemed to be priorities:

- 3 hydrological indicators;
- 13 environmental indicators;
- 5 economic indicators;
- 3 socioeconomic indicators.

The indicators monitoring the LTEQOs will be used to supplement and operationalize those selected in the aforementioned study as priority environmental indicators.

M&E of the SAP should also take inspiration from the monitoring/evaluation manual for the IP, developed in 2008. To this end, it should, from the outset, be considered in a medium-term perspective, in which the Investment Program and its M&E system will be separated from project and program practices (donor-based), to be able to evolve toward implementation of the IP as the NBA's single program. The evolution of institutional arrangements will, therefore, enable a switch from a "project/donor" focus to implementation modeled on the thematic organization of the IP, as presented in its components, sections and sub-sections. In this way, the general provisions for implementation of the various aspects of institutional organization of the SAP's M&E will espouse those of the IP's M&E, so as to fulfill the information requirements of the same categories of people/institutions.

The SAP's M&E system will entail several different levels of management and coordination within the NBA and its Member States. As a result, its tools and procedures will need to be developed via a participatory approach, to ensure buy-in by all stakeholders. In this respect, recommendations at this stage of development of the SAP must be limited to outlining the system, leaving detailed definitions open to future negotiations and discussions. For this reason, conduct of a study at inception of the SAP is suggested, to outline the M&E system and to evaluate resource requirements in greater detail.

The below list of monitoring indicators is provided as a provisional suggestion.

Table 5: List of monitoring indicators for the LTEQOs

LTEQO	Monitoring indicators
LTEQO 1. The basin's plant cover is restored and a system for the sustainable management of plant formations is set up	*Degraded forest areas treated*: areas under plant cover stripped through erosion and recovered with the aid of SWC (soil and water conservation) and DRS (soil restoration and protection) techniques and re-planted, forest formations cut down and replanted.
	Primary productivity (biomass/ha) of grazing pasture: this indicator is very relevant for monitoring the herbaceous and tree cover of grazing land.
	Productivity of factors in agricultural sectors: makes it possible to measure the effectiveness of actions undertaken to improve agricultural productivity in terms of additional production obtained per unit of inputs (kg of cereal grains per kg of fertilizer, weight of harvest per liter of irrigation water) and yield (weight harvest/surface area unit). This is a robust indicator for which data is quite easy to supply.
	Rate of degradation of forest formations: indicates the extent of the effort made in terms of reducing degradation of plant cover.
	Load level of livestock on grazing land in the basin compared to load capacity: assesses the effect of the action to adapt the livestock load to the productivity of grazing land.
	Proportion of forests under community management: measures the extent to which local communities are responsible for restoring and managing plant formations.
LTEQO 2. Productivity of agricultural and pastoral systems improved and system for the sustainable management of soil resources set up	*Productivity of factors in agricultural sectors:* makes it possible to measure the effectiveness of actions undertaken to improve agricultural productivity in terms of additional production obtained per unit of inputs (kg of cereal grains per kg of fertilizer, weight of harvest per liter of irrigation water) and yield (weight harvest/surface area unit). This is a robust indicator for which data is quite easy to supply.
	Primary productivity (biomass/ha) of grazing pasture: this indicator is very relevant for monitoring the herbaceous and tree cover of grazing land.
	Surface areas of developed drainage basins/degraded surface area: monitoring of the effort to develop drainage basins where the soils are degraded can be carried out on the basis of diachronic studies with the assistance of satellite images.

	Land under agro-forest parks/cultivated surface area: this indicator measures, in a production system with low input level, the effort to improve soil fertility and its protection by plant cover against degradation.
LTEQO 3. **Water needs of all users, including ecosystems, covered sustainably and system for the sustainable management of water resources set up**	*Number of water reservoirs*: The number of water reservoirs (dams, hillside dams, etc.) is a fairly reliable indicator of the availability of water for different uses.
	Surface areas irrigated efficiently/total irrigated surface area: water withdrawals for irrigation needs increasing in relation to the development of dam projects in the basin, the efficiency of water use in irrigated areas, i.e. the supply of water to the plant with the lowest possible loss would in principle increase the availability of water; collecting data for such an indicator, which only requires collection of the irrigated surface areas with water-saving irrigation systems and those irrigated overall, should not pose major problems.
	Rate of actual water allocation by use/reference rate: the model for allocation of the basin's water resources for different uses from large structures being almost finalized, monitoring this indicator over time will constitute a sufficiently reliable measurement of the availability of water from the structures.
LTEQO 4. **Water resource quality at least equal to the WHO's "safe drinking water" standard**	*Dissolved oxygen*: the presence of oxygen in water is due to the diffusion of oxygen on the surface, the aeration of the water by rapid movement and photosynthesis. Its presence guarantees water quality and is a necessary element for developing any form of aquatic life.
	pH: a pH around the neutral point is a good indicator of non-toxicity and enables the protection and helps the survival of freshwater organisms.
	Temperature: the optimum living and reproduction conditions for aquatic organisms oscillate between natural seasonal fluctuations. Any change to the water temperature outside this range presents a risk threatening the survival of fish and other aquatic organisms as it affects the solubility of oxygen.
	Electric conductivity: conductivity in water affects the productivity and survival of cultivated plants; high conductivity is an indicator of high salinity of the water.
	Turbidity of the water expressed as the quantity of matter suspended in water gives information on the penetration of light into the water and therefore on the photosynthesis aptitude of plants and the behavior of certain aquatic animal species. This indicator also gives information on the erosive capacity of water and the speed of silting of reservoirs.

	Water nutrient load: a high load in the water of phosphorous and nitrogen, generally from fertilizers, favors the proliferation of certain plant species (green algae) which harm aquatic life (by eutrophication).
	Pesticide load: downstream of the major irrigated areas and chemical industries, waste rich in pesticides harm the water quality; with the trend towards development of large irrigated areas and industrial development in the basin, the relevance of such an indicator is obvious.
	Heavy metal load: at high concentrations in water, heavy metals from mining and industrial pollution are very dangerous to health.
	Bacteriological load: this indicator measures the load of pathogenic bacteria in the water.
LTEQO 5. Biodiversity, including genetic diversity, of land ecosystems restored and sustainable management system set up	*Diversity of species of fauna and flora*: corresponds to specific diversity or the diversity of animal and plant species in an ecosystem. Each group defined can then be characterized by the number of species making it up.
	Number of individuals/species: expresses the population of a given species and characterizes the concept of abundance/dominance of a species in an ecosystem.
	Surface area of restored ecosystems/degraded surface area: measures the effort to restore degraded ecosystems and can be facilitated by the use of a GIS.
	Participation of local communities in the management of protected areas: the best gauge of sustainability of actions to restore and manage protected areas is for local communities to participate and be given responsibility. This indicator therefore makes it possible to predict the level of sustainability of actions to manage protected areas. Furthermore, within the framework of the implementation of decentralization policies, it makes it possible to measure the communities' commitment to creating, protecting and managing new areas.
LTEQO 6. Biodiversity, including genetic biodiversity, of aquatic ecosystems restored and sustainable development mechanism set up	*Number of days of flooding of wetlands/average number of days of flooding in the 1960s:* the largest water shortages (drought, evaporation, excessive withdrawals, climatic variability/change) have been recorded since the 1970s, and have heightened since then; thus, assessment of actions to improve water availability can validly use the situation of the 1960s as a reference, especially as reference data on wetlands of international importance exist.
	Diversity of species of fauna and flora: corresponds to specific diversity or the diversity of animal and plant species in an ecosystem. Each group defined can then be characterized by the number of species making it up.

	Number of individuals/species: expresses the population of a given species and characterizes the concept of abundance/dominance of a species in an ecosystem.
	Surface area of restored ecosystems/degraded surface area: measures the effort to restore degraded ecosystems and can be facilitated by the use of a GIS.
	Participation of local communities in management of wetlands: a wide variety of systems and instruments designed and manufactured locally are adapted to the different hydrological phases or enable the capture of very specific species. The involvement of local communities in managing wetlands is therefore a relevant indicator for the use and management of wetlands.
	Fishing catch volumes: makes it possible to monitor actions to improve the productivity of wetlands.
LTEQO 7. Reduction of infestation of aquatic plant species to a level that does not impact negatively on aquatic ecosystems and socio-economic activities on the river	*Spatial cover of invasive aquatic plants*: the surfaces occupied by invasive aquatic plants, particularly those which may occur along the river (water hyacinth and lettuce) fluctuate significantly: either vast inextricable masses, or isolated individuals occurring along the river. Whilst this indicator is reliable for fixed species (*Typha australis* for example), it is therefore much less so for water hyacinth and lettuce.
	Income drawn from the economic use of invasive plants: traditionally, Typha stems are plaited to cover hut roofs or create enclosures around dwellings. Today, the water hyacinth and lettuce are often used as raw materials to provide compost or biogas. All of these activities, whilst limiting the population of invasive aquatic plants, generate income for communities.
	Diversity of species of fauna and flora: corresponds to specific diversity or the diversity of animal and plant species in an ecosystem. Each group defined can be characterized by the number of species making it up.
	Number of individuals/species: expresses the population of a given species and characterizes the concept of abundance/dominance of a species in an ecosystem.
	Fishing catch volumes in affected zone: makes it possible to monitor the actions to improve the productivity of wetlands.

LTEQO 8. Reduction of basin vulnerability to the problems of climate variability and change	*Frequency of extreme climatic phenomena*: the frequency of extreme climatic phenomena (drought, flooding, frosts, heat waves, storms etc.) is one of the most reliable indicators of climatic variability/change. However, monitoring it requires a permanent prediction and modeling mechanism and the implementation of a disaster warning and management system.
	Extent of damage: like earthquakes and their consequences such as tsunamis, the extent of damage on a scale of their severity may make it possible to measure the level of severity of the impacts of climatic variability/change.
	Irrigated surface area/cultivated surface area: this indicator measures the degree of adaptation of agricultural production systems to climatic variability/change. It measures the degree of relative independence of agricultural production compared to crops relying solely on rainfall, which are therefore more sensitive to climatic variability/change.
	Areas treated by SWC (soil and water conservation) techniques/works: Measures populations' efforts of adaptation.
LTEQO 9. Biodiversity of the wetlands of the Inner Delta, the Middle Niger and the Maritime Delta restored and system for their sustainable development set up	Income per inhabitant: indicator measuring the quality of life.
	Number of days of flooding of wetlands/average number of days of flooding in 1960s: the largest water shortages (drought, evaporation, excessive withdrawals, climatic variability/change) have been recorded since the 1970s, and have heightened since then; thus, assessment of actions to improve water availability can validly use the situation of the 1960s as a reference, especially as reference data on wetlands of international importance exist.
	Diversity of species of fauna and flora; corresponds to specific diversity or the diversity of animal and plant species in an ecosystem. Each group defined can then be characterized by the number of species making it up.
	Number of individuals/species: expresses the population of a given species and characterizes the concept of abundance/dominance of a species in an ecosystem.
	Surface area of restored ecosystems/degraded surface area: measures the effort to restore degraded ecosystems and can be facilitated by the use of a GIS.
	Participation of local communities in the management of wetlands: measures efforts to associate communities in ecosystem management activities.
	Fishing catch volumes: measures the average quantity of fish caught by fisherfolk; it makes it possible to evaluate the availability of resources.
LTEQO 10. Biodiversity of the protected areas of	*Diversity of species of fauna and flora;* corresponds to specific diversity or the diversity of animal and plant species in an ecosystem. Each group defined can then be characterized by the number of species making it up.
	Number of individuals/species: expresses the population of a given species and characterizes the concept of

the Niger W, Chad and Northern Cameroon restored and system for their sustainable management set up	abundance/dominance of a species in an ecosystem.
	Surface area of restored ecosystems/degraded surface area: measures the effort to restore degraded ecosystems and can be facilitated by the use of a GIS.
	Participation of local communities in the management of protected areas: measures efforts to associate communities in protected area management activities.
	Number of joint surveillance outings.
	Number of livestock farms.
LTEQO 11. Mountain forest ecosystems in Upper Guinea, the Sikasso region and the Bani Basin in Mali, Adamaoua in Cameroon and Northern Benin restored, and system for their sustainable development set up	*Diversity of species of fauna and flora;* corresponds to specific diversity or the diversity of animal and plant species in an ecosystem. Each group defined can then be characterized by the number of species making it up.
	Number of individuals/species; expresses the population of a given species and characterizes the concept of abundance/dominance of a species in an ecosystem.
	Surface area of restored ecosystems/degraded surface area: measures the effort to restore degraded ecosystems and can be facilitated by the use of a GIS.
	Participation of local communities in the management of mountain forest ecosystems: measures efforts to associate communities in activities for the management of mountain forest ecosystems.
LTEQO 12. Stabilized catchment areas and riverbanks in the Inner Delta in Mali, the Niger Belt, the Middle Niger up to Kainjin in Nigeria, and the Chad portion of the Bénoué Basin	*Surface areas of restored drainage basins/eroded surface area:* measures the effort to restore degraded drainage basins and can be facilitated through the use of a GIS.
	Minimum water flow supply rate: as structures should in principle be designed to ensure minimum water flows downstream capable of satisfying uses and ensuring the dilution of pollutants and the renewal of dissolved oxygen, the level of supply of such a volume during low water level periods constitutes an excellent indicator for regulation of the hydrological regime.
	Number of sandbanks on the riverbed: makes it possible to measure de-silting actions and can be facilitated by using a GIS.
	Turbidity of the water expressed as the quantity of matter suspended in water gives information on the penetration of light into the water and therefore on the photosynthesis aptitude of plants and the behavior of certain aquatic animal species. This indicator also gives information on the erosive capacity of water and the speed of silting of reservoirs.

Table 6: List of monitoring indicators for legal and institutional reforms and for stakeholder capacity building measures

Area	Indicators
Reforms of the legal and institutional framework	The Environmental Charter (IP/SDAP) is disseminated
	The legislative and regulatory texts on transhumance are harmonized
	The legislative and regulatory texts on the protection of soils against degradation are harmonized
	The legal and institutional framework for water pollution control is harmonized
	The laws and regulations on pollution control are evaluated and harmonized
	The regulatory and legislative texts on biodiversity conservation in land ecosystems are harmonized
	The regulatory and legislative texts on biodiversity conservation in aquatic ecosystems are harmonized
	Number of regulatory and legislative texts developed on customary environmental law
	Number of regulatory and legislative texts developed on social impact studies
	Number of regulatory and legislative texts developed on strategic environmental assessments
	Number of regulatory and legislative texts developed on plant and animal health safety
	Number of regulatory and legislative texts developed on the protection of aquatic ecosystems
	Number of regulatory and legislative texts developed on the protection of national genetic resources
	Number of regulatory and legislative texts developed on the involuntary displacement/resettlement of populations
	Number of regulatory and legislative texts developed on the prevention and management of biotechnological risks
	In-depth participatory discussions initiated at the basin level, on the ability of current national land laws to ensure sustainable use of the land
	Legal and institutional framework defined for the harmonious exploitation and management of forest cover and rangeland
	Legal and institutional framework defined for the harmonious exploitation and management of land
	Number of regional water quality standards developed and regional programs implemented for the control and monitoring of water resource quality
	Number of local land conventions tested to promote investment in activities for the conservation, protection and sustainable improvement of soil productivity
	Study on the alignment of IWRM at the national and regional levels finalized and validated

	Legislation implementing the Water Charter developed and enforced
Capacity building	**Strengthening of the process for involving the scientific community**
	Amount of funding mobilized to enable the NBO to fulfill all of its monitoring tasks in relation to water resources and the responses to the actions
	Panel of Experts or NBA Permanent Technical Committee set up and operational
	Number of high level works published
	Number of scholarships awarded
	Number of prizes awarded
	Number of theses published
	Strengthening of the framework for participation of the NBO
	Number of members of the national structures for the collection and management of data on water resources having received specific training
	The basin's capacity to obtain climate-related information developed
	The NBO's capacities to ensure ecological and aquatic ecosystem biodiversity monitoring strengthened
	The NBO's capacities to ensure ecological and invasive aquatic species monitoring strengthened
	The NBO's capacities to ensure water resource monitoring strengthened
	The Regional Coordination Body for Natural Resource Users boosted
	Number of training/information programs on environmental issues for elected officials, administrative and traditional authorities, grassroots community organizations, and NGOs developed and implemented
	Public participation strategy developed by the NGO *Eau Vive* disseminated and implemented
	Network of Communicators set up in the States with RLWDT project backing, supported in its operation
	Number of training sessions for journalists, to strengthen environmental journalism and to improve media coverage of environmental topics
	Number of journalists trained, in order to strengthen environmental journalism and to improve media coverage of environmental topics
	Number of school teaching manuals produced and disseminated
	Amount of educational material disseminated

	Number of teachers trained
	Number of inspectors/educational advisors trained
	Number of elementary schools reached
	Number of high schools reached
	Strengthening of the framework for the participation of civil society
	Number of information workshops organized for administrative authorities
	Number of people trained
	Number of information workshops organized for traditional authorities
	Number of people trained
	Number of information workshops organized for elected representatives
	Number of people informed
	Number of information workshops organized for community organizations
	Number of people informed
	Number of information workshops organized for NGOs
	Number of people informed
	Number of information workshops organized for the general public
	Number of televised debates organized
	Number of people reached
	Number of debates broadcast on the radio
	Number of people reached
	Number of days organized
	Number of Member States having established an “Environment Day”
	Diversifying revenue sources for the poorest populations
	Number of community projects developed and implemented
	Number of people involved in community development projects
	Amounts of funding mobilized for micro-subsidies
	Number of community projects developed and implemented
	Number of people involved in RGAs
	Amounts of funding mobilized for RGAs

5.1 General arrangements for implementation

The planned organization used for implementation of the IP will be expanded at the time of implementation of the SAP. This new organization will be as follows:

- The Regional Steering Committee will be expanded to cover all actions that will be implemented under the Investment Program. The RSC executes the decisions made by the Council of Ministers, the body that will steer and monitor implementation of the SAP;
- The NBA will be the coordinating and implementing agency of the SAP. It will implement SAP activities as it does IP activities, in the name of the nine Members States;
- Implementation of the SAP will be performed by the Technical Department of the Executive Secretariat of the NBA, via its Operations Division;
- The NBA, via the Executive Secretariat, will sign memoranda of understanding with the national ministries in charge of the National Implementing Agencies (NIAs);
- The Niger Basin Observatory will:

- in the short-term, be mainly responsible for evaluation, with monitoring being performed by the Regional Coordinating Bodies,
- in the medium-term, with implementation of the program approach, be capable of coordinating the entire M&E system.

5.2 Data collection

The SAP's monitoring-evaluation system will use data from several sources:

- **Data from local communities:** The local communities will also be involved in the monitoring-evaluation of the SAP. Indeed, given the SAP's participatory nature, ecological monitoring and technical and institutional evaluations are insufficient; only participatory evaluation will make it possible to supply the crucial negotiations between managers of the SAP and the local populations, territorial authorities, state bodies and civil society. The participatory evaluation will enable the populations to give their perspective and opinion on the SAP's activities.
- **Data from the services of the Member States:** In the countries, thematic groups under the coordination of the National Focal Structure ensure the collection and management of data transmitted by extranet to the NBO.
- **Data from the regional level of the NBA:** This level of monitoring is crucial given the cross-cutting and cross-border nature of the SAP's actions. The SAP database will be coordinated and connected to that of the NBO. It will complement, in the areas of environmental management, the other databases already connected to the NBO database (Hycos DB; silting DB; GEF DB, etc.).
- **Data from regional organizations:** Regional organizations, such as AGRHYMET, the ACMAD, the OSS, the IRD, and the ECOWAS, have databases that are generally well documented and managed. They can provide a contribution, even if the geographical framework of their production does not correspond to that of the NBA.
- **Data from global organizations:** Information produced by global organizations generally adopts spatial integration units (SIU) on a national scale. Using these organizations' web sites, or even subscribing to specialized reviews or databases, could provide added value in the monitoring of environmental macro-indicators.

The main sources of information (data) used by the SAP's M&E system will be:

- Scorecards / monitoring records;
- Quarterly and annual activity reports;
- Annual work schedules and budgets;
- Technical and financial monitoring forms;

- Financial monitoring reports;
- Audit reports;
- Basic and specific surveys;
- Assessment reports (environmental impact);
- General and specific studies;
- Consultation reports;
- Mission / field visit reports;
- Village development / land management plans;
- Chemical / biological / hydrological laboratory reports;
- Maps and aerial / satellite photographs;
- Legal / implementing texts and decrees.

5.3 Programming and reporting

Scheduling and reporting for the Funding Program will feed upward, following the below main steps:

1. The M&E Focal Points and M&E agents at the project/program bodies will gather the raw data and send it to the NIAs;
2. At the NIAs, the collected information will be stored, compiled, processed, analyzed and periodically converted into scheduling and monitoring documents, work schedules, scorecards and quarterly and annual reports;
3. From the NIAs, the information prepared and documents produced will be sent to the NFSs;
4. The NFSs will process and store the information, supplement the documents with any secondary information they may have and validate them or obtain their validation;
5. After validation, the documents (quarterly and annual activity reports, annual work schedules and budgets) will be sent to the ES/NBA, where the Regional Coordinating Bodies, working closely with the NBO, will develop their regional work plans, budgets and activity reports.

GENERAL CONCLUSION

The present SAP (Strategic Action Program) is the end product of the FEM project, Reversing Land and Water Degradation in the River Niger Basin, implemented by the NBA for the purpose of ensuring economic, social and environmental security through the establishment of global, integrated water resource management and optimal, sustainable use of all of the basin's resources.

On the basis of past work (in this case, the Regional Summary of the TDA, adopted in Bamako in 2009, and the NAP reports), causal and impact analyses grouped the priority cross-border environmental issues in the following three main categories:

- ***High-priority cross-border environmental issues*** (i.e. environmental problems with the most worrisome scope): degradation of plant cover and soil degradation. Consequently, at the basin level, land degradation is the highest-priority cross-border environmental issue;
- ***Medium-priority cross-border environmental issues*** (broad scope): first, the degradation of water resources seen in their decreasing availability and quality and in the modification of the hydrological system and, second, the loss of land-based plant and animal biodiversity;
- ***Low-priority cross-border environmental issues*** (small scope): degradation of biodiversity in wetlands and invasive species of aquatic plants. It should, however, be noted that, although these problems are localized, they will tend to spread and worsen fairly quickly, as dams are built, intensive irrigated agriculture is developed, urban demographics expand and industrial activities along the main trunk of the river increase.

Because the cross-cutting problem of climate variability/change has considerable socioeconomic consequences that will define the practices of the basin's populations, the present SAP has incorporated the issue as one of the basin's priority environmental issues.

Added to this cross-cutting issue are problems specific to sites with unusually diverse ecosystems and/or that are exceptionally rich in natural resources. These sites were analyzed in terms of the following issues:

- *Loss of biodiversity* in the wetlands of the Inner Delta, Middle Niger and Maritime Delta, in protected areas west of the river, in Chad and in the North;
- *The deforestation of mountain forest ecosystems* in Upper Guinea, the Sikasso region and the Baní Basin in Mali, Adamaoua in Cameroon, and Northern Benin;
- *Silting of the river* in the Inner Delta in Mali, the Niger Belt, the Middle Niger up to Kainji in Nigeria, and the Chad portion of the Bénoué Basin.

These analyses were used to develop the Shared Vision for 2027: "**By 2027, the countries of the basin will use and manage its natural resources in a sustainable and concerted manner, and in an environment conducive to human development."** Based on this vision, twelve (12) LTEQOs were defined, as a function of the environmental issues included in the high-, medium- and low-priority categories.

However, the actual fulfillment of the different activities to achieve the LTEQOs will require a reform of the institutional and legal framework for environmental and natural resource management, capacity-building measures for the stakeholders, and substantial funding. As a result, the total cost of the activities has been estimated at FCFA 686 742 840 000, or EUR 1 046 932 711. This financial estimate will need to be refined in a feasibility study, prior to operational implementation.

The urgent resolution of environmental issues must be a priority in the fund-raising mechanisms employed with players such as the States, the private sectors of the NBA Member States, and Development Partners, including International NGOs. Likewise, new funding mechanisms, such as the Carbon Fund and the Basin's Fiduciary Fund, should also be solicited. It will be necessary to share the present document (SAP) at a Round Table, to encourage strong buy-in by all stakeholders in the Basin's sustainable development process.

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4. *Etude d'impact environnemental et social du projet de barrage de Fomi, Plan de Gestion Environnementale et sociale* [Environmental and social impact study of the Fomi dam project, Environmental and Social Management Plan], June 2009
5. *Etudes multisectorielles nationales (9) de la Vision Partagée* [National multisectoral studies (9) on the Shared Vision];
6. Training module on the TDA/SAP approach in the International Water Programme of the GEF;
7. *Programme d'Investissement du Plan d'Action de Développement Durable* (PADD) [Investment program of the Sustainable Development Action Plan (SDAP)], February 2008
8. *Programme Kandadji de Régénération des Écosystèmes et de Mise en valeur de la vallée du Niger - Étude d'impact environnemental et social détaillée*
9. *Rapport de l'Analyse Diagnostique Transfrontalière (ADT) préliminaire du Bassin du Fleuve Niger faite pendant la phase préparatoire du projet* (PDF-Bloc B) [Preliminary Transboundary Diagnostic Analysis Report on the River Niger Basin conducted during the preparatory phase of the project] (2001)
10. *Rapport de la phase 1 du Plan d'Action de Développement Durable* (PADD) [Report of phase 1 of the Sustainable Development Action Plan (SDAP)]
11. *Rapport de la phase 2 du Plan d'Action de Développement Durable* (PADD) [Report of phase 2 of the Sustainable Development Action Plan (SDAP)]
12. *Rapport de la synthèse régionale de l'ADT du bassin du Niger* [Regional summary report of the TDA of the Niger basin], February 2009
13. *Rapport synthèse régionale du Bilan-diagnostic régional* [Regional summary report of the regional diagnostic-assessment], December 2006
14. *Rapports nationaux des Bilans diagnostics de lutte contre l'ensablement* [National reports on the diagnostic assessments of silting control];
15. *Rapports nationaux des schémas directeurs de lutte contre l'ensablement* [National reports of silting control master plans]
16. Rapports nationaux du Plan d'action national (PAN) [National reports of the National Action Plan (NAP), May 2010
17. *Rapports nationaux en vue de la réalisation de l'ADT du bassin du Niger* [National reports in view of conducting the TDA of the Niger basin];
18. *Synthèse régionale des études multisectorielles de la Vision Partagée* [Regional summary of the multi-sectoral reports of the Shared Vision].

APPENDICES

Appendix 1. Summary table of the LTEQOs, priority actions, activities and targets of the LTEQOs

LTEQOs, ACTIONS AND ACTIVITIES	TARGET OF THE LTEQO
LTEQO 1. The basin's plant cover is restored and a system for the sustainable management of plant formations is set up	All countries
Action 1.1. Monitor evolutionary trends in forest cover and rangeland	
Activity E1.Activity E1.1.1 Produce baseline maps of the state of forest stands and rangeland	
Activity E1.Activity E1.1.2 Repeat the mapping process every 5 years	
Action 1.2. Develop and implement programs and projects to restore degraded ecosystems	
Activity E1.Activity E1.2.1. Identify and locate highly-degraded forest stands and pastoral rangeland	
Activity E1.Activity E1.2.2. Capitalize on experience in the restoration of degraded forest stands and rangeland	
Activity E1.Activity E1.2.3. Implement the most appropriate restoration actions	
Action 1.3. Capitalize on domestic energy strategy experience based on participatory forest development with a view to sustainable supply of fuel wood and other sources of alternative energy	
Activity E1.Activity E1.3.1. Strengthen research on new and renewable energies	
Activity E1.Activity E1.3.2. Conduct a capitalization study on experience in participatory forest development	
Activity E1.Activity E1.3.3. Create community forests and ensure their management	
Activity E1.Activity E1.3.4. Promote the use of solar energy	
Activity E1.Activity E1.3.5. Promote the use of bio-gas	
Activity E1.Activity E1.3.6. Make electrical power more accessible	
Activity E1.Activity E1.3.7. Promote the sale of carbon sequestration credits within the framework of the Clean Development Mechanism	
Action 1.4. Develop and implement reforestation programs and projects	
Activity E1.Activity E1.4.1. Experiment with the use of reforestation methods and techniques that take the characteristics of the environment into account	
Activity E1.Activity E1.4.2. Implement reforestation operations on land that is the most vulnerable to erosion	

LTEQO 2. Productivity of agricultural and pastoral systems improved and system for the sustainable management of soil resources set up	All countries
Action 2.1. Review the existing situation in terms of type and extent of soil degradation	
Activity E2.1.1. Create maps of land use units	
Activity E2.1.2. Cross-reference different criteria to classify soil by severity of degradation	
Action 2.2. Develop and implement soil development programs based on their aptitudes, constraints and purpose/ affectation	
Activity E2.2.1. Classify soil by its aptitudes, constraints and planned farming system	
Activity E2.2. 2. Test development methods for each of the major soil types cultivated and major types of rangeland, in the form of pilot projects	
Action 2.3. Capitalize on and promote the best practices, techniques and modern technology for water and soil restoration and conservation	
Activity E2.3.1. Conduct a capitalization study on SWC/SDR methods and techniques	
Activity E2.3.2. Using the experience of the SCP as an example, develop and promote integrated catchment area protection actions	
Activity E2.3.3. Conduct extension work on agroforestry and conservation agriculture practices on farms	
Action 2.4. Develop a regional soil reference system and ensure it is regularly supplied with data	
Activity E2.4.1. Create a regional group of cartographers and soil specialists to design a soil reference system for the basin and feed it with data	
Activity E2.4.2. Ensure that the think tank for the soil reference system is operational	
LTEQO 3. Water needs of all users, including ecosystems, covered sustainably and system for the sustainable management of water resources set up	All countries
Action 3.1. Implement the appropriate methods for better knowledge of water resources, their renewal and the needs	
Activity E3.1.1. Study mechanisms for renewing groundwater in the basin, and the relationship with surface water	

Activity E3.1.2. Update the study of user and ecosystem water requirements, incorporating the major new structures created	
Activity E3.1.3. Extend the water allocation model to cover all the major structures of the basin	
Action 3.2. Develop and implement a regional program for irrigation network management and water efficiency	
Activity E3.2.1. Experiment with efficient irrigation systems adapted to the specific features of each zone	
Activity E3.2.2. Implement pilot projects for the use of water-saving irrigation techniques	
Activity E3.2.3. Carry out extension work on the use of water-saving irrigation techniques	
Action 3.3. Develop and implement a regional village and pastoral water supply program	
Activity E3.3.1. Capitalize on experience in village and pastoral water supply	
Activity E3.3.2. Implement village and pastoral water supply projects	
LTEQO 4. Water resource quality at least equal to the WHO's "safe drinking water" standard	All countries
Action 4.1. Accelerate the assessment study of pollution sources and the mapping of major risk zones	
Activity E4.1.1. Accelerate the assessment study of pollution sources and the mapping of major risk zones	
Action 4.2. Develop and implement a master plan to control water pollution	
Activity E4.2.1. Perform an assessment of water quality in the basin	
Activity E4.2.2. Prepare very strict specifications for preserving water quality for the main uses (mining, agrifood industries, large irrigated perimeters, etc.)	
Activity E4.2.3. Set up pilot water quality preservation projects in a number of urban communities in the basin	
Action 4.3. Develop regional water quality standards and implement a regional program for the control and monitoring of water resource quality	
Activity E4.3.1. Define water quality standards for the whole of the basin	

Activity E4.3.2. Create a system for continuous monitoring of water quality	
LTEQO 5. Biodiversity, including genetic diversity, of land ecosystems restored and sustainable management system set up	All countries
Action 5.1. Review the existing situation in terms of land biodiversity	
Activity E5.1.1. Update knowledge of biodiversity in cross-border protected areas	
Activity E5.1.2. Identify and map land-based ecosystems remarkable for their rich biodiversity and natural wealth	
Action 5.2. Develop and implement a regional research program on issues related to land biodiversity in the basin	
Activity E5.2.1. Conduct research on endangered or extinct land-based plant species	
Activity E5.2.2. Conduct research on endangered or extinct land-dwelling wildlife species	
Action 5.3. Develop and implement a regional program to restore the land biodiversity of seriously damaged ecosystems	
Activity E5.3.1. Establish a typology of land ecosystems with seriously degraded biodiversity	
Activity E5.3.2. Experiment with effective biodiversity restoration techniques on each type of degraded land ecosystem, in the form of pilot projects	
Action 5.4. Develop and implement a regional program for the in-situ and ex-situ conservation of threatened land species and for reintroducing certain extinct species	
Activity E5.4.1. Experiment with the reintroduction of certain species that have disappeared from each major, representative type of land ecosystem, via test projects	
Activity E5.4.2. Promote the creation of a regional zoo for land-dwelling species	
Activity E5.4.3. Create and operationalize a regional gene bank for land-based species	

LTEQO 6. Biodiversity, including genetic diversity, of aquatic ecosystems restored and sustainable development mechanism set up	All countries
Action 6.1. Review the existing situation in terms of regional knowledge on biodiversity of wetlands	
Activity E6.1.1. Update knowledge of wetland biodiversity	
Activity E6.1.2. Identify and map aquatic ecosystems remarkable for their rich biological diversity and their natural wealth	
Action 6.2. Develop and implement a regional research program on issues related to biodiversity in wetlands the basin	
Activity E6.2.1. Conduct research on endangered and extinct, high-value wetland plant species	
Activity E6.2.2. Conduct research on endangered and extinct flagship wetland wildlife species	
Action 6.3. Develop and implement a regional program to restore the biodiversity of seriously damaged ecosystems of wetlands	
Activity E6.3.1. Establish a typology of wetland ecosystems with seriously degraded biodiversity	
Activity E6.3.2. Experiment with effective biodiversity restoration techniques on each type of degraded wetland ecosystem, in the form of pilot projects	
Action 6.4. Develop and implement a regional program for the in-situ and ex-situ conservation of threatened wetland species and for reintroducing certain extinct species	
Activity E6.4.1. Experiment with the reintroduction of certain species that have disappeared from each major, representative type of wetland ecosystem, via test projects	
Activity E6.4.2. Promote the creation of a regional zoo for wetland species	
Activity E6.4.3. Create and operationalize a regional gene bank for wetland species	
Action 6.5. Develop and implement practices for the sustainable management of aquaculture resources	
Activity E6.5.1. Experiment with techniques for safeguarding and developing endangered aquatic and semi-aquatic wildlife species (hippopotami and manatees), via pilot farms	
Activity E6.5.2. Further strengthen regional cooperation in terms of fishing, through the development of a regional strategy for the integrated management of fisheries	
Activity E6.5.3. Improve the productivity of halieutic resources	

LTEQO 7. Reduction of infestation of aquatic plant species to a level that does not impact negatively on aquatic ecosystems and socio-economic activities on the river	Burkina, Mali, Niger, Nigeria
Action 7.1. Review the existing situation in terms of invasive aquatic plant species	
Activity E7.1.1. Review the existing situation in terms of knowledge of invasive aquatic species and of the environments that favor their proliferation	
Activity E7.1.2. Map the spatial distribution and the evolution of areas infested with invasive aquatic plants	
Action 7.2. Develop a regional research program on invasive aquatic plant species, and the hydro-chemical and biological conditions of their proliferation	
Activity E7.2.1. Conduct biological research on invasive aquatic plant species	
Activity E7.2.2. Determine the hydro-chemical and biological conditions for the proliferation of aquatic plant species	
Activity E7.2.3. Create a framework for pooling and disseminating research results on invasive aquatic plant species	
Action 7.3. Develop and implement a regional program for the integrated control of invasive aquatic plant species	
Activity E7.3.1. Hold experience-sharing workshops on controlling invasive aquatic plant species	
Activity E7.3.2. Use a combination of mechanical (clearing, water weed cutting, manual cutting, etc.) and/or biological controls	
Action 7.4. Develop and implement a program to restore the ecology of the infested sites	
Activity E7.4.1. Experiment with techniques to restore the ecology of representative infested ecosystems, via pilot projects	
Action 7.5. Promote the socioeconomic value of invasive aquatic plants	
Activity E7.5.1. Train and organize players in exploiting invasive aquatic plant species (compost, bio-gas, livestock fodder, crafts industries, etc.)	

Activity E7.5.2. Set up the organization of sales channels for invasive plant products	
LTEQO 8. Reduction of basin vulnerability to the problems of climate variability and change	All countries
Action 8.1. Evaluate the basin's vulnerability to climate variability and change	
Activity E8.1.1. Conduct studies on the risks associated with extreme flooding and map at-risk zones	
Activity E8.1.2. Conduct studies on the risks associated with the rising sea level, for the maritime delta and the major coastal cities of the basin	
Activity E8.1.3. Conduct studies on the impacts of climate variability/change on the large dams	
Activity E8.1.4. Study the vulnerability of production systems to climate variability and change	
Action 8.2. Review the existing situation in terms of the forms of adaptation to climate variability/change, developed by the basin's populations	
Activity E8.2.1. Study the vulnerability of production systems to climate variability/change	
Activity E8.2.2. Review the existing situation in terms of the forms of adaptation to climate variability/change, developed by the basin's populations	
Action 8.3. Develop and implement measures for adapting production systems to climate variability/change	
Activity E8.3.1. Study the impacts of climate variability/change on production systems	
Activity E8.3.2. Develop and implement measures for adapting to the risks associated with devastating floods	
Activity E8.3.3. Adjust the technical standards for structures to conditions of climate variability/change	
Action 8.4. Develop and implement programs to mitigate the effects of climate variability/change	
Activity E8.4.1. Reinforce the "carbon sink" aspect of the basin's ecosystems	

Activity E8.4.1. Reverse land degradation trends by adopting exploitation practices that respect the environment	
LTEQO 9. Biodiversity of the wetlands of the Inner Delta, the Middle Niger and the Maritime Delta restored and system for their sustainable development set up	Inner Delta, Middle Niger, Maritime Delta
Action 9.1. Develop and implement a research program on the biodiversity of each site	
Activity E9.1.1. Update knowledge of the biodiversity of each wetland	
Activity E9.1.2. Conduct research on high-value endangered and extinct plant and animal species in each wetland	
Activity E9.1.3. Research and develop mitigation measures to counter the impacts of climate variability/change on each wetland	
Action 9.2. Develop and implement pilot demonstration programs and projects for site restoration and/or preservation	
Activity E9.2.1. Conduct research on specific indicators addressing the health of the environment in each wetland (migratory birds, specific ichthyofauna, etc.)	
Activity E9.2.2. Identify and map areas at an advanced stage of degradation or with biodiversity under threat, for each wetland	
Activity E9.2.3. Establish a typology of wetland ecosystems with seriously degraded biodiversity	
Activity E9.2.4. Capitalize on conclusive project results and experiment with a participatory pilot project for the restoration and management of resources and biodiversity, on each wetland area	
Activity E9.2.5. Create a system for continuous monitoring of each wetland	
Action 9.3. Improve the productivity of wetlands	

Activity E9.3.1. Set up organizations of fisherfolk	
Activity E9.3.2. Carry out extension work on the aquaculture of aquatic wildlife	
Activity E9.3.3. Develop the value of wetland products, including ecotourism	
LTEQO 10. Biodiversity of the protected areas of the Niger W, Chad and Northern Cameroon restored and system for their sustainable management set up	Niger W, Chad and Northern Cameroon
Action 10.1. Develop and implement a research program on the specific biodiversity of each area	
Activity E10.1.1. Update knowledge of the biodiversity of each protected area	
Activity E10.1.2. Conduct research on high-value endangered and extinct plant and animal species in each protected area	
Action 10.2. Operationalize the network of protected areas	
Activity E10.2.1. Create a mechanism for more effective dialogue and exchanges between the administrators, researchers and local communities of protected areas	
Activity E10.2.2. Schedule monitoring activities in a concerted manner between administrators of the same cross-border protected area	
Action 10.3. Develop and implement projects for the restoration and/or preservation of each area	
Activity E10.3.1. Identify and map zones at an advanced stage of degradation or with biodiversity under threat, for each protected area	
Activity E10.1.2. Experiment with a pilot project for the participatory restoration and management of resources and biodiversity, for each wetland	
Activity E10.3.3. Capitalize on and implement conclusive project results on the sites concerned	
Activity E10.3.4. Create a system for continuous monitoring of changes in the biodiversity of each protected area	
Action 10.4. Create conditions enabling the protected areas of each site to generate revenue	
Activity E10.4.1. Promote ecotourism	

Activity E10.4.2. Equitably share the resources generated, with the local populations	
Activity E10.4.3. Experiment with the breeding of wildlife species in peripheral zones	
Activity E10.4.4. Create new protected areas for the benefit of local authorities.	
LTEQO 11. Mountain forest ecosystems in Upper Guinea, the Sikasso region and the Bani Basin in Mali, Adamaoua in Cameroon and Northern Benin restored, and system for their sustainable development set up	Upper Guinea, the Sikasso region, the Bani basin in Mali, Adamaoua in Cameroon, Northern Benin
Action 11.1. Develop and implement a research program on the biodiversity of each mountain forest ecosystem	
Activity E11.1.1. Update knowledge of the biodiversity of each mountain forest ecosystem	
Activity E11.1.2. Conduct research on high-value endangered and extinct plant and animal species in each mountain forest ecosystem	
Activity E11.1.3. Conduct research on the replenishment modes and evolution of springheads in each mountain forest ecosystem	
Activity E11.1.4. Conduct research on the impacts of actions to restore the biodiversity of mountain forest ecosystems	
Action 11.2. Create a network of mountain forest ecosystems	
Activity E11.2.1. Create a framework for dialogue and exchanges between the administrators, researchers and local communities of mountain forest ecosystems	
Activity E11.2.2. Schedule monitoring activities in a concerted manner between administrators of the same cross-border mountain forest ecosystem	
Action 11.3. Develop and implement pilot demonstration projects for the restoration and/or preservation of each mountain forest ecosystem	
Activity E11.3.1. Identify and map zones at an advanced stage of degradation or with biodiversity under threat, for each mountain forest ecosystem	

Activity E11.3.2. Experiment with a pilot project for the participatory restoration and management of resources and biodiversity, for each mountain forest ecosystem	
Activity E11.3.3. Capitalize on and implement conclusive pilot project results on the sites concerned	
Activity E11.3.4. Create a system for continuous monitoring of changes in the biodiversity of each mountain forest ecosystem	
LTEQO 12. Stabilized catchment areas and riverbanks in the Inner Delta in Mali, the Niger Belt, the Middle Niger up to Kainjin in Nigeria, and the Chad portion of the Bénoué Basin	Inner Delta, the Niger Belt, the Middle Niger up to Kainji in Nigeria, Bénoué in Chad
Action 12.1. Review the existing situation in terms of silting levels and plant cover at each site	
Activity E12.1.1. Review the existing situation in terms of basin zones severely degraded by water and wind erosion	
Activity E12.2.2. Update the situation in terms of silting levels and danger of silting of the riverbed at each site	
Action 12.2. Develop and implement a program for water and soil conservation and for reforestation of the degraded zones of each site	
12.2.1. Devise an integrated development plan for water and soil conservation in degraded sub-catchment areas at each site	
Activity E12.2.2. At each site, conduct bank stabilization or dredging actions on severely silted segments and reserves, to restore their flows	
Action 12.3. Develop and implement a demonstration program on the sustainable exploitation and management of the site's resources	
Activity E12.3.1. Implement agricultural and pastoral practices causing little degradation of soils and plant cover, in the sub-catchment areas of each site	
Activity E12.3.2. Organize the local communities in natural resource management structures for each sub-catchment area in the site	
Activity E12.3.3. Discourage the plundering of construction materials in the riverbed and the discharge near riverbanks of extraction residue from mines	

Appendix 2: Summary table of the actions and activities in the areas of legal and institutional framework reforms and capacity building

Field	Action and activities
Reforms of the legal framework	**SALR-01. Updating and harmonization of the legal framework**
	Activity J1.1. Disseminate the Environmental Charter (IP/SDAP)
	Activity J1.2. Harmonize the legislative and regulatory texts on transhumance
	Activity J1.3. Harmonize the legislative and regulatory texts on the protection of soils against degradation
	Activity J1.4. Harmonize the legal and institutional framework for water pollution control
	Activity J1. 5. Evaluate and harmonize the laws and regulations on pollution control
	Activity J1.6. Harmonize the regulatory and legislative texts on biodiversity conservation in land ecosystems
	Activity J1.7. Harmonize the regulatory and legislative texts on biodiversity conservation in aquatic ecosystems
	Activity J1.8. Develop regulatory and legislative texts on customary environmental law
	Activity J1.9. Develop regulatory and legislative texts on social impact studies
	Activity J1.10. Develop regulatory and legislative texts on strategic environmental assessments
	Activity J1.11. Develop regulatory and legislative texts on plant and animal health safety
	Activity J1.12. Develop regulatory and legislative texts on the protection of aquatic ecosystems
	Activity J1.13. Develop regulatory and legislative texts on the protection of national genetic resources
	Activity J1.14. Develop regulatory and legislative texts on the involuntary displacement/resettlement of populations
	Activity J1.15. Develop regulatory and legislative texts on the prevention and management of biotechnological risks
	Activity J1.16. Initiate in-depth participatory discussions at the basin level, on the ability of current national land laws to ensure sustainable use of the land
	Activity J1.17. Define a legal and institutional framework for the harmonious exploitation and management of forest cover and rangeland
	Activity J1.18. Define a legal and institutional framework for the harmonious exploitation and management of land
	Activity J1.19. Develop regional water quality standards and implement a regional program for the control and monitoring of water resource quality
	Activity J1.20. Experimenting with local land conventions to promote investment in activities for the conservation, protection and sustainable improvement of soil productivity
	Activity J1.21. Finalize and validate the study on the alignment of IWRM at the national and regional levels

	Activity J1.22. Develop and apply the legislation implementing the Water Charter
Reforms of the institutional framework	**SAIR-01. Continuation and expansion of reforms stipulated in the SDAP**
	Activity I1.1. Include environmental management concerns in the SDAP's institutional reforms
	SAIR-02. Capitalization on relevant experience
	Activity I2.1. Conduct a capitalization study on NRM experiences in the Niger Basin
	Activity I2.2. Conduct a capitalization study on experience in water hyacinth control
	Activity I2.3. Conduct a capitalization study on experience in *Sida cordifolia* control
	Activity I2.4. Conduct a capitalization study on silting control experience
	Activity I2.5. Conduct a capitalization study on experience in using energy sources alternative to wood
	Activity I2.6. Conduct a capitalization study on experience in recovering degraded land
Capacity building	**SCBA-01. Building the capacities of the NBA and of the Niger Basin Observatory**
	Activity 01.1. Develop the basin's capacity to obtain climate-related information

	Activity C1.2. Build the NBO's capacities to ensure ecological and aquatic ecosystem biodiversity monitoring
	Activity C1.3. Build the NBO's capacities to ensure ecological and invasive aquatic species monitoring
	Activity C1.4. Build the NBO's capacities to ensure water resource monitoring
	Activity C1.5. Provide the NBO with substantial, regular funding, so that it may fulfill all of its monitoring tasks in relation to water resources and the responses of the environment to the actions
	SCBA-02. Strengthening of the framework for the participation of civil society
	Activity C2.1. Boosting of the Regional Coordination Body for Natural Resource Users
	Activity C2.2. Develop and implement training/information programs on environmental issues intended for local representatives, administrative and traditional authorities, grassroots community organizations, NGOs, etc.
	Activity C2.3. Promote environmental partnerships between NGOs, governments and the private sector
	Activity C2.4 Disseminate and support the implementation of a public participation strategy developed by the NGO *Eau Vive*
	Activity C2.5 Support the Network of Communicators set up in the States with support from the RLWDT project in its operation
	Activity C2.6. Provide regular training for journalists, to strengthen environmental journalism and to improve media coverage of environmental topics
	Activity C2.7. Promote environmental education in elementary, middle and high schools: i) introduction of environmental issues in teaching programs; ii) production and dissemination of teaching manuals and material; iii) training of teachers and of inspectors/educational advisors.
	Activity C2.8. Encourage behavioral change in relation to the environment among administrative and traditional authorities, local elected officials, grassroots community organizations, NGOs and the general public, etc through: i) the organization of workshops; ii) the organization of debates broadcast on the radio or on television; iii) the instauration of an "Environment Day".
	SCBA-03. Strengthening the capacities of the NFSs
	Activity C3.1. Ensure specific training for the members of the national structures for the collection and management of data on water resources and the state of the environment.

	SCBA-04. Strengthening of the process for involving the scientific community
	Activity C4.1. Accelerate the process for the setting up and operationalization of the Panel of Experts or Permanent Technical Committee of the NBA.
	Activity C4.2. Encourage high-level scientific production: scholarships, prizes, support for the publication of theses
	SCBA-05. Diversification of revenue sources for the poorest populations
	Activity C5.1. Create a micro-subsidy fund for community development projects for: the production and marketing of fruit and forest plants; ii) the organization of rural wood markets; iii) the construction of farm ponds and stocking of ponds; iv) the recuperation of degraded land; v) agro-forestry.
	Activity C5.2. Promote alternative, revenue-generating NRM activities: i) recuperation and recycling of plastic packaging; ii) manufacturing of improved domestic burners.

Appendix 3: Summary table of the elements for calculating the costs of the SAP's activities

PRIORITY ACTIONS BY OLTQUE	PARAMETRES AND PLANNING CYCLES	OBSERVATION/BODIES
LTEQO 1. The basin's plant cover is restored and a system for the sustainable management of plant formations is set up		
Action 1.1. Monitor evolutionary trends in forest cover and rangeland		
Activity E1.Activity E1.1.1 Produce baseline maps of the state of forest stands and rangeland F11	F CFA 51,5175 billion covering the purchase of images, and the processing, analysis, interpretation and development of maps In the short-term	Forest cover of all of the NBA member countries. 835 000 km² of which 5.5% of the active part of the basin i.e. 75 000 km² is covered by classified forests or reserves. **All NBA member countries**
Activity E1.Activity E1.1.2 Repeat the mapping process every 5 years	The amount includes the purchase of equipment, and the processing, analysis, interpretation and development of maps Per planning cycle Medium- and long-terms	
Action 1.2. Develop and implement programs and projects to restore degraded ecosystems		**All NBA member countries**
Activity E1.Activity E1.2.1. Identify and locate highly-degraded forest stands and pastoral rangeland	Study 20 m/d per country at the rate of F CFA 100 000 per m/d In the short-term	
Activity E1.Activity E1.2.2. Capitalize on experience in the restoration of degraded forest stands and rangeland	Study 45 m/d per country at the rate of F CFA 100 000 per m/d In the short-term	
Activity E1.Activity E1.2.3. Implement the most appropriate restoration actions	200 ha per country at the rate of F CFA 120 000 per ha In the short-term	
Action 1.3. Capitalize on domestic energy strategy experience based on participatory forest development with a view to sustainable supply of fuel wood and other sources of alternative energy		

Activity E1.Activity E1.3.1. Strengthen research on new and renewable energies	1 center by country and by year at the rate of F CFA 30 000 000 per centre Per planning cycle Short-, medium, and long-terms
Activity E1.Activity E1.3.2. Conduct a capitalization study on experience in participatory forest development	45 m/d per country at the rate of 100 000 per m/d In the short-term
Activity E1.Activity E1.3.3. Create community forests and ensure their management	10 000 ha per country at the rate of support of F CFA 200 000 /ha Per planning cycle Short-, medium, and long-terms
Activity E1.Activity E1.3.4. Promote the use of solar energy	Degressive support fund Per planning cycle Short-, medium, and long-terms
Activity E1.Activity E1.3.5. Promote the use of bio-gas	Degressive support fund Per planning cycle in the short-, medium, and long-terms
Activity E1.Activity E1.3.6. Make electrical power more accessible	Support fund Per planning cycle in the short-, medium, and long-terms
Activity E1.Activity E1.3.7. Promote the sale of carbon sequestration credits within the framework of the Clean Development Mechanism	10 000 ha per country at the rate of support of F CFA 200 000 /ha Per planning cycle Short-, medium, and long-terms
Action 1.4. Develop and implement reforestation programs and projects	
Activity E1.Activity E1.4.1. Experiment with the use of reforestation methods and techniques that take the characteristics of the environment into account	Study 10 000 ha per country at the rate of support of FCFA 200 000 /ha Per planning cycle Short-, medium, and long-terms
Activity E1.Activity E1.4.2. Implement reforestation operations on land that is the most vulnerable to erosion	Support fund F CFA 200 million Per planning cycle Short-, medium, and long-terms
LTEQO 2. Productivity of agricultural and pastoral systems improved and system for the sustainable	

management of soil resources set up	
Action 2.1. . Review the existing situation in terms of type and extent of soil degradation	
Activity E2.1.1. Create maps of land use units	30 communes per year and per country at the rate of 2 million per commune Per planning cycle Short-, medium, and long-terms
Activity E2.1.2. Cross-reference different criteria to classify soil by severity of degradation	Study 30 m/d per country at the rate of F CFA 100 000 m/d In the short-term
Action 2.2. Develop and implement soil development programs based on their aptitudes, constraints and purpose/ affectation	
Activity E2.2.1. Classify soil by its aptitudes, constraints and planned farming system	Study 45 m/d per country at the rate of F CFA 100 000 per m/d In the short-term
Activity E2.2. 2. Test development methods for each of the major soil types cultivated and major types of rangeland, in the form of pilot projects	100 ha per country and per year at the rate of F CFA 200 000 /ha Per planning cycle Short-, medium, and long-terms
Action 2.3. Capitalize on and promote the best practices, techniques and modern technology for water and soil restoration and conservation	
Activity E2.3.1. Conduct a capitalization study on SWC/SDR methods and techniques	Study 45 m/d per country at the rate of F CFA 100 000 per m/d In the short-term
Activity E2.3.2. Using the experience of the SCP as an example, develop and promote integrated catchment area protection actions	5 sites per country and per year at the rate of F CFA 1 000 000 per site Per planning cycle short-, medium, and long-terms
Activity E2.3.3. Conduct extension work on agroforestry and conservation agriculture practices on farms	10 school fields per country and per year at the rate of F CFA 500 000 per school field Per planning cycle

	short-, medium, and long-terms
Action 2.4. Develop a regional soil reference system and ensure it is regularly supplied with data	
Activity E2.4.1. Create a regional group of cartographers and soil specialists to design a soil reference system for the basin and feed it with data	5 million per country and per year Per planning cycle Short-, medium, and long-terms
Activity E2.4.2. Ensure that the think tank for the soil reference system is operational	5 million per country and per year Per planning cycle Short-, medium, and long-terms
LTEQO 3. Water needs of all users, including ecosystems, covered sustainably and system for the sustainable management of water resources set up	
Action 3.1. Implement the appropriate methods for better knowledge of water resources, their renewal and the needs	
Activity E3.1.1. Study mechanisms for renewing groundwater in the basin, and the relationship with surface water	Fixed sum 10 million per country In the short-term
Activity E3.1.2. Update the study of user and ecosystem water requirements, incorporating the major new structures created	Fixed sum; 20 million
Activity E3.1.3. Extend the water allocation model to cover all the major structures of the basin	Fixed sum; 30 million
Action 3.2. Develop and implement a regional program for irrigation network management and water efficiency	
Activity E3.2.1. Experiment with efficient irrigation systems adapted to the specific features of each zone	Support fund; 5 million per country and per year Per planning cycle Short-, medium, and long-terms
Activity E3.2.2. Implement pilot projects for the use of water-saving irrigation techniques	Support fund; 5 million per country and per year
Activity E3.2.3. Carry out extension work on the use of water-saving irrigation techniques	Support fund; 5 million per country and per year Per planning cycle

	Short-, medium, and long-terms
Action 3.3. Develop and implement a regional village and pastoral water supply program	Support fund; 5 million per country and per year Per planning cycle Short-, medium, and long-terms
Activity E3.3.1. Capitalize on experience in village and pastoral water supply	Support fund; 5 million per country and per year Per planning cycle Short-, medium, and long-terms
Activity E3.3.2. Implement village and pastoral water supply projects	Support fund; 5 million per country and per year Per planning cycle Short-, medium, and long-terms
LTEQO 4. Water resource quality at least equal to the WHO's "safe drinking water" standard	
Action 4.1. Accelerate the assessment study of pollution sources and the mapping of major risk zones	
Activity E4.1.1. Accelerate the assessment study of pollution sources and the mapping of major risk zones	Support fund; 5 000 000 per country In the short-term
Action 4.2. Develop and implement a master plan to control water pollution	
Activity E4.2.1. Perform an assessment of water quality in the basin	Fixed sum: 20 million In the short-term
Activity E4.2.2. Prepare very strict specifications for preserving water quality for the main uses (mining, agrifood industries, large irrigated perimeters, etc.)	5 million per country In the short-term
Activity E4.2.3. Set up pilot water quality preservation projects in a number of urban communities in the basin	3 urban communes per country and per year at the rate of F CFA 15 000 000 per commune Per planning cycle Short-, medium, and long-terms
Action 4.3. Develop regional water quality standards and implement a regional program for the control and monitoring of water resource quality	
Activity E4.3.1. Define water quality standards for the whole	Fixed sum: 15 million

of the basin	In the short-term
Activity E4.3.2. Create a system for continuous monitoring of water quality	10 million per country and per year
LTEQO 5. Biodiversity, including genetic diversity, of land ecosystems restored and sustainable management system set up	
Action 5.1. Review the existing situation in terms of the biodiversity/genetic diversity of land ecosystems	
Activity E5.1.1. Update knowledge of biodiversity in cross-border protected areas	Study 45 m/d per country at the rate of F CFA 100 000 m/d In the short-term
Activity E5.1.2. Identify and map land-based ecosystems remarkable for their rich biodiversity and natural wealth	3 sites per country at the rate of 20 million per site Per planning cycle Short-, medium, and long-terms
Action 5.2. Develop and implement a regional research program on issues related to land biodiversity in the basin	
Activity E5.2.1. Conduct research on endangered or extinct land-based plant species	F CFA 2 million per year, per team and per country based on one team per country Per planning cycle Short-, medium, and long-terms
Activity E5.2.2. Conduct research on endangered or extinct land-dwelling wildlife species	F CFA 2 million per year, per team and per country based on one team per country Per planning cycle Short-, medium, and long-terms
Action 5.3. Develop and implement a regional program to restore the land biodiversity of seriously damaged ecosystems	
Activity E5.3.1. Establish a typology of land ecosystems with seriously degraded biodiversity	Study 45 m/d per country at the rate of F CFA 100 000 m/d In the short-term
Activity E5.3.2. Experiment with effective biodiversity restoration techniques on each type of degraded land ecosystem, in the form of pilot projects	5 sites per country and per year at the rate of F CFA 3 million per site Per planning cycle

	Short-, medium, and long-terms
Action 5.4. Develop and implement a regional program for the in-situ and ex-situ conservation of threatened land species and for reintroducing certain extinct species	
Activity E5.4.1. Experiment with the reintroduction of certain species that have disappeared from each major, representative type of land ecosystem, via test projects	5 projects per country and per year at the rate of F CFA 5 million per project In the short-term
Activity E5.4.2. Promote the creation of a regional zoo for land-dwelling species	60 million for the creation and 20 million of maintenance per 5-year period per planning cycle Short-, medium, and long-terms
Activity E5.4.3. Create and operationalize a regional gene bank for land-based species	1 billion for the creation and 50 million for maintenance per short-, medium and long-term period
LTEQO 6. Biodiversity, including genetic diversity, of aquatic ecosystems restored and sustainable management system set up	
Action 6.1. Review the existing situation in terms of regional knowledge on biodiversity of wetlands	
Activity E6.1.1. Update knowledge of wetland biodiversity	Study 35 m/d per country at the rate of F CFA 100 000 per m/d In the short-term
Activity E6.1.2. Identify and map aquatic ecosystems remarkable for their rich biological diversity and their natural wealth	3 sites per country at the rate of F CFA 20 million per site
Action 6.2. Develop and implement a regional research program on issues related to biodiversity in wetlands the basin	
Activity E6.2.1. Conduct research on endangered and extinct, high-value wetland plant species	5 million per country Per planning cycle Short-, medium, and long-terms

Activity E6.2.2. Conduct research on endangered and extinct flagship wetland wildlife species	5 million per country Per planning cycle Short-, medium, and long-terms
Action 6.3. Develop and implement a regional program to restore the biodiversity of seriously damaged ecosystems of wetlands	
Activity E6.3.1. Establish a typology of wetland ecosystems with seriously degraded biodiversity	41000050 m/d per country at the rate of F CFA 100 000 /m/d In the short-term
Activity E6.3.2. Experiment with effective biodiversity restoration techniques on each type of degraded wetland ecosystem, in the form of pilot projects	5 sites per country and per year at the rate of 5 million per site
Action 6.4. Develop and implement a regional program for the in-situ and ex-situ conservation of threatened wetland species and for reintroducing certain extinct species	
Activity E6.4.1. Experiment with the reintroduction of certain species that have disappeared from each major, representative type of wetland ecosystem, via test projects	5 sites per country and per year at the rate of 5 million per site Per planning cycle Short-, medium, and long-terms
Activity E6.4.2. Promote the creation of a regional zoo for wetland species	60 million at the creation and 20 million for maintenance per 5-year period
Activity E6.4.3. Create and operationalize a regional gene bank for wetland species	1 billion at the creation and 20 million for maintenance per 5-year period
Action 6.5. Develop and implement practices for the sustainable management of aquaculture resources	
Activity E6.5.1.: Experiment with techniques for safeguarding and developing endangered aquatic and semi-aquatic wildlife species (hippopotami and manatees), via pilot farms	Fixed sum 900 million
Activity E6.5.2. Further strengthen regional cooperation in terms of fishing, through the development of a regional strategy for the integrated management of fisheries	35 m/d per country at the rate of F CFA 100 000 /m/d Per planning cycle Short-, medium, and long-terms

Activity E6.5.3. Improve the productivity of halieutic resources	Support fund: 675 million per planning cycle Short-, medium, and long-terms
LTEQO 7. Reduction of infestation of aquatic plant species to a level that does not impact negatively on aquatic ecosystems and socio-economic activities on the river	
Action 7.1. Review the existing situation in terms of invasive aquatic plant species	
Activity E7.1.1. Review the existing situation in terms of knowledge of invasive aquatic species and of the environments that favor their proliferation	65 m/d per year at the rate of F CFA 100 000 in the short-term
Activity E7.1.2. Map the spatial distribution and the evolution of areas infested with invasive aquatic plants	Support fund 25 million per country in the short-term
Action 7.2. Develop a regional research program on invasive aquatic plant species, and the hydro-chemical and biological conditions of their proliferation	
Activity E7.2.1. Conduct biological research on invasive aquatic plant species	5 million per country Per planning cycle Short-, medium, and long-terms
Activity E7.2.2. Determine the hydro-chemical and biological conditions for the proliferation of aquatic plant species	Support fund1 F CFA 3 333 000 In the short-term
Activity E7.2.3. Create a framework for pooling and disseminating research results on invasive aquatic plant species	Support fund 444 million
Action 7.3. Develop and implement a regional program for the integrated control of invasive aquatic plant species	
Activity E7.3.1. Hold experience-sharing workshops on controlling invasive aquatic plant species	F CFA 5 million per country In the short-term
Activity E7.3.2. Use a combination of mechanical (clearing, water weed cutting, manual cutting, etc.) and/or biological controls	20 km per country and year

Action 7.4 Develop and implement a program to restore the ecology of the infested sites		
Activity E7.4.1 Experiment with techniques to restore the ecology of representative infested ecosystems, via pilot projects	10 million per country and per year per planning cycle short, medium and long-terms	
Action 7.5. Promote the socioeconomic value of invasive aquatic plants		
Activity E7.5.1. Train and organize players in exploiting invasive aquatic plant species (compost, bio-gas, livestock fodder, crafts industries, etc.)	5 million per country and per year for the first period	
Activity E7.5.2. Set up the organization of sales channels for invasive plant products	2 million per country and per year In the short-term	
LTEQO 8. Reduction of basin vulnerability to the problems of climate variability and change		
Action 8.1 Evaluate the basin's vulnerability to climate variability/change		
Activity E8.1.1. Conduct studies on the risks associated with extreme flooding and map at-risk zones	15 million per country In the short-term	
Activity E8.1.2. Conduct studies on the risks associated with the rising sea level, for the maritime delta and the major coastal cities of the basin	30 million per country, Nigeria and Benin In the short-term	
Activity E8.1.3. Conduct studies on the impacts of climate variability/change on the large dams	Study: 45 m/d per country at the rate of F CFA 100 000 /m/d In the short-term	**The calculations of costs related to invasive species concern four countries: Burkina Faso, Mali, Niger and Nigeria**
Activity E8.1.4. Study the vulnerability of the production systems to climate variability and change	Study: 45 m/d per country at the rate of F CFA 100 000 /m/d In the short-term	
Action 8.2. Review the existing situation in terms of the forms of adaptation to climate variability/change, developed by the basin's populations		
Activity E8.2.1. Study the vulnerability of production systems to climate variability/change	Study: 30 m/d per country at the rate of F CFA 100 000 /m/d In the short-term	

Activity E8.2.2. Review the existing situation in terms of the forms of adaptation to climate variability/change, developed by the basin's populations	Study: 45 m/d per country at the rate of F CFA 100 000 /m/d In the short-term	
Action 8.3. Develop and implement measures for adapting production systems to climate variability/change		
Activity E8.3.1. Study the impacts of climate variability/change on production systems	Study: 45 m/d per country at the rate of F CFA 100 000 /m/d In the short-term	
Activity E8.3.2. Develop and implement measures for adapting to the risks associated with devastating floods	Support fund: F CFA 500 million per country	
Activity E8.3.3. Adjust the technical standards for structures to conditions of climate variability/change	Study: 45 m/d per country at the rate of F CFA 100 000 /m/d In the short-term	
Action 8.4. Develop and implement programs to mitigate the effects of climate variability/change		
Activity E8.4.1. Reinforce the "carbon sink" aspect of the basin's ecosystems	Support fund: F CFA 500 million per country	
Activity E8.4.2. Reverse land degradation trends by adopting exploitation practices that respect the environment	30% of cultivated land at the rate of F CFA 180 000 /ha	
LTEQO 9. Biodiversity of the wetlands of the Inner Delta, the Middle Niger and the Maritime Delta restored and system for their sustainable development set up		
Action 9.1. Develop and implement a research program on the biodiversity of each site		
Activity E9.1.1. Update knowledge of the biodiversity of each wetland	F CFA 3 million per country In the short-term	
Activity E9.1.2. Conduct research on high-value endangered and extinct plant and animal species in each wetland	F CFA 25 million per country In the short-term	
Activity E9.1.3. Research and develop mitigation measures to counter the impacts of climate variability/change on each wetland	F CFA 3 million per country In the short-, medium- and long-terms	Wetlands: Inner Delta, Middle Niger, Maritime Delta

Action 9.2. Develop and implement pilot demonstration programs and projects for site restoration and/or preservation		
Activity E9.2.1. Conduct research on specific indicators addressing the health of the environment in each wetland (migratory birds, specific ichthyofauna, etc.)	F CFA 25 million per country In the short-term	
Activity E9.2.2. Identify and map areas at an advanced stage of degradation or with biodiversity under threat, for each wetland	F CFA 2 billion fund In the short-term	
Activity E9.2.3. Establish a typology of wetland ecosystems with seriously degraded biodiversity	F CFA 1 million per country In the short-term	
Activity E9.2.4. Capitalize on conclusive project results and experiment with a participatory pilot project for the restoration and management of resources and biodiversity, on each wetland area	F CFA 5 million per country In the short-, medium- and long-terms	
Activity E9.2.5. Create a system for continuous monitoring of each wetland	Setting up of a system; 20 million In the short-term Running: 10 million Per planning cycle Short-, medium- and long-terms	
Action 9.3. Improve the productivity of wetlands		
Activity E9.3.1. Set up organizations of fisherfolk	Support fund: F CFA 25 million Per planning cycle Short-, medium- and long-terms	
Activity E9.3.2. Carry out extension work on the aquaculture of aquatic wildlife	Support fund: F CFA 25 million per country with wetlands Per planning cycle short-, medium, and long-terms	
Activity E9.3.3. Develop the value of wetland products, including ecotourism	Support fund: F CFA 125 million Per planning cycle Short-, medium, and long-terms	
Action 9.4. Diversify revenue sources for the poorest populations		

Activity E9.4.1. Create a micro-subsidy fund for community development projects	100 million per country and per period	
Activity E9.4.2. Promote alternative, revenue-generating NRM activities	1 billion per period	
LTEQO 10. Biodiversity of the protected areas of the Niger W, Chad and Northern Cameroon restored and system for their sustainable management set up		**Bodies of the three protected areas**
Action 10.1. Develop and implement a research program on the specific biodiversity of each area		
Activity E10.1.1. Update knowledge of the biodiversity of each protected area	4.5 million per country In the short-term	
Activity E10.1.2. Conduct research on high-value endangered and extinct plant and animal species in each protected area	Support fund: 50 million per protected area Per planning cycle Short-, medium, and long-terms	
Action 10.2. Operationalize the network of protected areas		
Activity E10.2.1. Create a mechanism for more effective dialogue and exchanges between the administrators, researchers and local communities of protected areas	F CFA 2.5 million per country Per planning cycle In the short-, medium, and long-terms	
Activity E10.2.2. Schedule monitoring activities in a concerted manner between administrators of the same cross-border protected area	F CFA 2.5 million per country Per planning cycle In the short-, medium- and long-terms	
Action 10.3. Develop and implement projects for the restoration and/or preservation of each area		
Activity E10.3.1. Identify and map zones at an advanced stage of degradation or with biodiversity under threat, for each protected area	F CFA 5 million per country In the short-term,	
Activity E10.3.2. Experiment with a pilot project for the participatory restoration and management of resources and biodiversity, for each wetland	Support fund: 50 million per protected area Per planning cycle Short-, medium- and long-terms	
Activity E10.3.3. Capitalize on and implement conclusive project results on the sites concerned	Support fund: F CFA 5 million per protected area Per planning cycle Short-, medium- and long-terms	

Action 10.4. Create conditions enabling the protected areas of each site to generate revenue		
Activity E10.4.1. Promote ecotourism	Support fund: 50 million Per protected area Per planning cycle Short-, medium- and long-terms	
Activity E10.4.2. Equitably share the resources generated, with the local populations	Support fund: 5 million Per protected area Per planning cycle Short-, medium- and long-terms	
Activity E10.4.3. Experiment with the breeding of wildlife species in peripheral zones	Support fund: 10 million Per protected area Per planning cycle Short-, medium- and long-terms	
Activity E10.4.4. Create new protected areas for the benefit of local authorities	Support fund: F CFA 4.5 million per protected area Per planning cycle Short-, medium- and long-terms	
LTEQO 11. Mountain forest ecosystems in Upper Guinea, the Sikasso region and the Bani Basin in Mali, Adamaoua in Cameroon and Northern Benin restored, and system for their sustainable development set up		
Action 11.1. Develop and implement a research program on the biodiversity of each mountain forest ecosystem		
Activity E11.1.1. Update knowledge of the biodiversity of each mountain forest ecosystem	Support fund: F CFA 1.8 million by mountain forest ecosystem In the short-term	
Activity E11.1.2. Conduct research on high-value endangered and extinct plant and animal species in each mountain forest ecosystem	Support fund: F CFA 40 million by mountain forest ecosystem Per planning cycle Short-, medium- and long-terms	
Activity E11.1.3. Conduct research on the replenishment modes and evolution of springheads in each mountain forest ecosystem	Support fund: F CFA 40 million by mountain forest ecosystem	**Mountain forest ecosystem bodies**

Activity E11.1.4. Conduct research on the impacts of actions to restore the biodiversity of mountain forest ecosystems	Support fund: F CFA 10 million by mountain forest ecosystem Per planning cycle Short-, medium- and long-terms	
Action 11.2. Create a network of mountain forest ecosystems		
Activity E11.2.1. Create a framework for dialogue and exchanges between the administrators, researchers and local communities of mountain forest ecosystems	Support fund: F CFA 25 million by mountain forest ecosystem In the short-term	
Activity E11.2.2. Schedule monitoring activities in a concerted manner between administrators of the same cross-border mountain forest ecosystem	Support fund: F CFA 75 million by mountain forest ecosystem Per planning cycle Short-, medium- and long-terms	
Action 11.3. Develop and implement pilot demonstration projects for the restoration and/or preservation of each mountain forest ecosystem		
Activity E11.3.1. Identify and map zones at an advanced stage of degradation or with biodiversity under threat, for each mountain forest ecosystem	Support fund: F CFA 400 million by mountain forest ecosystem In the short-term	
Activity E11.3.2. Experiment with a pilot project for the participatory restoration and management of resources and biodiversity, for each mountain forest ecosystem	Support fund: F CFA 720 million by mountain forest ecosystem Per planning cycle Short-, medium-terms and Support fund: F CFA 720 million F CFA 960 million in the long-term	
Activity E11.3.3. Capitalize on and implement conclusive pilot project results on the sites concerned	Support fund: F CFA 20 million by mountain forest ecosystem Per planning cycle Short-, medium- and long-terms	
Activity E11.3.4. Create a system for continuous monitoring of changes in the biodiversity of each mountain forest ecosystem		

LTEQO 12. Stabilized catchment areas and riverbanks in the Inner Delta in Mali, the Niger Belt, the Middle Niger up to Kainjin in Nigeria, and the Chad portion of the Bénoué Basin		
Action 12.1. Review the existing situation in terms of silting levels and plant cover at each site		
Activity E12.1.1. Review the existing situation in terms of basin zones severely degraded by water and wind erosion	F CFA 3.75 million per silting zone In the short-term	
Activity E12.1.2. Update the situation in terms of silting levels and danger of silting of the riverbed at each site	F CFA 500 million per silting zone In the short-term	
Action 12.2. Develop and implement a program for water and soil conservation and for reforestation of the degraded zones of each site		
Activity E12.2.1. Capitalize on SCP experience in controlling silting of the river	F CFA 5.625 million per silting zone In the short-term	
Activity E12.2.2. Devise an integrated development plan for water and soil conservation in degraded sub-catchment areas at each site	F CFA 5.625 million per silting zone In the short-term	
Activity E12.2.3. At each site, conduct bank stabilization or dredging actions on severely silted segments and reserves, to restore their flows	F CFA 250 million per silting zone Per planning cycle Short-, medium, and long-terms	
Action 12.3. Develop and implement a demonstration program on the sustainable exploitation and management of the site's resources		
Activity E12.3.1. Implement agricultural and pastoral practices causing little degradation of soils and plant cover, in the sub-catchment areas of each site	F CFA 1.250 billion per silting zone Per planning cycle Short-, medium- and long-terms	
Activity E12.3.2. Organize the local communities in natural resource management structures for each sub-catchment area in the site	F CFA 31.25 million per silting zone In the short-term	
Activity E12.3.3. Discourage the plundering of construction materials in the riverbed and the discharge near riverbanks of extraction residue from mines	F CFA 62.5 million per silting zone Per planning cycle	**Bodies of the four catchment areas and river banks**


Short-, medium- and long-terms

Appendix 4: Summary table of the costs of the SAP (in thousand F CFA)

A. LTEQO

PRIORITY ACTIONS BY LTEQO	TOTAL OF INDICATIVE COSTS (short-, medium- and long-term)			TOTAL
	FYP1	FYP2	FYP3	
LTEQO 1. The basin's plant cover is restored and a system for the sustainable management of plant formations is set up				
Action 1.1. Monitor evolutionary trends in forest cover and rangeland				
Activity E1.Activity E1.1.1 Produce baseline maps of the state of forest stands and rangeland	51517500	0	0	51517500
Activity E1.Activity E1.1.2 Repeat the mapping process every 5 years		**51517500**	**51517500**	103035000
TOTAL Action 1.1	**51517500**	**51517500**	**51517500**	**154552500**
Action 1.2. Develop and implement programs and projects to restore degraded ecosystems				
Activity E1.Activity E1.2.1. Identify and locate highly-degraded forest stands and pastoral rangeland	18000	0	0	18000
Activity E1.Activity E1.2.2. Capitalize on experience in the restoration of degraded forest stands and rangeland	40500	0	0	40500
Activity E1.Activity E1.2.3. Implement the most appropriate restoration actions	216000	0	0	216000
TOTAL Action 1.2	**274500**	**0**	**0**	**274500**
Action 1.3. Capitalize on domestic energy strategy experience based on participatory forest development with a view to sustainable supply of fuel wood and other sources of alternative energy				
Activity E1.Activity E1.3.1. Strengthen research on new and renewable energies	1350000	1350000	1350000	4050000
Activity E1.Activity E1.3.2. Conduct a capitalization study on experience in participatory forest development	40500	0	0	40500
Activity E1.Activity E1.3.3. Create community forests and ensure their management	18000000	18000000	18000000	54000000
Activity E1.Activity E1.3.4. Promote the use of solar energy	4800000	2000000	1200000	8000000
Activity E1.Activity E1.3.5. Promote the use of bio-gas	1600000	1000000	900000	3500000
Activity E1.Activity E1.3.6. Make electrical power more accessible	66500000	66500000	66500000	199500000
Activity E1.Activity E1.3.7. Promote the sale of carbon sequestration credits within the framework of the Clean Development Mechanism	0	0	0	0
TOTAL Action 1.3	**92290500**	**88850000**	**87950000**	**269090500**

Action 1.4. Develop and implement reforestation programs and projects				
Activity E1.Activity E1.4.1. Experiment with the use of reforestation methods and techniques that take the characteristics of the environment into account	18000000	18000000	18000000	54000000
Activity E1.Activity E1.4.2. Implement reforestation operations on land that is the most vulnerable to erosion	200000	2000000	200000	2400000
TOTAL Action 1.4	**18200000**	**20000000**	**18200000**	**56400000**
TOTAL LTEQO 1	**162282500**	**160367500**	**157667500**	**480317500**
LTEQO 2. Productivity of agricultural and pastoral systems improved and system for the sustainable management of soil resources set up				
Action 2.1. Review the existing situation in terms of type and extent of soil degradation				
Activity E2.1.1. Create maps of land use units	2700000	2700000	2700000	8100000
Activity E2.1.2. Cross-reference different criteria to classify soil by severity of degradation	27000	0	0	27000
TOTAL Action 2.1	**2727000**	**2700000**	**2700000**	**8127000**
Action 2.2. Develop and implement soil development programs based on their aptitudes, constraints and purpose/ affectation				
Activity E2.2.1. Classify soil by its aptitudes, constraints and planned farming system	40500	0	0	40500
Activity E2.2. 2. Test development methods for each of the major soil types cultivated and major types of rangeland, in the form of pilot projects	180000	180000	180000	540000
TOTAL Action 2.2	**220500**	**180 000**	**180 000**	**580500**
Action 2.3. Capitalize on and promote the best practices, techniques and modern technology for water and soil restoration and conservation				
Activity E2.3.1. Conduct a capitalization study on SWC/SDR methods and techniques	40500	0	0	40500
Activity E2.3.2. Using the experience of the SCP as an example, develop and promote integrated catchment area protection actions	45000	45000	45000	135000
Activity E2.3.3. Conduct extension work on agroforestry and conservation agriculture practices on farms	225000	225000	225000	675000
TOTAL Action 2.3	**310500**	**270000**	**270000**	**850500**
Action 2.4. Develop a regional soil reference system and ensure it is regularly supplied with data				
Activity E2.4.1. Create a regional group of cartographers and soil specialists to design a soil reference system for the basin and feed it with data	225000	225000	225000	675000
Activity E2.4.2. Ensure that the think tank for the soil reference system is operational	225000	225000	225000	675000
TOTAL Action 2.4	**450000**	**450000**	**450000**	**1350000**
TOTAL LTEQO 2	**3708000**	**3600000**	**3600000**	**10908000**

LTEQO 3. Water needs of all users, including ecosystems, covered sustainably and system for the sustainable management of water resources set up				
Action 3.1. Implement the appropriate methods for better knowledge of water resources, their renewal and the needs				
Activity E3.1.1. Study mechanisms for renewing groundwater in the basin, and the relationship with surface water	90000	0	0	90000
Activity E3.1.2. Update the study of user and ecosystem water requirements, incorporating the major new structures created	20000	0	0	20000
Activity E3.1.3. Extend the water allocation model to cover all the major structures of the basin	30000			30000
TOTAL Action 3.1	**140000**	**0**	**0**	**140000**
Action 3.2. Develop and implement a regional program for irrigation network management and water efficiency				
Activity E3.2.1. Experiment with efficient irrigation systems adapted to the specific features of each zone	225000	225000	225000	675000
Activity E3.2.2. Implement pilot projects for the use of water-saving irrigation techniques	225000	225000	225000	675000
Activity E3.2.3. Carry out extension work on the use of water-saving irrigation techniques	225000	225000	225000	675000
TOTAL Action 3.2	**675000**	**675000**	**675000**	**2025000**
TOTAL LTEQO 3	**815000**	**675000**	**675000**	**2165000**
LTEQO 4. Water resource quality at least equal to the WHO's "safe drinking water" standard				
Action 4.1. Accelerate the assessment study of pollution sources and the mapping of major risk zones				
Activity E4.1.1. Accelerate the assessment study of pollution sources and the mapping of major risk zones	45000	0	0	45000
TOTAL Action 4.1	**45000**	**0**	**0**	**45000**
Action 4.2. Develop and implement a master plan to control water pollution				
Activity E4.2.1. Perform an assessment of water quality in the basin	20000	0	0	20000
Activity E4.2.2. Prepare very strict specifications for preserving water quality for the main uses (mining, agrifood industries, large irrigated perimeters, etc.)	45000	0	0	45000
Activity E4.2.3. Set up pilot water quality preservation projects in a number of urban communities in the basin	202500	2025000	2025000	607500
TOTAL Action 4.2	**357500**	**202500**	**202500**	**762500**
Action 4.3. Develop regional water quality standards and implement a regional program for the control and monitoring of water resource quality				
Activity E4.3.1. Define water quality standards for the whole of the basin	15000	0	0	15000
Activity E4.3.2. Create a system for continuous monitoring of water quality	450000	450000	450000	1350000
TOTAL Action 4.3	**465000**	**450000**	**450000**	**1365000**
TOTAL LTEQO 4	**867500**	**652500**	**652500**	**2172500**

LTEQO 5. Biodiversity, including genetic diversity, of land ecosystems restored and sustainable management system set up				
Action 5.1. Review the existing situation in terms of biodiversity/genetic diversity of land ecosystems				
Activity E5.1.1. Update knowledge of biodiversity in cross-border protected areas	40500	0	0	40500
Activity E5.1.2. Identify and map land-based ecosystems remarkable for their rich biodiversity and natural wealth	540000	540000	540000	1620000
TOTAL Action 5.1	**580500**	**540000**	**540000**	**1660500**
Action 5.2. Develop and implement a regional research program on issues related to land biodiversity in the basin				
Activity E5.2.1. Conduct research on endangered or extinct land-based plant species	90000	90000	90000	270000
Activity E5.2.2. Conduct research on endangered or extinct land-dwelling wildlife species	90000	90000	90000	270000
TOTAL Action 5.2	**180000**	**180000**	**180000**	**540000**
Action 5.3. Develop and implement a regional program to restore the land biodiversity of seriously damaged ecosystems				
Activity E5.3.1. Establish a typology of land ecosystems with seriously degraded biodiversity	40500	0	0	40500
Activity E5.3.2. Experiment with effective biodiversity restoration techniques on each type of degraded land ecosystem, in the form of pilot projects	675000	675000	675000	2025000
TOTAL Action 5.3	**715500**	**675000**	**675000**	**2065500**
Action 5.4. Develop and implement a regional program for the in-situ and ex-situ conservation of threatened land species and for reintroducing certain extinct species				
Activity E5.4.1. Experiment with the reintroduction of certain species that have disappeared from each major, representative type of land ecosystem, via test projects	1125000	0	0	1125000
Activity E5.4.2. Promote the creation of a regional zoo for land-dwelling species	80000	20000	20000	120000
Activity E5.4.3. Create and operationalize a regional gene bank for land-based species	1000	50000	50000	101000
TOTAL Action 5.4	**1206000**	**70000**	**70000**	**1346000**
TOTAL LTEQO 5	**2682000**	**1465000**	**1465000**	**5612000**

LTEQO 6. Biodiversity, including genetic biodiversity, of aquatic ecosystems restored and sustainable development mechanism set up				
Action 6.1. Review the existing situation in terms of regional knowledge on biodiversity of wetlands				
Activity E6.1.1. Update knowledge of wetland biodiversity	27500	0	0	27500
Activity E6.1.2. Identify and map aquatic ecosystems remarkable for their rich biological diversity and their natural wealth	540000	0	0	540000
TOTAL Action 6.1	**567500**	**0**	**0**	**567500**
Action 6.2. Develop and implement a regional research program on issues related to biodiversity in wetlands the basin				
Activity E6.2.1. Conduct research on endangered and extinct, high-value wetland plant species	45000	45000	45000	135000
Activity E6.2.2. Conduct research on endangered and extinct flagship wetland wildlife species	45000	45000	45000	135000
TOTAL Action 6.2	**90000**	**90000**	**90000**	**270000**
Action 6.3. Develop and implement a regional program to restore the biodiversity of seriously damaged ecosystems of wetlands				
Activity E6.3.1. Establish a typology of wetland ecosystems with seriously degraded biodiversity	410000	0	0	410000
Activity E6.3.2. Experiment with effective biodiversity restoration techniques on each type of degraded wetland ecosystem, in the form of pilot projects	1125000	1125000	1125000	3375000
TOTAL Action 6.3	**1535000**	**1125000**	**1125000**	**3785000**
Action 6.4. Develop and implement a regional program for the in-situ and ex-situ conservation of threatened wetland species and for reintroducing certain extinct species				
Activity E6.4.1. Experiment with the reintroduction of certain species that have disappeared from each major, representative type of wetland ecosystem, via test projects	1125000	1125000	1125000	3375000
Activity E6.4.2. Promote the creation of a regional zoo for wetland species	80000	20000	20000	120000
Activity E6.4.3. Create and operationalize a regional gene bank for wetland species	1000000	1000000	1000000	3000000
TOTAL Action 6.4	**2205000**	**2145000**	**2145000**	**6495000**
Action 6.5. Develop and implement practices for the sustainable management of aquaculture resources				

Activity E6.5.1. Experiment with techniques for safeguarding and developing endangered aquatic and semi-aquatic wildlife species (hippopotami and manatees), via pilot farms	900000	900000	900000	2700000
Activity E6.5.2. Further strengthen regional cooperation in terms of fishing, through the development of a regional strategy for the integrated management of fisheries	27500	27500	27500	82500
Activity E6.5.3. Improve the productivity of halieutic resources	675000	675000	675000	2025000
TOTAL Action 6.5.	**1602500**	**1602500**	**1602500**	**4807500**
TOTAL LTEQO 6	**6000000**	**4962500**	**4962500**	**15925000**
LTEQO 7. Reduction of infestation of aquatic plant species to a level that does not impact negatively on aquatic ecosystems and socio-economic activities on the river				
Action 7.1. Review the existing situation in terms of invasive aquatic plant species				
Activity E7.1.1. Review the existing situation in terms of knowledge of invasive aquatic species and of the environments that favor their proliferation	24222	0	0	24222
Activity E7.1.2. Map the spatial distribution and the evolution of areas infested with invasive aquatic plants	100000	0	0	100000
TOTAL Action 7.1	**124222**	**0**	**0**	**124222**
Action 7.2. Develop a regional research program on invasive aquatic plant species, and the hydro-chemical and biological conditions of their proliferation				
Activity E7.2.1. Conduct biological research on invasive aquatic plant species	20000	20000	20000	60000
Activity E7.2.2. Determine the hydro-chemical and biological conditions for the proliferation of aquatic plant species	13333	0	0	13333
Activity E7.2.3. Create a framework for pooling and disseminating research results on invasive aquatic plant species	444	444	444	1332
TOTAL Action 7.2	**33777**	**20444**	**20444**	**74665**
Action 7.3. Develop and implement a regional program for the integrated control of invasive aquatic plant species				
Activity E7.3.1. Hold experience-sharing workshops on controlling invasive aquatic plant species	20000	0	0	20000
Activity E7.3.2. Use a combination of mechanical (clearing, water weed cutting, manual cutting, etc.) and/or biological controls	200000	200000	200000	600000

TOTAL Action 7.3	**220000**	**200000**	**200000**	**620000**
Action 7.4. Develop and implement a program to restore the ecology of the infested sites				
Activity E7.4.1. Experiment with techniques to restore the ecology of representative infested ecosystems, via pilot projects	200000	200000	200000	600000
TOTAL Action 7.4	**200000**	**200000**	**200000**	**600000**
Action 7.5. Promote the socioeconomic value of invasive aquatic plants				
Activity E7.5.1. Train and organize players in exploiting invasive aquatic plant species (compost, bio-gas, livestock fodder, crafts industries, etc.)	20000	0	0	20000
Activity E7.5.2. Set up the organization of sales channels for invasive plant products	8888	0	0	8888
TOTAL Action 7.5	**28888**	**0**	**0**	**28888**
TOTAL LTEQO 7	**606887**	**440444**	**440444**	**1487775**
LTEQO 8. Reduction of basin vulnerability to the problems of climate variability and change				
Action 8.1. Evaluate the basin's vulnerability to climate variability and change				
Activity E8.1.1. Conduct studies on the risks associated with extreme flooding and map at-risk zones	135000	0	0	135000
Activity E8.1.2. Conduct studies on the risks associated with the rising sea level, for the maritime delta and the major coastal cities of the basin	60000	0	0	60000
Activity E8.1.3. Conduct studies on the impacts of climate variability/change on the large dams	40500	0	0	40500
Activity E8.1.4. Study the vulnerability of the production systems to climate variability and change	40500			40500
TOTAL Action 8.1	**276000**	**0**	**0**	**276000**
Action 8.2. Review the existing situation in terms of the forms of adaptation to climate variability/change, developed by the basin's populations				
Activity E8.2.1. Study the vulnerability of production systems to climate variability/change	27000	0	0	27000
Activity E8.2.2. Review the existing situation in terms of the forms of adaptation to climate variability/change, developed by the basin's populations	40500	0	0	40500

TOTAL Action 8.2	**67500**	**0**	**0**	**67500**
Action 8.3. Develop and implement measures for adapting production systems to climate variability/change				
Activity E8.3.1. Study the impacts of climate variability/change on production systems	40500	0	0	40500
Activity E8.3.2. Develop and implement measures for adapting to the risks associated with devastating floods	4500000	4500000	4500000	13500000
Activity E8.3.3. Adjust the technical standards for structures to conditions of climate variability/change	40500	0	0	40500
TOTAL Action 8.3	**4581000**	**4500000**	**4500000**	**13581000**
Action 8.4. Develop and implement programs to mitigate the effects of climate variability/change				
Activity E8.4.1. Reinforce the “carbon sink” aspect of the basin’s ecosystems	4500000	4500000	4500000	13500000
Activity E8.4.2. Reverse land degradation trends by adopting exploitation practices that respect the environment	66500	66500	66500	199500
TOTAL Action 8.4	**4566500**	**4566500**	**4566500**	**13699500**
TOTAL LTEQO 8	**9491000**	**9066500**	**9066500**	**27624000**
LTEQO 9. Biodiversity of the wetlands of the Inner Delta, the Middle Niger and the Maritime Delta restored and system for their sustainable development set up				
Action 9.1. Develop and implement a research program on the biodiversity of each site				
Activity E9.1.1. Update knowledge of the biodiversity of each wetland	9000	0	0	9000
Activity E9.1.2. Conduct research on high-value endangered and extinct plant and animal species in each wetland	75000	0	0	75000
Activity E9.1.3. Research and develop mitigation measures to counter the impacts of climate variability/change on each wetland	9000	9000	9000	27000
TOTAL Action 9.1	**93000**	**9000**	**9000**	**111000**
Action 9.2. Develop and implement pilot demonstration programs and projects for site restoration and/or preservation				
Activity E9.2.1. Conduct research on specific indicators addressing the health of the environment in each wetland (migratory birds, specific ichthyofauna, etc.)	75000	0	0	75000
Activity E9.2.2. Identify and map areas at an advanced stage of degradation or with biodiversity under threat, for each wetland	2000000	0	0	2000000
Activity E9.2.3. Establish a typology of wetland ecosystems with seriously degraded biodiversity	9000	0	0	9000

Activity E9.2.4. Capitalize on conclusive project results and experiment with a participatory pilot project for the restoration and management of resources and biodiversity, on each wetland area	45000	45000	45000	135000
Activity E9.2.5. Create a system for continuous monitoring of each wetland	30000	10000	10000	50000
TOTAL Action 9.2	**2159500**	**55000**	**55000**	**2269500**
Action 9.3. Improve the productivity of wetlands				
Activity E9.3.1. Set up organizations of fisherfolk	25000	25000	25000	75000
Activity E9.3.2. Carry out extension work on the aquaculture of aquatic wildlife	75000	75000	75000	225000
Activity E9.3.3. Develop the value of wetland products, including ecotourism	125000	125000	125000	375000
TOTAL Action 9.3	225000	225000	225000	675000
TOTAL LTEQO 9	**2477500**	**289000**	**289000**	**3055500**
LTEQO 10. Biodiversity of the protected areas of the Niger W, Chad and Northern Cameroon restored and system for their sustainable management set up				
Action 10.1. Develop and implement a research program on the specific biodiversity of each area				
Activity E10.1.1. Update knowledge of the biodiversity of each protected area	13500	0	0	13500
Activity E10.1.2. Conduct research on high-value endangered and extinct plant and animal species in each protected area	150000	150000	150000	450000
TOTAL Action 10.1	**163500**	**150000**	**150000**	**463500**
Action 10.2. Operationalize the network of protected areas				
Activity E10.2.1. Create a mechanism for more effective dialogue and exchanges between the administrators, researchers and local communities of protected areas	7500	7500	7500	22500
Activity E10.2.2. Schedule monitoring activities in a concerted manner between administrators of the same cross-border protected area	7500	7500	7500	22500
TOTAL Action 10.2	**15000**	**15000**	**15000**	**45000**
Action 10.3. Develop and implement projects for the restoration and/or preservation of each area				
Activity E10.3.1. Identify and map zones at an advanced stage of degradation or with biodiversity under threat, for each protected area	15000	0	0	15000
Activity E10.3.2. Experiment with a pilot project for the participatory restoration and management of resources and biodiversity, for each wetland	150000	150000	150000	450000
Activity E10.3.3. Capitalize on and implement conclusive project results on the sites concerned	15000	15000	15000	45000
TOTAL Action 10.3	**180000**	**165000**	**165000**	**510000**
Action 10.4. Create conditions enabling the protected areas of each site to generate revenue				

Activity E10.4.1. Promote ecotourism	150000	150000	150000	450000
Activity E10.4.2. Equitably share the resources generated, with the local populations	15000	15000	15000	45000
Activity E10.4.3. Experiment with the breeding of wildlife species in peripheral zones	30000	30000	30000	90000
Activity E10.4.4. Create new protected areas for the benefit of local authorities	13500	13500	13500	40500
TOTAL Action 10.4	**208500**	**208500**	**208500**	**625500**
TOTAL LTEQO 10	**567000**	**538500**	**538500**	**1644000**
LTEQO 11. Mountain forest ecosystems in Upper Guinea, the Sikasso region and the Bani Basin in Mali, Adamaoua in Cameroon and Northern Benin restored, and system for their sustainable development set up				
Action 11.1. Develop and implement a research program on the biodiversity of each mountain forest ecosystem				
Activity E11.1.1. Update knowledge of the biodiversity of each mountain forest ecosystem	9000	0	0	9000
Activity E11.1.2. Conduct research on high-value endangered and extinct plant and animal species in each mountain forest ecosystem	200000	200000	200000	600000
Activity E11.1.3. Conduct research on the replenishment modes and evolution of springheads in each mountain forest ecosystem	200000	200000	200000	600000
Activity E11.1.4. Conduct research on the impacts of actions to restore the biodiversity of mountain forest ecosystems	50000	50000	50000	150000
TOTAL Action 11.1	**459000**	**450000**	**450000**	**1359000**
Action 11.2. Create a network of mountain forest ecosystems				
Activity E11.2.1. Create a framework for dialogue and exchanges between the administrators, researchers and local communities of mountain forest ecosystems	125000	0	0	125000
Activity E11.2.2. Schedule monitoring activities in a concerted manner between administrators of the same cross-border mountain forest ecosystem	375000	375000	375000	1125000
TOTAL Action 11.2	**500000**	**375000**	**375000**	**1250000**
Action 11.3. Develop and implement pilot demonstration projects for the restoration and/or preservation of each mountain forest ecosystem				
Activity E11.3.1. Identify and map zones at an advanced stage of degradation or with biodiversity under threat, for each mountain forest ecosystem	2000000	0	0	2000000
Activity E11.3.2. Experiment with a pilot project for the participatory restoration and management of resources and biodiversity, for each mountain forest ecosystem	3600000	3600000	4800000	12000000
Activity E11.3.3. Capitalize on and implement conclusive pilot project results on the sites concerned	0	100000	100000	200000

Activity E11.3.4. Set up a system for continuous monitoring of changes in the biodiversity of each mountain forest ecosystem	250000	250000	250000	750000
TOTAL Action 11.3	**5850000**	**3950000**	**5150000**	**14950000**
TOTAL LTEQO 11	**6809000**	**4675000**	**5875000**	**17359000**
LTEQO 12. Stabilized catchment areas and riverbanks in the Inner Delta in Mali, the Niger Belt, the Middle Niger up to Kainjin in Nigeria, and the Chad portion of the Bénoué Basin				
Action 12.1. Review the existing situation in terms of silting levels and plant cover at each site				
Activity E12.1.1. Review the existing situation in terms of basin zones severely degraded by water and wind erosion	15000	0	0	15000
Activity E12.1.2. Update the situation in terms of silting levels and danger of silting of the riverbed at each site	2000000	0	0	2000000
TOTAL Action 12.1	**2015000**	**0**	**0**	**2015000**
Action 12.2. Develop and implement a program for water and soil conservation and for reforestation of the degraded zones of each site				
Activity E12.2.1. Capitalize on SCP experience in controlling silting of the river	22500	0	0	22500
Activity E12.2.2. Devise an integrated development plan for water and soil conservation in degraded sub-catchment areas at each site	22500	0	0	22500
Activity E12.2.3. At each site, conduct bank stabilization or dredging actions on severely silted segments and reserves, to restore their flows	10000000	10000000	10000000	30000000
TOTAL Action 12.2	**10045000**	**10000000**	**1000000**	**30045000**
Action 12.3. Develop and implement a demonstration program on the sustainable exploitation and management of the site's resources				
Activity E12.3.1. Implement agricultural and pastoral practices causing little degradation of soils and plant cover, in the sub-catchment areas of each site	5000000	5000000	5000000	15000000
Activity E12.3.2. Organize the local communities in natural resource management structures for each sub-catchment area in the site	125000	0	0	125000
Activity E12.3.3. Discourage the plundering of construction materials in the riverbed and the discharge near riverbanks of extraction residue from mines	250000	250000	250000	750000
TOTAL Action 12.3	**5375000**	**5250000**	**5250000**	**15875000**
TOTAL LTEQO 12	**17435000**	**15250000**	**15250000**	**47935000**
TOTAL LTEQO	***213836887***	***202107444***	***200607444***	***616551775***

Appendix 4: ctd.)

B. Legal and institutional reforms and stakeholder capacity building measures

	FYP1	FYP2	FYP3	TOTAL
REFORMS OF THE LEGAL AND INSTITUTIONAL FRAMEWORKS				
Reforms for the improvement of the legal framework				
Action1. Updating and harmonization of the legal framework				
Activity J1.1. Dissemination of the Environmental Charter (IP/SDAP)	27000	0	0	27000
Activity J1.2. Harmonization of the legislative and regulatory texts on transhumance	45000	0	0	45000
Activity J1.3. Harmonize the legal and institutional framework for water pollution control	9000	0	0	9000
Activity J1. 4. Evaluate and harmonize the laws and regulations on pollution control	9000	9000	9000	27000
Activity J1.5. Harmonize the regulatory and legislative texts on biodiversity conservation in aquatic ecosystems	20000	20000	20000	60000
Activity J1.6. Develop regulatory and legislative texts on customary environmental law				0
Activity J1.7. Develop regulatory and legislative texts on social impact studies	40500	0	0	40500
Activity J1.8. Develop regulatory and legislative texts on strategic environmental assessments	40500	0	0	40500
Activity J1.9. Develop regulatory and legislative texts on plant and animal health safety	180000	0	0	180000
Activity J1.10. Develop regulatory and legislative texts on the protection of aquatic ecosystems	180000	0	0	180000
Activity J1.11. Develop regulatory and legislative texts on the protection of national genetic resources	180000	0	0	180000

Activity J1.12. Develop regulatory and legislative texts on the involuntary displacement/resettlement of populations	180000	0	0	180000
Activity J1.13. Develop regulatory and legislative texts on the prevention and management of biotechnological risks	360000	0	0	360000
Activity J1.14. Initiate in-depth participatory discussions at the basin level, on the ability of current national land laws to ensure sustainable use of the land	225000	0	0	225000
Activity J1.15. Define a legal and institutional framework for the harmonious exploitation and management of forest cover and rangeland	360000	0	0	360000
Activity J1.16. Define a legal and institutional framework for the harmonious exploitation and management of soils	360000	0	0	360000
Activity J1.17. Develop regional water quality standards and implement a regional program for its control and monitoring of water resource quality	465	450	450	1365
Activity J1.18. Experiment with local land conventions to promote investment in activities for the conservation, protection and sustainable improvement of soil productivity	18000	0	0	18000
Activity J1.19. Finalize and validate the study on the alignment of IWRM at the national and regional levels	20000	0	0	20000
Activity J1.20. Develop and apply the legislation implementing the Water Charter (cf. section 3.1. IP)	45000	0	0	45000
TOTAL ACTION 1	2299465	29450	29450	2358365
TOTAL SALR	**2299465**	**29450**	**29450**	**2358365**
Reforms for the improvement of the institutional framework				0
Action 1. Continuation and expansion of reforms stipulated in the SDAP				0

Activity I1.1. Include environmental management concerns in the SDAP's institutional reforms: Implementation of the SAP will require the continuation and intensification of these reforms, while at the same time expanding some of them to better incorporate issues relating to environmental management	180000	0	180000	360000
TOTAL ACTION 1	**180000**	**0**	**180000**	360000
Action2. Capitalization on relevant experience				0
Activity I2.1. Conduct a capitalization study on NRM experiences in the Niger Basin	180000	0	180000	360000
Activity I2.2. Conduct a capitalization study on experience in water hyacinth control	13500	0	0	13500
Activity I2.3. Conduct a capitalization study on experience in *Sida cordifolia* control	13500	0	0	13500
Activity I2.4. Conduct a capitalization study on silting control experience	13500	0	0	13500
Activity I2.5. Conduct a capitalization study on experience in using energy sources alternative to wood	71100	67900	69200	208200
Activity I2.6. Conduct a capitalization study on experience in recovering degraded land	13500	0	0	13500
TOTAL ACTION 2	**305100**	**67900**	**249200**	1342200
TOTAL SAIR	**485100**	**67900**	**429200**	1702200
STRATEGIC CAPACITY BUILDING ACTION				0
Action 1. Build the capacities of the NBA and of the Niger Basin Observatory				0
Activity C1.1. Develop the basin's capacity to obtain climate-related information	77500	0	0	77500
Activity C1.2. Build the NBO's capacities to ensure ecological and aquatic ecosystem biodiversity monitoring	675000	675000	675000	2025000
Activity C1.3. Build the NBO's capacities to ensure ecological and invasive aquatic species monitoring	675000	675000	675000	2025000

Activity C1.4. Build the NBO's capacities to ensure water resource monitoring	675000	675000	675000	2025000
Activity C1.5. Provide the NBO with substantial, regular funding, so that it may fulfill all of its monitoring tasks in relation to water resources and the responses of the environment to the actions	675000	675000	675000	2025000
TOTAL ACTION 1	**2777500**	**2700000**	**2700000**	8177500
Action 2. Strengthening of the framework for the participation of civil society				0
Activity C2.1. Boosting of the Regional Coordination Body for Natural Resource Users	20000	0	0	20000
Activity C2.2. Develop and implement training/information programs on environmental issues intended for elected officials, administrative and traditional authorities, grassroots community organizations, NGOs, etc.	90000	0	90000	180000
Activity C2.3. Promote environmental partnerships between NGOs, governments and the private sector	9000	9000	9000	27000
Activity C2.4 Disseminate and support the implementation of a public participation strategy developed by the NGO *Eau Vive*	45000	0	0	45000
Activity C2.5 Support the operation of the Network of Communicators set up in the States with support from the RLWDT project	45000	45000	45000	135000
Activity C2.6. Provide regular training for journalists, to strengthen environmental journalism and to improve media coverage of environmental topics	180000	180000	180000	540000
Activity C2.7. Promote environmental education in elementary, middle and high schools: i) introduction of environmental issues in teaching programs; ii) production and dissemination of teaching manuals and material; iii) training of teachers and of inspectors/educational advisors	90000	90000	90000	270000
Activity C2.8. Encourage behavioral change in relation to the environment among administrative and traditional authorities, local elected officials, grassroots community organizations, NGOs and the general public, etc, through: i) the organization of workshops; ii) the	225000	225000	225000	675000

organization of debates broadcast on the radio or on television; iii) the instauration of an "Environment Day"				
TOTAL ACTION 2	**704000**	**549000**	**639000**	1892000
Action 3. Strengthening the capacities of the NFSs				0
Activity C3.1. Ensure specific training for the members of the national structures for the collection and management of data on water resources and the state of the environment	135000	135000	135000	405000
TOTAL ACTION 3	**135000**	**135000**	**135000**	405000
Action 4. Strengthening of the process for involving the scientific community				0
Activity C4.1. Accelerate the process for the setting up and operationalization of the Panel of Experts of the NBA	18000	0	18000	36000
Activity C4.2. Encourage high-level scientific production for the creation of a fund for scientific research of the basin	450000	450000	450000	1350000
TOTAL ACTION 4	**468000**	**450000**	**468000**	1386000
Action 5. Diversification of revenue sources for the poorest populations				0
Activity C5.1. Create a micro-subsidy fund for community development projects for: the production and marketing of fruit and forest plants; ii) the organization of rural wood markets; iii) the construction of farm ponds and stocking of ponds; iv) the recuperation of degraded land; v) agro-forestry	9000000	9000000	9000000	27000000
Activity C5.2. Promote alternative, revenue-generating NRM activities: i) recuperation and recycling of plastic packaging; ii) manufacturing of improved domestic burners	900000	900000	900000	2700000
TOTAL ACTION 5	**18000000**	**18000000**	**18000000**	**54000000**
TOTAL SCBA	**22084500**	**21834000**	**21942000**	65860500
TOTAL REFORMS AND MEASURES	**25229065**	**21931350**	**22760650**	69921065