

## PROJECT BRIEF

### 1. IDENTIFIERS

<b>PROJECT NUMBER:</b>	<b>1148</b>
<b>PROJECT TITLE:</b>	<b>Senegal: Integrated Ecosystem Management in Four Representative Landscapes</b>
<b>DURATION:</b>	Ten years
<b>IMPLEMENTING AGENCY:</b>	United Nations Development Programme (UNDP)
<b>EXECUTING AGENCY:</b>	Ministry of Environment (ME) with the cooperation of DPN,
	DEFCCS, DCERP; and Ministry of Fisheries
<b>REQUESTING COUNTRY:</b>	Senegal
<b>ELIGIBILITY:</b>	Convention on Biological Diversity ratified in June 1994
<b>GEF FOCAL AREA:</b>	Biodiversity and Climate Change, Crosscutting with Land Degradation
<b>GEF OPERATIONAL PROGRAMME:</b>	OP12: Integrated Ecosystem Management

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**2. SUMMARY:** The project will promote community-based integrated ecosystem management (IEM) of globally significant biodiversity, sequestering of C and avoidance C emissions, and prevent degradation of 4 landscapes selected to represent the four major ecosystems in the country : (1) the Wildlife and Sylvo-pastoral Reserves in the Ferlo Steppe; (2) the Niokolo-Koba National Park and its associated Classified Forests in the South-East Sudanin-Guinean zone; (3) the Niayes coastal dunes and classified reserves along the northern sea front; and (4) the Saloum Delta National Park and associated classified forests and mangrove/marine systems in the south-eastern coastal area. The alternative GEF scenario will build on the baseline by testing and applying an ICD model at each site, promoting integrated eco-regional planning, and removing the legal, policy, and technical barriers to IEM. The landscapes consist of three inter-linked spatial units : PAs, newly established CNRs (Community Nature Reserves), and VTs (Village Territories). In the VTs, production systems will be intensified, land use will be rationalized and food and energy self-sufficiency will be promoted in order to enhance natural resource management and reduce pressure on protected areas. In the CNRs, participatory, integrated, management plans for sustainable use and conflict resolution will be promoted in order to create buffer zones, and alternative techniques for income diversification through sustainable harvesting of biological resources will be demonstrated. In the PAs, a co-management model will be tested for the first time in the Sahel including mechanisms for the equitable sharing of benefits accruing from conservation. Furthermore, the project will build institutional and technical capacities, will demonstrate innovative incentives for conservation, and will monitor impacts on biodiversity and carbon balances over the ten year period. The project will be phased. In the First Phase, the it will remove barriers and create the enabling environment for IEM, ICD, CNRs, and Eco-regional Planning. In the Second Phase, it will test these models in sample sites and catalogue lessons learnt. In the Third Phase, replication of project results will be done by the populations themselves, as well as State services, ongoing projects and NGOs, in order to generate global benefits as well as sustainable socio-economic and environmental benefits at the national level well beyond project life.

## 2. COST AND FINANCING (MILLION US\$)

<b>GEF:</b>	Project	:	9.720	Phase 1:	4.000
	PDF B	:	0.350	Phase 2:	4.320
	<b>Sub-total</b>	:	<b>10.070</b>	Phase 3:	1.400

### Direct Co-financing:

<b>Senegal</b>	Project inkind	:	7.266	Phase 1:	2.350
	Project cash	:	1.050	Phase 2:	2.357
	PDF B	:	0.081	Phase 3:	3.609
	<b>Sub-total</b>	:	<b>8.397</b>		

<b>UNDP</b>	Project	:	3.192	Phase 1:	1.650
	PDF B	:	0.051	Phase 2:	1.200
	<b>Sub-total</b>	:	<b>3.243</b>	Phase 3:	0.342

### Re-programmed Co-financing:

<b>Japan</b>	:	<b>3.298</b>	Sub-Total Phasing:		
<b>Netherlands</b>	:	<b>2.000</b>	Phase 1:	6.500	
<b>EU</b>	:	<b>1.105</b>	Phase 2:	2.305	
<b>CIDA</b>	:	<b>1.500</b>	Phase 3:	1.098	
<b>USAID</b>	:	<b>1.000</b>			
<b>GTZ</b>	:	<b>1.000</b>			
<b>Sub-total</b>	:	<b>9.903</b>			

**Total co-financing** : **21.543**

<b>GRAND TOTAL PROJECT</b>	:	<b>31.613</b>	Total Project Phasing:		
			Phase 1:	14.500	
			Phase 2:	10.182	
			Phase 3:	6.449	

## 4. ASSOCIATED FINANCING (MILLION US\$)

Local Development Funds (UNDP) :	2.098
Partnership to fight poverty (AfDB) :	8.167
Promotion of Agric. Intensification (IDA):	7.100
Village Self-management (IFAD):	10.960
Traditional energy management(WB/UNDP-GEF):	10.145
Reinforcement of borehole management (CFD):	9.914
Support to Artisanal fisheries (EDF/AFD):	7.983
Fight against bush fires (GoS) :	3.906
Rehabilitation of PNNK (FDS/FFEM):	0.608
<b>Total:</b>	<b>60.881</b>

**5. ENDORSEMENT OF OPERATIONAL FOCAL POINT:** Name: Ms. Fatimata Dia TOURE, Director of Environment and Classified Establishments-Ministry of Environment; Date: Letter of Endorsement No. 0492 of 27 July 2000.

**6. CONTACTS:** Maryam Niamir-Fuller: UNDP-GEF Regional Coordinator for Biodiversity and International Waters: e-mail: [maryam.niamir-fuller@undp.org](mailto:maryam.niamir-fuller@undp.org)

Ramon Prudencio C. de Mesa

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## LIST OF ACRONYMS AND ABBREVIATIONS

AFD	:	French Development Agency ( <i>Agence Française pour le Développement</i> )
AIEA	:	IAEA ( <i>Agence Internationale pour l'Energie Atomique</i> )
ATEF	:	Water and Forestry Technical Agent ( <i>Agent Technique des Eaux et Forêts</i> )
BOAD	:	West African Development Bank ( <i>Banque Ouest Africain pour le Développement</i> )
CBNRM	:	Community Based Natural Resource Management
CERP	:	Polyfunctional Rural Expansion Centre ( <i>Centre d'Expansion Rurale Polyvalent</i> )
CF	:	Classified Forest
CITES	:	Convention on International Trade in Endangered Species
CNR	:	Community Nature Reserve
CONSERE	:	Higher Council for Environment and Natural Resources ( <i>Conseil Supérieur de l'Environnement et des Ressources Naturelles</i> )
CSE	:	Ecological Monitoring Centre ( <i>Centre de Suivi Ecologique</i> )
CZM	:	Coastal Zone Management
DA	:	Directorate of Agriculture
DAT	:	Directorate of Land-Use Planning ( <i>Direction de l'Aménagement du Territoire</i> )
DEEC	:	Directorate of Environment and Classified Establishments ( <i>Direction de l'Environnement et des Etablissements Classés</i> )
DEFCCS	:	Directorate of Water, Forestry, Hunting and Soil Conservation ( <i>Direction des Eaux, Forêts, Chasses et de la Conservation des Sols</i> )
DIREL	:	Directorate of Livestock ( <i>Direction de l'Elevage</i> )
DP	:	Directorate of Planning
DPN	:	Directorate of National Parks ( <i>Direction des Parcs Nationaux</i> )
DPV	:	Directorate of Plant Protection ( <i>Direction de la Protection des Végétaux</i> )
ECN	:	Niayes Coastal Ecosystems ( <i>Ecosystèmes Côtiers des Niayes</i> )
FAO	:	Food and Agricultural Organization of the United Nations
FDS	:	Social Development Fund ( <i>Fonds de Développement Social</i> )
FED	:	European Development Fund ( <i>Fonds Européen de Développement</i> )
FFEM	:	French Fund for Global Environment ( <i>Fonds Français pour l'Environnement Mondial</i> )
FRG	:	Federal Republic of Germany
GEF	:	Global Environment Facility
GIE	:	Economic Interest Group ( <i>Groupe d'Intérêt Economique</i> )
GoS	:	Government of Senegal
ICD	:	Integrated Conservation and Development
IEF	:	Water and Forestry Engineer ( <i>Ingénieur des Eaux et Forêts</i> )
IEM	:	Integrated Ecosystem Management
IREF	:	Regional Inspectorate of Water and Forestry ( <i>Inspection Régionale des Eaux et Forêts</i> )
ISE	:	Environmental Sciences Institute ( <i>Institut des Sciences de l'Environnement</i> )
ITA	:	Agricultural Engineer ( <i>Ingénieur des Travaux Agricoles</i> )
ITE	:	Animal Science Engineer ( <i>Ingénieur des Travaux d'Elevage</i> )
ITEF	:	Water and Forestry Work Engineer ( <i>Ingénieur des Travaux des Eaux et Forêts</i> )
IUCN	:	International Union for Conservation of Nature
LC	:	Local Community
LMC	:	Local Management Committee
MA	:	Ministry of Agriculture
MAB	:	Man and Biosphere
MAT	:	Ministry of Land-Planning ( <i>Ministère de l'Aménagement du Territoire</i> )
ME	:	Ministry of Environment
MEF	:	Ministry of Economy and Finance
MI	:	Ministry of the Interior
NGO	:	Non-Governmental Organization
NP	:	National Park
NRM	:	Natural Resource Management
PA	:	Protected Area
PAGAP	:	PA Development and Management Plan ( <i>Plan d'Aménagement et de Gestion des AP</i> )
PAGERNA	:	NRM Self-Promotion Project ( <i>Projet d'Autopromotion en Gestion des Ressources Naturelles</i> )
PAGTV	:	Village Land Development and Management Plan ( <i>Plan d'Aménagement et de Gestion des TV</i> )
PAN/LCD	:	National Action Plan to Combat Desertification ( <i>Plan d'Action National pour la Lutte Contre la Désertification</i> )
PCU	:	Project Coordination Unit
PFIE	:	Environmental Training and Information Programme ( <i>Programme de Formation et d'Information</i> )

		<i>Environnementale)</i>
PGCRN	:	Community-based Natural Resource Management Project ( <i>Projet de Gestion Communautaire des Ressources Naturelles</i> )
PNACB	:	National Action Plan for Biodiversity Conservation ( <i>Plan National d'Action pour la Conservation de la Biodiversité</i> )
PNAE	:	National Environmental Action Plan ( <i>Plan National d'Action pour l'Environnement</i> )
PNDS	:	Saloum Delta National Park ( <i>Parc National du Delta du Saloum</i> )
PNNK	:	Niokolo-Koba National Park ( <i>Parc National de Niokolo-Koba</i> )
PROGEDE	:	Participatory Management of Traditional and Alternative Energies Project ( <i>Projet de Gestion Participative des Energies traditionnelles et de Substitution</i> )
PSAOP	:	Agricultural Service and Private Organization Programme ( <i>Programme du Service Agricole et Organisation Privée</i> )
PTIP	:	Triennial Public Investment Programme ( <i>Programme Triennal d'Investissement Public</i> )
PU	:	Pastoral Unit
RC	:	Rural Community
RFA	:	Federal Republic of Germany
SFIECE	:	Environmental Awareness, Training, Information and Communication Programme ( <i>Sensibilisation, Formation, Information, Communication Environnementale</i> )
SNCB	:	National Strategy for Biodiversity Conservation ( <i>Stratégie Nationale pour la Conservation de la Biodiversité</i> )
SPR	:	Sylvo-Pastoral Reserve
UNDP	:	United Nations Development Programme
UNESCO	:	United Nations Education, Science and Culture Organisation
USAID	:	United States Agency for International Development
VG	:	Village Group
VT	:	Village Territories
WR	:	Wildlife Reserve

## PROJECT CONTEXT

### ***Environment Context and Global Significance***

1. Senegal is located at the crossroads of four major West African climatic zones – Saharan, Sahelian, Sudanian and Guinean. Senegalese ecosystems are characterized by their relative diversity and their multiple functions (environmental, economic, social and cultural). The country's ecosystems range from steppes, grassland and tree savanna in the North, to dry sub-guinean open forest formations in the East and South, and coastal and littoral ecosystems located along the entire length of the country's Atlantic coastline (500 km). Senegals' protected areas include 6 National Parks, 3 Wildlife Reserves, 8 Hunting Reserves, 20 Sylvo-pastoral Reserves, and 213 Classified Forests, all covering a total area of 11,934,663 ha (MEPN; 1993:35-39), or over 40% of the country's land area. Three of the protected areas are Biosphere Reserves; two are UNESCO World Heritage Sites, and four are Ramsar Wetland sites.
2. Senegal's carbon balance is in the negative. Total emissions of 9539.3 Gg of equivalent CO<sub>2</sub> are derived from energy consumption (41%), agriculture (31.3%), wastes (23.8%) and industry (3.9%). Senegal's forests are estimated to have a net sequestration capacity of 6001 Gg equivalent CO<sub>2</sub>, or 63% of emissions. However, this does not count the potential sequestration from estimated soil organic stock of around 1700 Gg (Batjes 1998).
3. Overall, ecosystem degradation is due to the impact of overgrazing, logging, erosion, bush fires and drought. Forest degradation in the country is estimated at 250,000 ha of tree savanna each year, i.e. 2% of the country's wood resources (Senegal Forest Action Plan, 1993). Rangeland degradation in the Ferlo has been estimated at 80,000 ha/year. Carbon emissions from forest degradation and rangeland fires is estimated to be about 19,286 Gg per year. Mangrove degradation is estimated at 10% a year, primarily from natural and anthropogenic causes. Natural pressures are due to changes in ocean currents caused by the disappearance of Sangomar Point between Toubacouta and Niodior. Anthropogenic pressures are linked to increased need for fuelwood and inappropriate techniques for oyster harvesting. Some 395,000 tons of fish (and over 300 marine species) are caught per year, 80% of which by traditional fishing. Of this tonnage, two species of sardinella alone represent more than 60% of the catch (DPM, 2000).
4. Annex IXa shows the major ecoregions of Senegal. The central zone as well as the Senegal River Valley are the most densely occupied and rate of land conversion to agriculture is high (Annex IXb). Of the remainder, biodiversity values still remain high in four major ecoregions : north and eastern pastoral, south and south-eastern savanna woodlands, Niaye complex of dunes and marshes, and southern mangroves. The project has identified four sites of high global significant most representative of these four main ecosystems (Annex IXc) - summarised below. Annex VII provides detailed description of the flora and fauna of these ecosystems and lists the protected areas chosen to be part of the project.

### **Sylvo-Pastoral Ecosystems**

5. This ecosystem extends over a total of 5,816,900 ha in the north-eastern part of the country, i.e. 45% of the country's vegetation cover. It contains 9 protected areas (PAs) including Classified Forests (CFs), sylvo-pastoral reserves (SPRs) and wildlife reserves (WRs). The northern part of this ecosystem is grassland and shrub steppe (37%), largely dominated by Sahelian species, such as *Acacia tortilis* and *Balanites aegyptiaca*. The southern part is mainly wooded savanna (55%) of Sudano-Sahelian species such as *Pterocarpus lucens* and various Combretaceae. The transition consists of intermixing of Saharo-Sahelian shrubs (8%) such as *Guiera senegalensis*, *Combretum glutinosum*, *Grewia flavescens*, and *Anogeissus leiocarpus* (Bonfiglioli *et al*, 1988; Republic of Senegal, 1993:43).

6. Rainy season precipitation varies widely over time and space, producing a mosaic of pasture lands whose access and use by both domestic and wild animals are dependent upon the availability of water in depressions, ponds and permanent boreholes. A significant decrease in rainfall and irregular regime in the last three decades have resulted in the early drying of ponds, high mortality of certain plant species, and wind and water erosion. This phenomenon has been compounded by pressure from human activity, particularly around permanent water points. Eros Data Center reports that since 1982, there has been a general regression in the vegetation composition, decreasing soil cover, productivity, regeneration capacity and diversity of the vegetation community. In addition, desiccation induces transhumants to go further south, often reaching Niokolo-Koba Park in search of better conditions. However, such unplanned, and uncontrolled transhumance also disturbs the Park's ecosystems (see below).

7. Of the 31 rare plant species that are globally threatened and listed on the IUCN Red List for Senegal, there are three known endemic species in the Ferlo region : *Abutilon macropodum*, *Digitaria aristulata*, and *Nesaca dodecandra*. In addition, the status of *Justicia niokoloKobae*, *Digitaria aristulata*, *Dalbergia melanoxylon*, and *Pterocarpus lucens* remains critical. In spite of ecosystem degradation, several animal species are still observed in the Ferlo Fauna Reserves, including ostrich (the last remaining population in Senegal), Arabian bustard, Grimm's duiker, red-fronted gazelle, bushbuck, patas, porcupine and aardvark. The region provides wintering grounds for several migratory species, in particular raptors, such as the bustard, the land calao (*Bucorvus abyssinicus*), the bateleur eagle (*Terathopius ecaudatus*), and to a lesser extent, the white-tailed African kite, present only on a narrow strip through Sub-Saharan Africa (Ornis et al, 1998). The landscapes outside PAs still harbour significant biodiversity populations as well as biomass for carbon sequestration, mainly due to the dominance of mobile transhumance.

8. The eastern Ferlo's continuing capacity to facilitate migration of fauna to and from Niokolo-Koba National Park further south (aided by a corridor of contiguous classified forests), and as a wintering ground for palearctic migratory birds, add further to the sites's global significance and strategic importance for biodiversity conservation in Senegal, making this ecosystem an obvious choice for selection.

## Forest Ecosystems

9. The forest ecosystems in the south-east of the country consist mainly of dry, open forests of the sudanian type, with sub-guinean type forest further south, and interspersed dense gallery forest formations (Republic of Senegal, 1993:43). The transition zone to the Sylvo-pastoral zone consists of sahelo-sudanian wooded savanna. This ecosystem represents the most important ligneous cover in the country, both in terms of density and acreage. It contains diverse flora and fauna, including rare sudanian species such as the galago (*Galago senegalensis*). The vegetation cover is generally dominated by *Bombax costatum* (kapok tree), *Pterocarpus erinaceus*, *Daniellia oliveri* and *Sterculia setigera* and an underbrush with combretaceae and high perennial gramineae. This eastern forest zone includes a total of 6 PAs consisting of 4 Classified Forests, a National Park and a Wildlife Reserve. Gallery forests in the Niokolo-Koba system account for 78% of the gallery forests of Senegal, and harbour borassus and raphia palms as well as meadow swamps. Of the 31 plant species considered endemic to Senegal, 12 are present in this area, 8 of which are considered threatened by the NBSAP.

10. The area contains 80 mammal species, some 330 bird species, 36 reptilian species, 60 fish species, 2 amphibian species, numerous invertebrate species, and 1500 species of flora. Of these, 12 floral and 7 faunal species are endemic to Senegal, and 8 are listed on the IUCN Red List. Carnivores include the charismatic species such as the panther, lion and African wolf (*Lycaon pictus*). Also present in the area is the only viable population the sub-region of Derby eland (*Taurotragus derbianus*) (approximately 1,000 individuals according to the latest survey). The Park is also the last refuge for the elephant (*Loxodonta africana*) in Senegal, and only approximately 150 chimpanzees (*Pan troglodytes*) inhabit the Park's gallery forests. The site also has strategic global importance since it provides feed and shelter for

migratory fauna during the dry season (Diop 2000:18). The landscapes outside PAs still harbour important biodiversity and carbon sinks because of the relatively low density of crop cultivation, when compared to the Peanut Basin and the Coastal areas.

### Niayes Coastal Ecosystem

11. The Niayes region is formed by the Atlantic fringe of the coast of Senegal from Dakar to Saint Louis. It stretches over nearly 180 km North to South, with a width between 30 to 35 km and is characterised by a succession of dunes and interdunal depressions frequently containing ponds which appear as the water table rises. It is distinguished from the rest of the country by a humid, sub-canarian maritime climate and strong, relatively constant marine trade winds. The dunes are sterile and active on the coast (white dunes), but stabilise gradually as one progresses towards the interior (red dunes) with the appearance of a very fragile vegetation cover. In the interdunal depressions, the soils are rich and suited for vegetable and fruit crops. The vegetation is sub-guinean in nature dominated by *Elae guinensis* in several tiers, but has been severely degraded due to human activities. This is compounded by droughts, which have caused a drop in the water table level, gradual salinization and an accelerated encroachment of active dunes.

12. Of the 31 plant species endemic to Senegal, 13 were found in the Niayes and 10 of them are threatened. The two species of the genus *Ceropegia* are also included in the 1996 CITES list. This zone has 9 PAs. The Gueumbeul Hunting Reserve is globally significant as a wintering area for thousands of birds, mainly waders. The Langue de Barbarie National park is an important sanctuary for green (*Chelonias mydas*), leatherback (*Dermochelys coriacea*), and loggerhead turtles (*Caretta caretta*) and the common dolphin (*Delphinus delphis*). All these species are now on IUCN's Red List because of over-exploitation due to their culinary utility. Fish populations have generally decreased in the Niayes ponds and lakes. Some formerly abundant species, such as protopterus, have become very rare. Most of the forest species protected by the Forestry Code have practically disappeared from the Niayes region, hence the urgency to act for biodiversity conservation in this ecosystem, one of the rarest in the world.

### Saloum Domain

13. The Saloum ecosystem consists of three interdependent biophysical domains: (1) the continental domain consisting of guinean gallery and Sudanian wooded savanna, blending into the mangroves in the intertidal and coastal zone; (2) the insular domain with three major groups of islands (two of which are inhabited, containing some 25 villages); and (3) the marine domain, extending 10 km into the ocean. The Saloum estuary is a confluence of three rivers: the Saloum, the Diombos and the Bandiala interlinked by channels, each of which has its own chemical and biological characteristics.

14. Three of the 31 endemic plants of Senegal are found in the forests of this Domain (*Lipocarpa prieuriana*, *Scleria chevalieri* and *Ficus dicranostul*). Fourteen tree species found in the area are rare and/or threatened (IUCN 1999) and are listed in the Forestry Code. Mangrove ecosystems extend over 80% of the surface area of the Saloum Delta National Park. The southern part of this mangrove is particularly well protected, and provides a rest and night shelter for numerous bird species, a refuge for several wild animals such as hyenas, and spawning and feeding grounds for fish. The islands' sand strings and terraces contain diverse flora with threatened species such as *Phoenix reclinata*, various Guinean species at the edge of their distribution areas, and important stands of rare species (*Lophira lanceolata*). According to Lykke (1996), the Fathala Classified Forest on the continental domain alone contains at least 400 plant species, including 160 ligneous species belonging to 39 families.

15. Manatees (*Trichechus senegalensis*), hump-backed dolphins (*Souza teuszii*), common dolphins (*Delphinus delphis*) and several species of marine turtles live in the marine section of the Park but are highly threatened. In addition, 36 wild mammal species have been recorded in the Saloum Delta area, more particularly within the PNDS area. Among these species, the leopard (*Panthera pardus*) and the



roan antelope (*Hippotragus equinus*) have recently disappeared. Among the crustaceans are some fifty species of lobsters, crayfish, slipper lobsters, shrimp, crabs and stomatopoda. Three fish species have disappeared or have become extremely rare: the tarpon (*Tarpon atlanticus*), the sawfish (*Pristis spp*), and the straw-fish (*Rhynchobatus lubberti*). In addition, *Lisa bandialensis*, carp (or yaakh) and groupers (*Epinephelus aenus*) or Thiof, are decreasing because they are highly sought after by Senegalese consumers. Furthermore, sharks, *Caranx hipos*, *Tilapia guineensis* and turtles are decreasing primarily due to disturbances in their nesting areas and over-exploitation. Sharks and rays, whose fins have a high commercial value, are subject to intense fishing pressures.

### **Socio-economic context and anthropogenic pressures**

16. Traditionally based on extensive agriculture, livestock farming, hunting and gathering, Senegal's present economy is dominated by the primary sector with increasing importance of services and low added value from the processing of crop, livestock and fish products. In each of the three major types of ecosystems, the socio-economic context is characterised by high consumption of biological resources in the production, processing, storage and marketing of goods. However, the nature of the production system varies in each of the ecosystems. Annex VIII provides detailed description of the socio-economic context, and describes the existing linkages between sustainable use and conservation.

17. The **Ferlo** is inhabited by several agro-pastoral ethnic groups (Wolof, Toucouleur, Sarakollé, Pheul). The first three are primarily sedentary, while the Pheul are primarily transhumant (Benoit 1988), but all practice both livestock and crop farming. Gathering of natural products, such as gum arabic from *Acacia senegal*, provides food, manufactured products and cash income. The dominant feature of traditional pastoralism is short or long distance mobility of animals, as a strategy for risk management (e.g. risks linked to climate, health, policy and conditions of natural resources).

18. Recently the character of agro-pastoralism has changed considerably in the Ferlo. First, the creation of boreholes in the 1980's has opened new pastureland, but has also resulted in an influx of transhumants from outside the system who are often unofficially sanctioned by local staff of Water and Forest Department. This is increasingly leading to overgrazing around the boreholes, and conflicts between traditional users and the newcomers. The fact that boreholes frequently break down adds to the pressure. Second, the high domestic demand for small ruminant meat has led to an increase in the number of extensive sheep and goat herds and an influx of Waalwaalbe families who specialize in small ruminant breeding. This has contributed to over-grazing, but also has increased the motivation of herders to kill predators such as jackals and hyenas who threaten small ruminants. But by far the greatest pressure comes from a third tendency, that of increasing settlement and influx of new farmers, resulting in excessive conversion of land to crops. This has not only resulted in degradation of lands marginal to cropping, but also reduction in pastureland, thus increasing pressure elsewhere. Although Rural Communities are legally embowered to regulate Village Territories and Sylvo-pastoral Reserves in terms of land use plus sustainable harvesting of resources, they are not able to enforce the law effectively nor to prevent chaotic settlement and cultivation from seeping into the Reserves.

19. Finally, the droughts have induced ever greater transhumance from Ferlo to the southern regions around Niokolo-Koba. The same pastoralists who are at home in the Ferlo, are now seen as outsiders by residents of Niokolo-Koba area. The frequency and destructiveness of bush fires has apparently not changed in recent years; however, it continues to be a major factor in determining both the health of the ecosystem, as well as its wood and forage supply. There is general agreement among local residents, Forestry Department, and scientists that fire must be managed more effectively.

20. The vast majority (91%) of the active population in the **Niokolo-Koba** zone is involved in agriculture, mostly at the subsistence levels, despite the low occupation rate of arable land in the region

(3.9% only). Cereals (millet, maize, sorghum and rice) extend over 58% of the cultivated areas. Agricultural activities are marginally mechanized, rely on high labour input, and contribute to 40% of the GDP in the area. The greatest threat to biodiversity comes from ever expanding extensive crop cultivation. Livestock contribute to 30% of the GDP. Although livestock production is less extensive than in the Ferlo, it nevertheless has been increasingly pushed into or around protected areas because of expanding crop cultivation and settlement.

21. The second major threat to biodiversity comes from fuelwood harvesting. More than 55% of the country's domestic energy needs are met from wood and charcoal (UNDP, 1999:204), almost all of which is extracted and produced in the Niokolo-Koba zone. The extent of poaching the third major threat is much higher in this region, primarily due to hunting, but also to self-protection by farmers and herders. Furthermore, the relatively high cost of customary hunting permits encourages poaching. Poaching has been shown to be responsible for the disappearance of certain species such as the giraffe and the damalisk, and for the marked decrease in elephant and antelope populations. The lack of human and physical resources in the PAs management systems, the rigidity of the legal status of protected areas which does not allow benefit sharing, and the resultant low interest in conservation on the part of the population, all contribute to poaching. Hunting tourism has been introduced into the buffer zones of Niokolo-Koba National Park to generate revenue for park management. However, in some cases the concessions have not been well managed (hunting inside core areas and out-of-season hunting) to the extent that already there is some evidence that kill rates exceed sustainable limits. Until recently, the PNNK constituted a sanctuary, but the construction of a road several hundreds of kilometres in length cutting across the park poses grave threats for the fauna.

22. The **Niayes** is an important area for fruit and vegetable production (tomatoes, lettuce, onions, beets, cabbages, strawberries, and to a lesser extent rice), providing 2/3<sup>rd</sup> of Dakar's consumption and 89% of the national consumption. This production employs more than 75% of the local people. There is evidence that the fresh water table is decreasing due to overexploitation for irrigation for the gardens. The dunes are used for production of bovine and small ruminant in an extensive system, characterised by seasonal short scale mobility during the rainy season, when most of the land is flooded, and the dry season (lack of forage and to avoid conflicts with farmers). The white (active) dunes are increasingly being overgrazed. Colonial era afforestation (150 km of "filao" or *Casuarina equisetifolia*, along the Niaye coastline) is not spontaneously regenerating as the thickness of accumulated litter prevents spontaneous germination. Semi-industrial poultry farming is on the rise in the Niaye due to high demand from Dakar, but it is mainly owned by urban entrepreneurs who entrust the enterprise to rural relatives. Horticulture is at a rapid pace leading to habitat destruction in inter-dunal zones, plus pressure on expansion into the Ferlo.

23. Fisheries are increasingly under stress. Fish nets with very small mesh are used at sea, and have strong negative impacts on the aquatic fauna, particularly juveniles. Turtle nesting grounds on the coast, mainly in the central and northern Niayes, are severely disturbed. Despite an existing surveillance project (Project de Surveillance des Peches), illegal boats continue to ply the coastal area, adding pressure on biodiversity and competing with local community fisheries. A few projects have worked on improving traditional fishing equipment, but their impact has not been felt yet on the fisheries resources. Local communities are keen to establish marine protected areas to allow reconstitution of stocks.

24. The production system in the **Saloum** site is based on four types of resources : fishing and trading of fish products, salt extraction, crop cultivation, and extensive livestock breeding. Fishing and gathering of molluscs, oysters and shells are done in the mangroves, mudflats and adjacent coastal waters. Local communities have reported a drop in fish production which they link to increased exploitation. Gathering and processing of crustaceans results in high demand for wood from mangroves. Decreasing income from fisheries has pushed many men into salt extraction, which was formerly managed by women, but the impact on land use patterns is not clear.

25. Crop cultivation is practiced on the continental side by a different ethnic group than the coastal people. Major food crops are pearl millet, sorghum, rice and maize. Commercial crops include groundnuts, cotton, cashew nuts and, to a lesser extent, soy. During the dry season, valleys and low-lying areas are used for vegetable crops. Over-cultivation has led to fields coming adjacent to and even crossing over protected area boundaries, causing conflict between local communities and PA authorities. Livestock are also raised on the continental side. Because of the presence of tse tse flies, the livestock breed are generally trypanotolerant, although cross breeding is feared to be diluting this genetic resource. Livestock are raised relatively intensively in comparison to the other three ecosystems. Finally, despite the high tourism potential of the Saloum National Park, the tourism industry remains practically non-existent to this day, except for three private enterprises tapping only a minimal percentage of the ecotourism potential. In contrast, coastal tourism in neighbouring Gambia is very well developed.

26. In general across all ecosystems, the relationship between PA authorities and peripheral populations is very conflictual. One of the main sources of these conflicts is the absence of buffer zones. The fields cultivated by the population are adjacent or very near to the PAs, sometimes even seeping through the boundaries. As a result, predation on livestock and damage to crops from wildlife (hyenas, warhogs, monkeys and ground squirrels) pose problems, especially as forestry legislation does not explicitly provide for compensation for damages caused by wildlife. Local communities are prevented from accessing certain commodities that are rare in the village lands and abundant in the PAs (fuel wood, straw, medicinal plants, fruit). Furthermore, the four ecosystems are united by their complementarity and spill over effects. Pressure from crop expansion in the Niaye, Saloum and Peanut Belt, into the Ferlo and Niokolo areas, is squeezing pastoralists in ever smaller rangelands. The lack of updated and detailed biological inventories and data hampers effective planning. The lack of participatory consultation between the various stakeholders and mechanisms to foster incentives for conservation and benefit sharing are at the root causes of these problems.

### ***Legal and Policy Context***

27. Senegal has signed and ratified all of the international environmental conventions (CBD, CCD, UNFCCC). The Ninth Orientation Plan for Economic and Social Development requested the formulation of the National Environmental Action Plan (PNAE) which has been accompanied by the establishment of the National Action Plan to Combat Desertification (PAN-LCD), and the National Biodiversity Conservation Strategy (SNCB). The latter was followed by the National Biodiversity Conservation Action Plan (PNACB) with UNDP-GEF support. These instruments define the following four strategic directions for biodiversity conservation in the country : (1) Biodiversity conservation in high BD density sites; (2) Integration of biodiversity conservation within sustainable development programmes and activities; (3) Equitable sharing of roles and responsibilities in biodiversity management and of benefits accruing therefrom; (4) Information and awareness-raising of all actors on the significance of biodiversity and the need for its conservation (MEPN, 1998:46). The present project addresses all of these issues.

28. The new Forestry Code of 1988 recognised for the first time the existence of community forests and private forests and confirmed both communal and private ownership of forest products (Republic of Senegal, 1998:9). In addition, the government has instituted a tax on charcoal which is meant to help decrease excessive deforestation. However, such a tax as yet does not exist on wood.

29. The Hunting Code of 1986 prohibits the capturing, killing and selling of any parts of charismatic wildlife species. The Code is strictly enforced in PAs, markets, airports, railways, and ports. The Code is currently being amended in order to provide private and community incentives in control of poachers (e.g. community involvement in hunting leases and profit sharing). The Fisheries Code first developed in 1977, was revised recently in 1998, to encompass the definition of two types of fisheries : communal and

industrial. In each of these types, the code establishes fish size capture, proscribes suitable equipment, and prohibits certain devastating techniques, such as dynamiting.

30. Land remains the property of the State but the State entrusts Local Communities (LCs) with the proper management of land. Senegal launched a decentralisation process in 1972 which led to a policy and law on the transfer of authority and responsibilities for stewardship to local communities in matters pertaining to Environment and Natural Resource Management (Republic of Senegal, 1997:89). This law allowed the creation of Rural Communities (RCs). The RC is headed by an elected president with power to decide on land allocation and regulation within the boundaries of the RC. He is assisted by a Rural Council consisting of elected members from the villages in the RC. However, the does not specify precise criteria regarding land use regulation, and judgement remains subjective. For instance, although cultivation is considered a form of land development, thus allowing certain target groups to have access to land, livestock farming is not, thus effectively creating an “open access” regime on pasturelands. Furthermore, land allocated to an individual or group for agricultural use cannot be transferred, whether by sale or inheritance, and therefore cannot be used as collateral to obtain bank loans. This has a tendency to decrease incentives for investment in improvement of farmland. In addition to the management of natural resources, the RCs also have a budget funded by the rural tax and used by the Rural Council according to the priorities defined by the Council, covering mainly capital expenditures and social services. The public revenues from these rural taxes are managed centrally by Treasury, and allocated to the Provincial (Département) level for allocation to RCs.

31. Finally, lack of clarity of laws and regulations (including inconsistency with those in neighbouring countries adjacent to the selected sites such as Guinea and the Gambia) hinder conservation efforts.

### ***Institutional Context***

32. The Ministry of Environment (ME) is mandated to implement the national environmental policies under the authority of the Prime Minister and the President of the Republic. In addition, the ME is also in charge of environmental impact assessments and management of protected areas. In April 2000, the Government assigned two major priorities for this ministry : the sustainable management of Natural Renewable Resources and the conservation of biodiversity. The Ministry comprises the following departments: (1) Directorate of Water, Forestry, Hunting and Soil Conservation (DEFCCS); (2) Directorate of National Parks (DPN); and (3) Directorate of Environment and Classified Establishments (DEEC). The first two directorates have staff in each of the country’s ten Regions. DEFCCS also has offices at the Provincial and District levels. The decentralised ME staff form a local team with their colleagues from the Ministry of Agriculture, Livestock and Fisheries, the Ministry of Planning, and Rural Counsellors, to serve as technical advisors to the RCs for integrated management of environment and development at the grassroots level. This team works in cooperation with NGOs and Village Associations (VAs) and constitutes what is called the Polyvalent Rural Expansion Centre (CERP). (See Organisational chart in Annex XIII). Although the structure exists for local level IEM, the capacity for inter-sectoral work requires strengthening.

33. At the national level, the ME is also supported by a multidisciplinary Higher Council for Environment and Natural Resources (CONSERE). The ME acts as the Secretariat of CONSERE whose members are representatives of agriculture, livestock, water, marine fisheries, tourism and decentralisation under the chairmanship of the representative of the Prime Minister’s Office. CONSERE is mandated to ensure synergy and consistency between sectoral policies, actions and strategies.

34. The protected area system is based on a decreasing level of restrictions starting from strongest restrictions in national parks and Wildlife Reserves, to permitting some form of use rights and grazing in Classified Forests. Sylvo-pastoral Reserves allow permanent hydraulic installations and rangeland use,

but do not allow durable dwellings. Local authorities mandated to manage the PA system are : Curators for national parks, Regional Inspectors of Water and Forestry and their Provincial staff and District Forestry Brigades for WR and CF, and Regional Livestock Inspectors for Sylvo-pastoral reserves. Although there is yet no specific law promoting co-management of protected areas, the government is keen to test viable approaches as a first step towards establishment of such laws.

35. The absorptive capacity of these institutions at the local, district and provincial levels is moderate, due to high levels of staff turnover, low salaries, and fair working conditions. The absorptive capacity of local communities, village councils and RC is also moderate, due to recent emphasis on decentralization, low experience with IEM, and continuing poverty levels. As a result, the project is designed to be implemented in three phases over 10 years, with considerable emphasis on capacity building and lifting institutional barriers upfront.

### ***Threats and Root Causes***

36. In summary, the problems facing long term IEM (through conservation of globally significant biodiversity, and carbon sequestration) in Senegal stem from four related issues : loss of endemic biodiversity, fragmentation of and increasing pressure on resources in the protected area system, land degradation in landscapes, and decrease in the ability of vegetation and other biological resources to spontaneously regenerate. The PDF B process conducted a major participatory planning exercise with representatives of sedentary farmers, transhumant pastoralists, fishermen, hunting lessees, hotel owners, women, vegetable-gardening groups, NGOs, agriculture, livestock and forestry extension services, National Parks and all baseline projects, as well as village leaders and rural advisors. This process identified seven priority threats to globally significant biodiversity in the four project sites. Some of these threats cut across all four project sites, and others are specific to certain sites. Some of these threats cut across all four project sites, and others are specific to certain sites. These are : land conversion, deforestation, poaching, overgrazing, and over-extraction of marine resources and non timber products, and uncontrolled fires. Annex X provides a problem and solution tree, as well as a summary matrix of threats, root causes and Alternative strategy.

### **Land Conversion**

37. The GoS has steadily been dismantling subsidies and price support to the traditional agricultural sector. For those farmers who had used the subsidies to adopt semi-intensive techniques and external inputs such as chemical fertilizers and pesticides. In the absence of large scale application of mitigating measures (e.g. alternative income generating activities; promotion of conservation farming; etc.) this has inadvertently resulted in a return to more extensive production requiring more cleared land. Compounding this trend has been population increase and drought. All of these factors are pushing farmers successively eastward and southward and often pushing against (and into) protected area boundaries. In the Ferlo, there is the added threat from settlement and cultivation around permanent water points. On the coast, this agricultural expansion contributes to dune instability in Niaye, and increased sedimentation and siltation in mangroves. Lack of environmentally sustainable and economically viable intensive production technologies, and alternative income generating activities hampers any reversal of this trend. Furthermore, lack of clear procedural guidelines and participatory due process for land use planning and enforcement in RCs and Village Territories hampers effective control and regularization of expansion of farmland.

## Deforestation

38. Deforestation is continuing at a fast rate, both due to conversion of woodland into crops, and due to population increase and high urban demand for fuelwood. Furthermore, destructive practices (such as selective logging of only a few species, and uprooting of mangroves for oysters) results in deforestation targeted at globally significant species. This is compounded by over-browsing by livestock in the dry season. Deforestation in Senegal is estimated to release 19,244.5 Gg of  $\text{ECO}_2$  per year. As fuelwood resources outside of protected areas deteriorate, there is increasing pressure on resources inside. Lack of formalized co-management mechanisms for national parks and classified forests means that local communities continue to illegally log and harvest wood resources inside the protected areas, in effect approaching an open access situation due to the lack of protected area enforcement. Furthermore, the inconsistency in tax law (charcoal vs. wood) and lack of co-management legislation creates policy distortions and disincentives.

## Poaching

39. With crops and villages getting ever closer to protected area boundaries, damage from wildlife becomes more evident. A lack of buffering results in more frequent defensive poaching (particularly of predators, competitors such as monkeys, and dangerous invertebrates). Furthermore, hunting is rising in Senegal at a rate of more than 10% per year (see Annex XI). Opportunistic and illegal leasing of hunting rights by peripheral residents is fast becoming an attractive source of income. This is compounded by mismanagement of hunting concessions by the protected area staff. Illegal poaching is rampant because there is a lack of effective enforcement of regulations (staff, boundary markers, etc.). Local communities too do not have long term incentives to communally regulate poaching in the buffer zones.

## Overgrazing

40. Conversion of pastureland into crops is pushing pastoralists and their herds more and more into Reserves and even Parks. Even where grazing is allowed (e.g. Sylvo-pastoral Reserves), lack of effective communal structures and regulations for natural resource management (e.g. badly managed water resources), lead to overgrazing, conflicts between “resident” and non-resident transhumants, and conflicts between farmers and pastoralists. Very often to avoid conflicts, pastoralists move clandestinely into Parks, Wildlife and Forest Reserves. Most of the overgrazing in the Ferlo is centrifugal around 10 of the most used boreholes. Furthermore, there is a lack of readily available intensification techniques, particularly for small ruminants that are appropriate to the socio-economic and ecological situation. These factors are exacerbated by an attitude of mistrust between pastoralists and protected area managers.

## Over-extraction of marine resources

41. It is estimated that Senegal’s annual fish catch of 420,000 tons currently exceeds sustainable levels by around 25,000. Fishermen also report declining rates. In some cases, fishermen have turned to salt and fuelwood extraction as alternative income. Despite a national fisheries monitoring project, there is insufficient capacity to regulate large scale commercial fisheries. In addition, traditional fishing technology is inefficient, environmentally destructive, and affects reproduction. Harvesting of crustaceans is also done with environmentally damaging techniques. Furthermore, habitat conversion of mangroves and littoral lakes has reduced nesting and spawning sites. The lack of effective enforcement of existing regulations on fisheries and increasing population growth in coastal areas are among the root causes.

## Over-exploitation of non-timber products

42. Sustainable harvesting in the traditional system is based on a very diverse range of products. The scale of harvesting is mostly limited to self-sufficiency in medicines, food, fiber, and oil, but some products are commercialized domestically (and in the case of gum arabic, internationally). These include the fruits of *Adansonia digitata*, *Ziziphus mauritiana*, and *Diospiros mespiliformis*. With decreasing economic returns from crop cultivation, there has been an increase in harvesting of these products in protected areas. Evidence suggests that the rate is strong enough to affect regeneration of the plants, as well as feed source of wild animals. Lack of incentives from co-management result in opportunistic action by local communities.

## Uncontrolled bush fires

43. Traditional techniques of using fire for clearing, pasture regeneration, honey harvesting, charcoal production, and the like, have been practiced for thousands of year, but they are not efficient and can run out of control. This is compounded by increasing human population and therefore higher incidence of such fires. In some cases, fires have also been deliberately set to drive away non-resident transhumants. There is evidence to show that uncontrolled fires can be damaging to the ecosystem. Fire in the savanna is estimated to emit 42 Gg of  $\text{ECO}_2$  per year. Neither the customary system, nor the modern public system has the capacity to control fires on its own. But effective fire management cannot be implemented as long as there is lack of capacity in protected area systems, lack of effective and integrated natural resource management by the RC and VT, and lack of community collaboration in protected area management.

## **Baseline course of action**

44. The ongoing sustainable development efforts in the country are set within the umbrella of investments encouraged by the Triennial Public Investment Programme (PTIP), which focuses on five thematic areas : (1) Design and implementation of productive activities; (2) Strengthening of production support; (3) Enhancement of human resources; (4) Improvement of living conditions; and (5) Institutional strengthening. Added to these actions are those pertaining to the fight against poverty, a cross-cutting theme covering all activity sectors (MEFP, 1999 :5). A detailed description of the baseline situation is provided in Annexes II & V. The following is a brief analysis of the baseline.

45. Rural and Agricultural Development. Ongoing assistance to this sector is focusing on food security through promoting animal traction, locust control, rural organization, agricultural water management infrastructure, and better entrepreneurship. Ministry of Planning and the Rural Councils are engaged in a massive decentralization effort, during which RCs and VTs are mandated to conduct rural land use planning and classical regional planning and implementation. Several national and regional projects and programmes are currently underway, including the Matam Agricultural Development Project (IFAD), National Locust Control (Netherlands, IAEA), and Support to Farmer Entrepreneurship (CIDA). In addition a large WB assisted project is aimed at restructuring the Ministry of Agriculture and Livestock, reforming the National Fund for Agricultural Research, and providing technical assistance to farmer associations. Senegalese research institutions, such as ISRA, continue to experiment with appropriate agricultural technologies, however, their impact on rural production is low. Government agricultural extension agents continue to be deployed in the Districts, but need assistance to make the transition from a classical subsidized agricultural system, to the new self-reliant and environmentally sound production system.

46. Pastoral development. Ongoing assistance in this area is currently far less than what it used to be in the 1970's and 1980's. This previous work including ground-breaking projects in the development of

pastoral associations and community based natural resource management. Lessons from these projects are now incorporated into ongoing work as well as the present proposal. Currently there are pastoral associations around each borehole in the Ferlo, who have the right to manage pasture and water including charging fees. Revenues are used for maintenance of the boreholes as well as provision of veterinary services and salt licks. However, these pastoral associations are still not legally recognized by the State. Furthermore, there is a disturbing trend towards increasing sedentarization, leading to greater land degradation in this fragile ecosystem. In terms of ongoing assistance, the Pastoral Self-Help project in the northern Ferlo (RFA/GTZ) is concentrating on building local capacity for marketing, and natural resource management. A major assistance is also being provided for rehabilitation and management of boreholes in the Ferlo (Belgium and AFD). Some assistance is also being provided by the GoS through the national rural production intensification programme for livestock intensification in the Niaye, Saloum and PNNK. However, none of the ongoing assistance is inter-sectoral, nor does it address biodiversity conservation issues, or incorporate larger landscape (eco-regional) planning issues.

47. Forestry sector. Baseline actions in this sector are focused on promoting natural resource management by RCs and villages, promotion of alternative energies, equipment for fighting bush fires, and rehabilitation of degraded lands, such as the Project for Community Based Natural Resource Management (USAID), Sustainable and participatory management of Traditional and Alternative Energies (WB/GEF), and Coastal Zone Reforestation (JICA). Furthermore, several national and international NGOs (among them research organizations) are active in native species silviculture, fallow land management, fuelwood saving, food transformation and processing, population organization, training and extension services in the Country. In addition, there are some interesting initiatives for testing alternative technologies for bee keeping in the Niokolo-Koba area through a GoS programme since 1997. However, the baseline in the forestry sector has few links with biodiversity conservation in and around protected areas. Isolated attempts at reforestation in classified forests continue to use eucalyptus for fast growth.

48. Poverty alleviation and sustainable livelihoods. The baseline is very active in this sector. Most of the focus is on ensuring access to basic services and micro-credit, support to women and other vulnerable groups, and building small scale enterprises. These include the Local Development Funds Project (UNDP), the Project to fight poverty (AfDB), and the Village Self-Management and Development Project (IFAD).

49. Marine resources and fisheries. The baseline activities in this sector are centered mostly around private sector investment in fisheries. Some public sector assistance is available, particularly in improving the operation of the Saint Louis Fishing Complex (Japan), and Support to Artisanal Fisheries (AFD) in the southern coast of Senegal (Saloum Delta and Basse Casamance). A recently completed Japanese funded project in the Delta area (Missirah Center) was successful in promoting fish conservation techniques. But it failed to establish mechanisms to cover recurrent costs and much of the infrastructure and equipment have fallen into disrepair.

50. Environmental Education. The Ministry of Environment (through DEFCCS and DPN) holds yearly awareness campaigns to combat bush fires and promote reforestation around protected areas. In addition, the Environmental Training and Information Project conducts awareness raising campaigns in primary schools. These efforts are important in mainstreaming environmental concerns, but need to be integrated within a more holistic, multi-sectoral, IEM vision of conservation and sustainable use of land and resources at the community level.

51. Conservation. Ministry of Environment continues to cover recurrent costs of staff and infrastructure in all protected areas, but limited financial and technical capacity hamper its ability to look beyond PA boundaries. Out of 213 classified forests in the country, only half a dozen have a simple management plan. Most of the assistance to this sector has centred around infrastructure and capacity building of two



major parks (PNNK and PNDS). In the former, good lessons have been learnt from a previous “Watershed Management Programme” in participatory approaches to co-management. In addition, ORSTOM provides assistance to DPN for periodic census of a limited set of species. Africa 2000 Network and SAPAD (an NGO) have had some success in the training of eco-guards/tourist guides (villagers recruited on a volunteer basis). The NGO WAAME has worked on regeneration of mangroves in the Saloum Delta. Mention must also be made of spontaneous initiatives by a number of Village Groups in the Niayes region to conserve certain species and restore forest cover by establishing Community Nature Reserves on the border of protected areas. The baseline situation has already advanced towards recognizing the need for linking conservation to sustainable development, but has a long way to go in terms of developing and testing viable models for IEM, and lifting technical, institutional and policy barriers for sustainability and replication.

52. Ecotourism. Baseline situation is very limited in this sector. There are two hotels each in PNNK and PNDS, and only a few camping facilities operated by the private sector adjacent to these parks. Community participation in providing services to tourists is very limited. Two Lakes in the Niaye region (Lake Rose and Tamna) attract quite a lot of day visitors, but there are no facilities for longer term stays. There is a need to lift barriers that would encourage the private tourism industry to increase its investment in Senegal. These barriers are related to protected area infrastructure, as well as capacity of local communities to provide services.

53. In summary, the baseline situation is such that pressure on biological and natural resources will continue to grow, while ongoing action will focus primarily on increasing living standards and devising short term solutions for natural resource problems. Concrete actions have been carried out with the participation of several development partners, NGOs, various economic associations (GIE) and Village Associations, as well as numerous youth and women groups. However, in most cases, these measures have failed to meet expectations. There has been a lack of sectoral integration, resulting in technological packages/systems that are non-replicable outside of laboratories or demo plots. There has been limited adoption by the population due to distortions in economic and policy incentives. And there has been limited involvement of the stakeholders in planning, monitoring and evaluation processes.

## **Project Rational and Objectives**

54. The **overall objective** of the GEF Alternative is to promote Integrated Ecosystem Management in four representative ecosystems of Senegal to generate both global benefits from enhanced biodiversity conservation and carbon sequestration, as well as national benefits from sustainable use and equitable sharing of benefits. The **GEF Alternative** will build on the baseline (described above) by consolidating lessons learnt into a 10 year phased program of activity that brings together GEF and other Assistance in a coherent package, in order to obtain both global and national benefits. The Alternative model will be tested in four representative landscapes in the country, and will be complemented with upstream activities in policy reform, capacity building and monitoring.

55. The model to be tested in this project has been developed during the PDF B process, based on a review of lessons learnt both nationally and internationally, and through consultation with local and national stakeholders. It is not a static model, but will be adapted to each site, and will be revised through an iterative process of adaptive management during the life of the project. The description below provides the general outline of the model, but each site will have its own set of adapted activities. The expected outputs and indicators in Annex III reflect this adaptability.

56. Faced with increasing population pressure on biological and natural resources inside protected areas, and recognizing that pure conservation will no longer be effective in protecting Senegal’s threatened biodiversity, nor in maintaining carbon sinks, the model adopted by the project will intertwine a series of

co-managed conservation, community-based natural resource management, local land use planning and sustainable harvesting activities into an Integrated Conservation and Development (ICD) model based on IEM principles. In addition, the regional interlinkages between the four ecosystems will be taken into account by incremental eco-regional planning, where IEM and bio-regional issues are incorporated into regional planning, and provide the overall framework for ICD planning at the local and regional levels. IEM will be promoted through capacity building and enabling activities both at the national and regional levels (Regional Councils, etc.) as well as at the local level through the Polyvalent Extension Services (CERPs) which provide the structure for integrative work. Each of the project's four representative landscapes contains three different but integrated spatial units. These units and the activities that will be targeted selectively to them are :

- § **Core zone of protected areas (PA):** The project will build on the baseline, by filling gaps related to equipment and infrastructure, as well as capacity building of PA staff in eco-regional planning, PA management, and participatory fire control. In addition, the project will build institutions and capacity for co-management with local communities. Finally, the protected area's capacity to generate revenue for covering recurrent costs will be strengthened. Enhanced protection is estimated to result in 5000 -6000 tonnes of carbon sequestered per hectare per year.
- § **Community Nature Reserves (CNR) in buffer zones immediately around selected protected areas:** The project will encourage and build capacity for the establishment of community controlled Nature Reserves on the boundaries of selected protected areas of global significance following eco-regional principles. About 100 such CNRs were identified during the PDF B by local stakeholders. It will also develop and apply appropriate legislation and recognition of such Reserves as viable extensions of the protected area system. Communal management and control of the CNR, appropriate sustainable harvesting regimes for selected resources, community-based anti-poaching structures, links to Protected Area management, co-management of fire, opportunities for eco-tourism benefits, rehabilitation of degraded areas, and access to local credit and savings, are all issues requiring attention in the CNR. Buffer zones will enhance biodiversity protection in the Core zones. Rehabilitation and reforestation will result in an estimated 1400 tonnes of carbon sequestered per hectare per year.
- § **Village Territories around these CNR and PAs:** The project will enhance baseline efforts in decentralization, by building capacity for CBNRM, conflict resolution, land use planning/enforcement, control of bush fires, and regulation of transhumance and pastoral resources at the Village Group level. Furthermore, the project will implement legal and regulatory amendments to the land tenure regime in support of this decentralization. In addition, it will demonstrate alternative technologies for low-external-input intensification of agriculture (crops and livestock), and meeting fuelwood demand, as well biodiversity-friendly alternative income generation activities (including processing and marketing). These activities will be supported by the establishment of local credit and savings schemes. At the regional level, integrated eco-regional planning will be promoted to rationalize land use and IEM. ICD and eco-regional planning will maximize the conservation effectiveness of PA's, and by creating economic prosperity, reducing the imperative of local communities to use PA resources for survival strategies. Agricultural intensification is expected to reduce emissions of carbon from cropped land by at least 30%.

57. These field level activities will be complemented and supported by national and provincial level activities aimed at capacity building, monitoring, and inter-sectoral policy and legal reform for IEM. Senegal already has one of the most favorable policy environments for integrated ecosystem management,

and therefore these policy changes are mostly in the nature of fine-tuning and operationalizing policies, rather than fundamental changes. It is felt that the combined and coordinated actions of several bilateral donors who have agreed to partner with the project, as well as the commitment of the GoS to the project, should help to affect these policy and legal changes in the First Phase, and if need be reinforced over the life of the project. Local level activities will be implemented through existing CERP and PA agents as well as NGOs. National level work will be coordinated through a project implementation unit housed in the Ministry of Environment.

58. The **GEF increment** will build upon the baseline and co-financing, to cover the additional costs related to achieving global benefits. Annex XIII provides the detailed description of coordination and co-financing arrangements for each site. In general, co-financing will cover the cost of sustainable development activities, credit schemes, promoting livelihood strategies, investments in production inputs, and replication of successful models. The GEF increment will cover the costs of developing, testing and demonstrating the integrated conservation/development (ICD) and eco-regional planning models in a few selected sites in each of the four landscapes. In some cases the GEF increment will provide innovative improvements to already existing technologies, and in other cases, it will test in Senegal techniques that have been developed elsewhere (See Annex XI). The GEF increment will also lift barriers to the sustainability and replicability of the ICD and eco-regional models, and appropriate harvesting techniques. These barriers are technical, economic, political and institutional in nature. The GEF increment will address these barriers at the local (e.g. appropriate technologies, institution building, economic incentives), provincial (e.g. capacity building), and national levels (e.g. inter-sectoral policy reform, legal clarification). A more detailed IC analysis is given in Annex II.

59. **Project Sites.** The four representative landscapes represent a total of 5.7 million ha and include 4 National Parks, 4 Wildlife Reserves, 16 Classified Forests, 80 Sylvo-pastoral Reserves, and one Biosphere Reserve (Annex VII-1), with a total of 1014 villages adjacent to these protected areas (Annex VII-2). Although the initial landscape selection was based on biodiversity values, it was soon recognized that there can be substantial global benefits from carbon sequestration and integrated ecosystem management. The project has selected a sub-set of 19 protected areas (or 18% of the total) and their buffer zones to reflect this integrative nature of the project. In addition, a sample of 10% of the villages will be chosen to test all IEM models in Phases 1 and 2. Eco-regional planning (Annex XI) will be demonstrated in two linked landscapes : the Ferlo and Niokolo. Based on an agreement reached by the GoS for Niayes and Saloum landscapes (see below), this project will concentrate on terrestrial ecosystems/sites, while the sister GEF/WB project on Coastal Zone Management will focus on marine sites (see Annex VII for details). Phase 3 will replicate successful results to a further 20% of villages and protected areas in all landscapes. Annex VII provides a tentative list of the site selection based on initial rounds of consultation with local communities, government and donor partners and confirmed in January 2001.

60. **Project Phasing.** The project will require consistent presence over a sufficient amount of time to ensure that results are sustained. Activities related to policy reform, participatory planning and development, capacity building, and ecological rehabilitation require investment in time in order to be effective. Therefore the project will be implemented over 10 years in three phases (detailed description and benchmarks in Annex VI). At the end of each phase, the achievement of benchmarks will be evaluated and the proposal for the following phase will be developed. In the first phase (3 years), the project will establish the enabling environment for ICD and eco-regional planning at the national level (lift policy and legal barriers in the environment sector). It will also collect all necessary information (scientific, participatory visions, etc.), build political consensus in each landscape and sample site in the development of adapted ICD and eco-regional planning, build institutions and capacities at all levels, and initiate pilot activities not requiring prior removal of policy and legal barriers, such as micro-credit, sustainable harvesting regimes, some NRM, and fire control.

61. By the end of the first phase it is expected that the social and political groundwork will have been set to effectively implement the models in the selected sites in the second phase (4 years). Implementation will not only serve to test the model, but also allow demonstration to other areas. Policy reformulation and capacity building will continue as necessary. In this phase, emphasis will also be placed on developing appropriate economic incentives and credit schemes to ensure that recurrent costs of the activities are covered by non-project funding.

62. In the third phase (3 years), the project will conduct any remedial measures needed to refine the model in existing sites, and replicate actions to other protected areas and villages. All replication will be done through co-financing from government, local communities, NGOs, and other donors. As the third phase is one of disengagement, project activities will work towards refining mechanisms for economic sustainability and replicability of activities. Some GEF funding will also be made available for monitoring and evaluation, and any remaining barrier lifting work.

### ***Justification for GEF funding***

63. The project is eligible for GEF funding through the Operational Programme 12 (Integrated Ecosystem Management), because it addresses integrated threats and inter-sectoral concerns, by adopting an ecosystem approach, and because it is expected to provide benefits to two focal areas (biodiversity and climate change through carbon sequestration). In addition, the project adopts a long term phased approach to GEF funding, aiming at building capacity and sustainability in all actions, and supporting a change to more conducive policy and legislative environment. Furthermore, the project addresses the concerns of member states as well as the CBD COP for greater attention to the cross-cutting issue of land degradation, by focusing on mitigating the effects of over-cultivation, overgrazing, deforestation, and mangrove destruction. Project activities aimed at ecosystem rehabilitation, agricultural production intensification, and promoting sustainable harvesting regimes will have beneficial effects on controlling land degradation. The project also follows the guidance provided by the GEFSEC Action Plan on Land Degradation (1999) for lifting barriers at the policy and legislative level, and in emphasizing the leveraging of additional financing. Furthermore, the project will emphasize mainstreaming biodiversity and land degradation work into local and national concerns.

### ***Linkages to ongoing assistance***

64. The GoS and UNDP have established the 6<sup>th</sup> Country Cooperation Framework (CCF) which places environmental protection in a central position as a pillar supporting the two main thrusts of the fight against poverty, and good governance for sustainable human development. UNDP coordinated the formulation of the National Strategy and Action Plan, which led to the establishment of the priorities enshrined in this project. UNDP will continue its support to the project (in addition to having supported the PDF B phase) by focusing on strengthening stakeholders' capacities for sustainable development, improving access to local credit, and linking the project to other ongoing programmes to fight poverty in rural areas (e.g. AfDB programme).

65. The project has been closely designed to complement the interventions expected under the GEF/World Bank project (now under preparation) for coastal zone management. The present project's activities in the Saloum Delta and Niaye zones are restricted to a small number of demonstration sites on the terrestrial side, designed to test the ICD and eco-regional planning models (see Annex VII) <sup>1</sup>. It is

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<sup>1</sup> These sites were selected during a GoS planning meeting on 5 February 2001 and approved by the Minister of Environment. As a result of this country driven guidance, the IEM project will focus on a sub-set of villages and sites on in-land dunes in Niayes, and on about 55% of the PNDS representing the terrestrial section of the Park, and all villages on the periphery of these sites (see Annex VII).

expected that the project will provide lessons learnt that are cross-fertilized among the four representative ecosystems of Senegal, and can therefore add value to Coastal Zone Management. Modalities for cooperation and synergy between the two projects will be developed prior to CEO endorsement (in so far as possible given that the CZM project has not yet been designed).

66. Among other ongoing assistance that the project will coordinate closely with, one can mention the Community Based NRM project (USAID), which will serve to provide valuable lessons on developing the ICD model, and building synergies such as using similar networks and marketing channels. Another project which will be the subject of close coordination, is the Traditional Energy Management Project (WB/GEF) which aims to develop local level appropriate models for renewable energy conservation around Tambacounda area. Furthermore, several ongoing projects in the Ferlo, Coastal zone and Niokolo-Koba areas will work closely with the project, such as the Pastoral Self Promotion project (RFA/GTZ), two Projects on borehole management and maintenance (Belgium and AFD), Rehabilitation of PNNK (FDS/FFEM), AGIR(EU), Coastal zone reforestation (Japan) and Support to Artisanal fisheries (EDF/AFD). Annex XIII provides a description of modalities for cooperation with all of these projects. Further cooperative modalities will be fine-tuned during the feasibility study.

## **Components and expected Outputs**

67. The participatory planning process of the PDF B developed the logical framework of the project, including an indicative list of activities, verifiable indicators, means of verification, and assumptions, which is presented in Annex III. The following is a brief description of the expected outputs and GEF increment for each component. Detailed technical specifications for all these outputs, based on lessons learnt, are provided in Annex XI.

### ***Component 1: Policy and legal framework adapted to participatory integrated ecosystem management (GEF: US\$98,000; co-financing : US\$65,000).***

68. The GEF Alternative provides that the legal status of protected areas will be amended in order to allow co-management and participation by local communities and the private sector in the management of and equitable sharing of benefits from national parks, classified forests, and wildlife reserves. Current development policies pertaining to agriculture, pastoralism, forestry and hunting will be reviewed in order to identify and remove obstacles and disincentives to individual and community initiatives for sustainable management of biological resources. This will include revision of land tenure laws pertaining to communal land to allow creation of Community Nature Reserves. In addition, the policy environment for eco-regional planning will be strengthened in relevant sectoral and planning ministries. Furthermore, the GEF Alternative will build capacity for compulsory environmental impact assessments of all future projects in the four project sites, in order to ensure harmonized conservation and development actions. The GEF increment will be additional to the efforts of other projects in influencing policy reform, and will focus on providing technical assistance, capacity building, and awareness raising on biodiversity conservation issues.

### ***Component 2: Sustainable development and natural resource management in Village Territories (GEF : US\$920,000; Co-financing : US\$11,071,000)***

69. This component will initially focus on applying a multi-sectoral environmental awareness, training, information, communication and education programme at the four project sites, in order to establish the fundamental basis for change towards community based IEM. The component will then assist local communities in the development and implementation of management plans for the selected Village Territories, that are linked to the management plans in the CNR and PAs. The implementation will

include demonstration of appropriate technologies (agricultural intensification, pastoral management, sustainable fisheries, forest and renewable energy management, fire control, land rehabilitation, soil and water conservation, etc.). It will also include institution and capacity building at VT and RC levels, for integrated eco-regional planning, land use planning, conflict resolution, and participatory and adaptive monitoring. Furthermore, activities will be designed to improve access of local communities and individuals to credit for sustainable use activities. These revolving funds will be managed by local communities and will be capitalized with membership fees, contribution from protected area revenues, and some external co-financing. The GEF increment will be additional on a substantial co-financing that focuses on sustainable development and poverty alleviation (donors, government and rural credit). The GEF increment will restrict itself to the biodiversity and inter-sectoral “added-value” primarily through technical assistance but also for investments in demonstration of appropriate technologies.

***Component 3: Conservation and sustainable management of Community Natural Reserves (GEF: US\$1,572,000; Co-financing : US\$5,315,000)***

70. This component will aim to establish a representative sample of Community Nature Reserves, the legal basis for which will have been developed in Component 1 and taking into account eco-regional principles. Local communities will donate parts of their village territories (100 such CNRs have already been identified) and the project will provide assistance and capacity building for developing and implementing management plans in these buffer zones. These plans will take into account the VT and PA plans in order to provide a spatial continuity and synergy in all actions. Land and vegetation rehabilitation, and ecologically sound pastoral production and eco-tourism techniques will be promoted. Sustainable harvesting regimes for wood, fruits, medicines, fish, fibers, and other natural products will be tested, demonstrated and implemented with the help of eco-guards. Local communities will be assisted in improved processing and marketing of these products as alternative income sources. Local micro-credit and savings scheme (component 2) will also be applied for these activities. An environmental awareness program will also target buffer zone issues, such as controlled management of and early warning system for bush fires, and adaptive monitoring. The GEF increment will finance the creation of these community reserves which are groundbreaking and innovative for West Africa and Senegal in particular. It will also cover the development and demonstration of sustainable harvesting regimes, capacity building of local communities in management and monitoring of CNRs, and testing ecosystem rehabilitation techniques. It is expected that revenues generated from sustainable use activities (and those in Component 4) will allow local communities to continue to monitor and regulate the CNRs after project completion.

***Component 4: Sustainable conservation and co-management of natural resources in protected areas (GEF: US\$6,760,000; Co-financing : US\$4,795,000)***

71. This component will develop and/or finalize management plans for selected protected areas, depending on the specific situation, as well as improve protected area infrastructure and human resources through capacity building. It will also focus on reducing poaching, crop encroachment, overgrazing, uncontrolled fires, and deforestation in the protected areas through co-management systems and building incentives through benefit sharing with local communities. This will be coordinated with actions in components 2 and 3. Eco-guards recruited from the villages will be trained as tourism guides as well as biodiversity and fire monitors. Mechanisms to ensure that protected areas are able to cover recurrent costs will be developed and implemented, including greater decentralization of protected area budgets. The GEF increment will fill the gaps left by existing and planned assistance to the protected areas, as well as in promoting co-management models, and options and incentives for sustainability.

### **Component 5: Participatory monitoring and evaluation of the ecosystem (GEF: US\$370,000; Co-financing : US\$165,000)**

72. This component is intended to provide the monitoring and evaluation “glue” to the project, that will allow it to apply an iterative and adaptive approach to project design and implementation. As a phased project, this component will be crucial in demonstrating achievement of results at each phase, and in refining and readjusting project actions in subsequent phases. Outputs will include a data bank on biodiversity dynamics and carbon sequestration (to be housed in an appropriate national institution) that integrates local knowledge and promotes participatory mechanisms for planning, development and adaptive monitoring. Results and lessons learnt will be disseminated through national and international media, scientific journals and networks, community meetings, theatre troupes, etc.. The GEF increment will cover the cost of technical assistance and equipment for the data bank, capacity building for participatory M&E, and biodiversity “value-added” on diffusion and dissemination.

73. **Linkages between components:** The strategy of the project is to maintain synergistic linkages between the components, not only from a thematic perspective, but also in cross-fertilization among the four project sites. Thus the project will include periodic workshops, reviews and networking to ensure these linkages exist.

74. **End of project situation.** At the end of the 10<sup>th</sup> year, the GEF Alternative is expected to leave behind a situation where there is:

- Ü Improvement of living conditions for local communities in the project site, equivalent to direct benefits for an estimate 50,000 people, and indirect benefits three times that amount
- Ü Improved and self-sufficient management of protected areas (18% of the PAs in the project site, or about 3.68 million hectares)
- Ü At least 100,000 hectares of newly established and sustainably managed Community Natural Reserves
- Ü Effective capacity for IEM in CERP, VT, RC, and PA.
- Ü Effective integrated eco-regional planning among RCs providing guidance to VT and PA plans.
- Ü Effective models for co-management of protected areas, and mechanisms for sharing of benefits
- Ü Effective appropriate technologies for agricultural intensification and sustainable harvesting
- Ü Enhanced capacity for participatory monitoring and evaluation, conflict resolution and adaptive management among local stakeholders
- Ü 50% reduction in uncontrolled fires in the four representative landscapes.
- Ü Biodiversity status particularly of global significance is maintained or increased significantly.
- Ü Senegal’s carbon balance improved by 10%.

### **Risks, Sustainability and Replicability**

75. The project’s **assumptions and risks** are provided in the Logical Framework (Annex III). In general the major risks are associated with instability and drought. Instability may be generated due to unforeseen political factors, either at the sub-regional, national or provincial levels, including spill over effects from the disturbances in Casamance, although the project sites are far from this area. The GoS has shown considerable stability particularly following the latest elections, and peace negotiations have resumed with the rebel movement. In addition, the government is keen to reform its legal and policy framework, and has renewed the push to greater decentralization and devolution of authority to the lowest feasible level. Droughts are known to affect this Sahelo-sudanian country regularly. Major droughts occur on average every 10 years, with minor ones every 3-4 years. The project’s ten year phased approach is designed to smooth over these effects and increase its chances of success.

76. Various design elements have been incorporated to ensure sustainability of the project. The high commitment of the GoS to this project, as evinced by their substantial budgetary contribution, direct ownership of the PDF B process, and leadership in developing partnerships with Bilateral Donors for this project, is a major and necessary ingredient for ensuring sustainability in the long term. **Socio-economic sustainability** will be enhanced with the promotion of appropriate techniques to generate sustainable income and establish rules for sustainable NRM. The project will demonstrate appropriate mechanisms for consultation, cooperation and equitable sharing of the profits from conservation in CNRs and PAs. Participatory selection of village eco-guards, development of management plans, and design of conflict resolution mechanisms (based on both traditional and modern means) will help to ensure adherence to good management rules on the part of the residents and outsiders alike. Thus, illegal exploitation will be better controlled because local communities will have incentives to enforce the rules.

77. **Financial sustainability** will be ensured by the actors themselves, in particular by implementing activities capable of generating profit from sustainable use of renewable natural resources. A community-adapted credit system will extend loans at a 10% interest rate, with the money accruing from interest payments being used to cover recurrent costs and loaned to others through a revolving mechanism. The RC budgets, and donor matching grants will contribute to the capitalisation of these revolving funds, in addition to the contribution made by the individuals benefiting from the loans. The revolving funds will benefit from considerable experience in Senegal (and elsewhere) on the design of such funds. A second mechanism for financial sustainability built in by the project is that of grazing and watering fees. It is estimated that these will generate revenues up to US\$3,756,000 annually for the pastoral organisations in the Ferlo, which should be sufficient to assume all recurring costs of pastoral investments, while improving the living conditions and alleviating poverty. User fees will also be tested in the fisheries and agricultural sectors, so as to cover recurrent costs of operating, repairing and replacing equipment and other inputs through farmer or fishermen associations. Finally, one of the main assumptions of the project is that with the investments in protected areas and community level engagement in eco-tourism during the 10 years, receipts from gate fees will expand. The project will improve mechanisms for self-reliance in protected area system, through more efficient budget allocations and management.

78. The project will not be creating new institutions, but will be working through existing ones. Therefore, **institutional sustainability** will be assured through capacity building of CERP agents, PA agents, and decentralized authorities in the RC and VG institutions. Recurrent costs will be assumed by the Government of Senegal, communities and the NGOs acting at grassroots level, which will ensure the continuation of the activities in the post-project phase, independently from the GEF.

79. The fundamental design of the project is based on testing and demonstrating models for **replication**, and preparing the enabling environment for such replication in Senegal. In addition, it is expected that the lessons learnt from this project will contribute in general to our understanding of ICD and IEM and community based conservation in Africa, as well as specifically to biodiversity conservation and carbon sequestration in similar situations in the Sahel.

## **Stakeholder participation and Implementation Arrangements**

80. **Stakeholders' participation** in the preparation and planning of this project was achieved during the PDF B through a series of workshops organized in 60 villages, directly involving some 2,000 people including crop farmers, sedentary and transhumant livestock farmers, hunters, forestry operators, tourist camp managers, village leaders, rural advisors, RC Presidents, sociologists, geographers, scientists, foresters, park and reserve managers, legal scholars, NGOs, and representatives of government entities and development partners (Annex XII). All of these actors and stakeholders approved the approach and



endorsed the project, stressing its major innovation, i.e. the active role they were given at all identification and formulation stages, and the model of co-management. Actors including LCs, socio-professional organisations concerned with NRM, NGOs, various village associations, private individuals and GIEs will continue to participate in the implementation of this community project. They will be the primary actors responsible for applying the approaches and methods and carrying out the activities, and will assume responsibility for and acquire ownership of the project and its impacts to ensure the sustainability of the activities undertaken in the post-project phase.

81. The project will be **implemented** under the National Execution modality by the Ministry of Environment (ME) through assistance from UNDP, and under the financial supervision of the Ministry of Economy and Finance (MEF), which will open a bank account for the project and monitor expenses with UNDP. MEF will be responsible for certifying expenses as authorised according to the established yearly work programme and cost estimate. The ME will be the project execution agency and will provide technical services through DPN and DEFCCS. The Project Coordination Unit and four Field Units will be supervised by the Project Steering Committee, and will seek advice from the Scientific and Technical Committee. The project will not create any new institutions, but rather will rely on permanent existing structures (both public and civic) so as to ensure institutional sustainability.

82. CONSERE will act as the project's Steering Committee, and will coordinate at the national level with other projects, including the WB/GEF projects on Renewable Energy, and Coastal Zone Management. CONSERE has already played a major role in ensuring coordination at the design stage of this and the CZM project. At the local level, the project will establish yearly coordination meetings with all Associated and Co-financing Projects. An external evaluation will be conducted towards the end of each phase to report on achievement of benchmarks and recommend revisions where necessary. A final evaluation will be conducted upon project completion according to UNDP and GEF procedures. Annex XIII provides more details on the implementation arrangements.

## Project Financing

83. The total cost of the GEF Alternative, including the baseline, is US\$ 263,500,000. Total cost of the project is US\$ 31,613,000 of which US\$ 21,543,000 is co-financing from several sources, including GoS, UNDP, EU, JICA, USAID, GTZ, Netherlands. The EU co-financing does not include an additional expected grant allocation of about \$1 million through Euro-Aid. The GEF incremental cost is \$10,070,000 including the PDF B. GoS co-financing is US \$ 8,397,000 of which US \$1.05 million is in cash (almost 13% of total government contribution). Given the participatory nature of the project, it is expected that local communities will also contribute in-kind resources (labour, minor equipment, land), but these have not been quantified.

### Project Output Budget (US \$ million)

Project Outputs	GEF	GoS	UNDP	EU	Nether lands	JICA	Other	TOTAL
1. A Policy and legal framework adapted to participatory IEM	0.098	0.035	0.030					0.163
2. Sustainable development systems and community based natural resource management in Village Territories	0.920	4.266	2.405		0.900		3.500	11.991
3. Conservation and sustainable management of Community Natural Reserves	1.572	0.710	0.707		0.600	3.298		6.887
4. Sustainable conservation and								

co-management of natural resources in Protected Areas	6.760	3.190		1.105	0.500			11.555
5. Participatory monitoring and evaluation of the ecosystems	0.370	0.115	0.050					0.535
<b>Total project outputs</b>	<b>9.720</b>	<b>8.316</b>	<b>3.192</b>	<b>1.105</b>	<b>2.000</b>	<b>3.298</b>	<b>3.500</b>	<b>31.131</b>
<b>PDF B</b>	<b>0.350</b>	<b>0.081</b>	<b>0.051</b>					<b>0.482</b>
<b>GRAND TOTAL</b>	<b>10.070</b>	<b>8.397</b>	<b>3.243</b>	<b>1.105</b>	<b>2.000</b>	<b>3.298</b>	<b>3.500</b>	<b>31.613</b>

84. The project will be implemented in three phases. Annex VI provides a detailed but indicative description of the three phases and their expected outputs. It is expected that GEF and donor financing will gradually decrease by Phase 3, in order to ensure an orderly phase-out. Annex XIII describes the types of interventions expected from the major co-financiers of the project. The remainder of the co-financing (11% of the total project cost) will be confirmed during the feasibility study of the project.

## Monitoring, evaluation and dissemination

85. M & E will be conducted in several layers by the project. Monitoring of the biodiversity status and carbon sequestration (potential and actual) will be done formally (inventories, targeted research, surveys, etc.) through sub-contracts with competent organizations in Senegal, and through ongoing surveys by DPN, assisted by eco-guards and other local villagers. Monitoring of project results will be done through formal events (3 evaluations, one each at the end of a phase), as well as through participatory M&E techniques on a regular basis. Capacity of local communities and authorities will be enhanced to incorporate M&E techniques for adaptive management and enforcement. The PCU will submit quarterly technical and financial reports assessing the level of success in reaching the expected outputs, based on the indicators listed in the logical framework. It will indicate project potentialities, success and weak points, and recommend improvements as needed. The project's activities in awareness raising and dissemination of results are important tools for ensuring diffusion of lessons learnt within Senegal. Project staff and NGOs will be encouraged to disseminate information through existing networks and scientific journals. Supervision missions by UNDP-GEF, technical evaluations by STAP, and other formal evaluations by GEFSEC will be fielded on an as-needed basis in order to gather and disseminate lessons learnt.

## List of Annexes

Annex I.	Letter of Endorsement of GEF Focal Point
Annex II.	Incremental Cost Analysis
Annex III.	Logical Framework Analysis
Annex IVa.	STAP Roster Review
Annex IVb.	Response to STAP Roster Review
Annex V.	Detailed Baseline Funding for Ongoing Activities
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Annex VIII.	Detailed socio-economic description of project sites
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## ANNEX II: INCREMENTAL COST ANALYSIS

### DEVELOPMENT OBJECTIVE

*Economic Policy:* The Senegalese Government's (GoS), economic targets for 2001 include raising GDP to 6%, while keeping inflation below 3%, reducing their external current account deficit to 6% of GDP, maintaining a budget surplus of 2% or more, and sustainable improvement of social indicators. Public investment is being targeted at education, health and basic infrastructure while the GoS is liberalizing and promoting the private sector in other economic sectors.

***Agricultural Policy:* The Agricultural sector generates only 20% of the country's GDP, but employs over 60% of the workforce, particularly in rural poor. Policies have focused on improving access to credit and supporting producer organizations while removing subsidies, price support and more direct intervention in the sector.**

***Environmental Policy:* the GoS has set aside 5.15 % of its land to total protection, and a further 35 % for multi-use including biodiversity conservation. In the second half of the last decade the GoS created the Higher Council for Environment and Natural Resources (CONSERE) to coordinate environmental policy between government Ministries. The Ministry of Environment is responsible for the management of National Parks and Classified Areas. However in recognizing the increasing strain on PA resources from local populations the GoS now wishes to make legal provisions for co-management of PAs in order to provide incentives for community involvement in biodiversity conservation and natural resource management.**

### GLOBAL ENVIRONMENT OBJECTIVE

The four areas selected for project intervention contain the largest remaining pristine and contiguous mangrove in West Africa; a RAMSAR site of international importance for wintering migratory and palearctic birds; and two World Heritage sites. The sites are representative of Senegal's 4 main relatively untouched ecoregions, and contain endangered and charismatic species such as the elephant, Jaguar, and the African Wolf. These sites are under pressure from a number of principal threats, defined during PDF B preparations as: land conversion; deforestation; poaching; overgrazing; over-extraction of marine and non-timber resources; and bush fires. Over USD 231 million in baseline funding is being invested through projects, mainly in village lands to intensify natural resource management and to make approaches more sustainable. PA staff do not have sufficient capacity and resources to enforce PA legal provisions against illegal resource use. Recognizing this, the objective of the project is to promote integrated ecosystem management of globally significant biodiversity in and around Protected Areas through co-managed conservation, sustainable use and equitable redistribution of benefits from natural resources between local stakeholders, introduce eco-regional planning and buffer zone management principals in areas between PAs, and promote inter-sectoral integrated means to intensify crop production systems and enhance

traditional pastoralism. Global benefits are expected to be generated from protection of globally significant biodiversity as well as increased carbon sequestration and enhancement of carbon sinks.

## ***BASELINE***

Those activities expected to occur during the life of the project are described below (Annex V provides a more detailed description of the baseline).

**Policy and legal framework : In the recent past, GoS has out into effect legislation concerning decentralization, EIAs, community based forestry, and environmental codes such as fisheries and hunting. Currently and in the near future, no activities are expected under the baseline that would have and impact on this output.**

Natural Resource Management: There are seven projects with a combined investment of around USD 40 million from UNDP, UNCDF,, USAID, IFAD, GTZ, Germany, WB, BOAD, the GoS and local beneficiaries to help local stakeholders generate environmentally sustainable income opportunities on village lands. Interventions are focused at: assisting communities to organize themselves into advocacy, collective and other productive groups; assist private sector and collectives to develop investment plans, and assist Rural Councils to prepare area development and natural resource management plans; improve credit access to rural populations; and increase the profitability of local community economic activities.

Poverty Alleviation, Agricultural and Pastoral management: ten projects with combined investments of over USD 136 million, funded from IFAD, WB, BOAD, CFD, RFA, GTZ, AfDB, CIDA, IDA, the GoS and local beneficiaries, aim to combat poverty and improve the management of agriculture and pastoralism. Interventions focus on agricultural intensification; assisting agricultural start-ups; improve access to water; restructure the Ministry of Agriculture and improve the agricultural support services they provide to rural communities.

Forestry and fuel wood management: two projects with an investment of over USD 13 million, funded by Japan and Dutch aid, focus on sustainable forestry management and the sustainable management of traditional forms of energy.

Fisheries Management: two projects for over USD 13 million funded by JICA and EDF, one to build/improve a fishing complex, the other to provide support to artisanal fishermen.

Vegetation rehabilitation: one project is a USD 9.9 million proposal to be funded by JICA and the GoS to fix sand dunes by afforestation and protect inland pastures along the entire Niayes coast, and to put in place a regime for the sustainable collection of firewood from the plantations. This project will be implemented in the context of Article 12 of the Kyoto Protocol, and is confined to plantation work. It will not address the need for sustainable management systems by local communities.

Conservation : Three projects for USD 8.4 million will contribute to this output. The first funded by the GoS is for the purchase of fire-fighting equipment; the second project funded by FFEM and FDS (which will likely terminate before the project starts) will contribute somewhat to the improved management of Niokolo-koba National Park; and the third funded by the EU will support Natural Resource Management in the Niger and Gambia River Basins (AGIR) and will cover PNNK to some degree.

Monitoring & Evaluation, and Environmental Education: There is one project for just under USD 7 million funded by JICA, to monitor fish stock levels off the coast of Senegal. In addition, in the past, NASA has increased the capacity of CSE to establish training facilities for monitoring carbon

sequestration in West Africa (USD 1 million). Japan is currently financing a national environmental education program for a total cost of USD 2.8 million.

In summary, the baseline situation is such that pressure on biological and natural resources will continue to grow, while ongoing action will focus primarily on increasing living standards and devising short term solutions for natural resource problems. Concrete actions have been carried out with the participation of several development partners, NGOs, various economic associations (GIE) and Village Associations, as well as numerous youth and women groups. However, in most cases, these measures have failed to meet expectations. There has been a lack of sectoral integration, resulting in technological packages/systems that are non-replicable outside of laboratories or demo plots. There has been limited adoption by the population due to distortions in economic and policy incentives. And there has been limited involvement of the stakeholders in planning, monitoring and evaluation processes

### *ALTERNATIVE*

The Alternative GEF scenario will build on the baseline by testing and applying an ICD model at each site, promoting integrated eco-regional planning, promoting C sequestration and avoidance of C emissions, and removing the legal, policy, and technical barriers to IEM. In the VTs, production systems will be intensified, land use will be rationalized and food and energy self-sufficiency will be promoted in order to enhance natural resource management and reduce pressure on protected areas. In the CNRs, participatory, integrated, management plans for sustainable use and conflict resolution will be promoted in order to create buffer zones, and alternative techniques for income diversification through sustainable harvesting of biological resources will be demonstrated. In the PAs, a co-management model will be tested for the first time in the Sahel including mechanisms for the equitable sharing of benefits accruing from conservation. Furthermore, the project will build institutional and technical capacities, will demonstrate innovative incentives for conservation, and will monitor impacts on biodiversity and carbon balances over the ten year period.

### *GEF INCREMENT*

The rationale for GEF intervention in the Alternative is to :

- § To retain connectivity between, and promote suitable land uses around PAs by building the capacity of Rural Councils and VTs to plan and implement the principals of local land use planning, and eco-regional planning in village lands;
- § to demonstrate, remove barriers, and create the opportunity for co-management of PA resources in order to provide incentives for local community involvement in biodiversity conservation and CBNRM, and foster custodianship of PA resources by local communities through the equitable distribution of PA resources,
- § to encourage sustainable harvesting (not already covered by baseline activities) to improve rural incomes in village lands;
- § to encourage complementary land uses, and to augment a buffer between commercially oriented land uses in village lands, and conservation in PAs, by promoting planning, designation and management of Community Nature Reserves;
- § to improve the enabling environment for sustainability of project results.

In keeping with the GEF's incremental cost rationale the following broad principals of separation between co-financed and GEF funded activities have been adopted. The GEF will finance all project activities to:

- § review and draft legislation

- § augment the capacity of PA authorities, and local communities to co-manage the project's target PAs for biodiversity conservation and maintenance of carbon sinks;
- § create the institutional structures, legal means and procedures for equitable distribution of benefits from PA resources;
- § enable Rural Councils to adopt and implement IEM and eco-regional planning principals in development and NRM plans;
- § encourage local communities to designate, plan and manage Community Nature Reserves using IEM principles; and
- § remove barriers and demonstrate techniques and approaches for intensification of production systems and make the use of the natural resources more sustainable and profitable.

Co-financing will cover:

- § all recurrent costs to enforce legislative changes introduced by project activities;
- § all recurrent costs of PA planning and management in keeping with the GEF's financial sustainability principals;
- § all recurrent costs of local level land use planning (VT);
- § all capital, labour and material inputs of the sustainable use activities the project is removing barriers for; and
- § all costs to replicate throughout the project area those activities the GEF is financing the costs of demonstration for.

## LOCAL VS. GLOBAL BENEFITS AND COSTS

The following matrix provides a summary of the expected costs and benefits accruing from the project.

**Table IIa. Expected costs and benefits to local and global levels**

Component	Cost (USD)	Intervention summary	Local Benefits	Global Benefits
<i>Output 1:</i> Policy and legal framework adapted to IEM	Baseline		Legislation is distorting incentives promoting optimal land use, encouraging unsustainable resource usufruct practices	Continued degradation of ecosystems due to overexploitation of biological resources resulting in extinction of species and loss of globally significant habitat
	Alternative	Draft, enact and enforce legislation enabling co-management of PA's, amend land tenure law, harmonize sectoral policies and make EIA compulsory	Incentives promoting sustainable use of biological resources, and a steady income stream from these resources	Legal enabling environment created to sustain contiguity of wildlife corridors between PA's and PA co-management, and pressure on PA resources reduced, thereby enabling conservation of important habitats endangered and endemic species within them.
<i>Output 2:</i> Sustainable development and NRM in VTs	Baseline	Short term measures to increase livelihoods and solve more pressing sectoral problems.	High income streams generated from natural resource usufruct, over the short term, but deteriorating over the long term, as soils, and ecosystem functions degraded	Accelerated deterioration of ecosystems in village lands, their ability to trap carbon, increasing pressure on juxtaposed PA's, and leading to the extinction of globally significant species.

Component	Cost (USD)	Intervention summary	Local Benefits	Global Benefits
	Alternative	Intensification of agricultural production, NRM, eco-regional planning, demonstration for new sustainable harvesting regimes to adding value to NRM products, and scaling up activities demonstrated.	IEM and eco-regional planning to make best use of ecosystem functions, and generate sustained incomes	Contiguity of wildlife corridors, and reduced pressure on PA resources, thereby conserving important habitats and conserving endangered and endemic species within them; and leveraging the capacity of the productive environment to sequester and retain carbon.
<i>Output 3: Conservation and sustainable management of CNRs</i>	Baseline	Limited amount of vegetation rehabilitation.	Incompatible land uses around PAs, poor use of harvesting, hunting and eco-tourism potential in PA buffer zones, leading to a loss of potential income from the natural resource base and land degradation.	Pressure on PA resources leading to loss of globally significant habitat, extinction of endangered and endemic species, and loss of carbon sink potential.
	Alternative	Community Nature Reserve planning, designation; and barrier removal and demonstration of new sustainable use activities including vegetation rehab.	Bio-compatible and sustainable income generated in buffers zones, and avoiding wasteful conflict between different interest groups for effective NRM	Buffer generated around PAs reducing pressure, conserving PA habitats and endangered species inside and outside PAs, and enhancing carbon sequestration in buffer zones
<i>Output 4: Sustainable conservation and co-management of natural resources in PAs</i>	Baseline	Some activities in two national parks (PNNK and PNDS) for improving infrastructure, management plans, and eco-tourism.	Continued degradation of plant cover in PAs, exposing village lands to sand storms, soil erosion, fires and risks of floods with attendant disasters.	Continued degradation of ecosystems in World Heritage sites, Biosphere reserves and Ramsar sites, and of globally significant species living in these ecosystems, together with a reduced capacity of PA habitats to sequester and hold carbon sinks.
	Alternative	Training, institutional strengthening, capacity building, and installation of infrastructure for improved enforcement and co-management of PA's	Co-management of PA resources creating win win situations with local benefits from equitable distribution of benefits from PA use, and protection of watersheds and village lands.	Conservation of ecosystems and global biodiversity in World Heritage sites, Biosphere reserves and Ramsar sites, and of globally significant species they contain, together with increased mitigation of greenhouse gas emissions and enhanced carbon sequestration.
<i>Output 5: Participatory monitoring &amp; evaluation of the ecosystems</i>	Baseline	Some monitoring of fisheries and wildlife resources.	Poor understanding of the anthropogenic impact on biodiversity, and the potential from IEM to local uses	Rapid loss of endemic and globally threatened species due to lack of knowledge.
	Alternative	Participatory M&E for adaptive management; creating data base on biodiversity and carbon balance.	Improved knowledge of local benefits from biodiversity conservation and sustainable use, and better use of project resources.	Improved protection and sustainable conservation of endemic and globally threatened species; improved knowledge and capacity to monitor carbon sequestration in arid lands.



## PRINCIPLES GUIDING INCREMENTALITY

The distinction between the GEF increment and co-financing during implementation is given in more detail below, by project output, and is summarized in Annex IIIb.

*Output 1:* The GEF will fund the review and recommendation phase of output 1, while the GoS will fund all enactment, adoption, and enforcement of the new legislation.

*Output 2:* Under output 2 the GEF will fund all start-up costs to develop IEM and eco-regional planning overlays for village and coastal development and natural resource management plans. This will include generating broad based consensus on usufruct rules; capacity building and assistance to Rural Councils, VTs, Fisheries Management Committees and local populations in eco-regional planning; and developing institutional and procedural means and capacity for conflict resolution. Co-financing will cover the operational costs of implementing and replicating those plans. The GEF will fund barrier removal and demonstration for; conflict resolution mechanisms; developing fuel wood alternatives; introduction of sustainable soil and water conservation techniques in arable and pastoral land uses; intensifying and diversifying rural production systems; training and community mobilization in effective bush fire control; sustainable oyster collection techniques; aqua-culture and fish processing. Co-financing will cover all recurrent costs of these activities. The demonstration and barrier removal rational is explained in more detail below.

*Output 3:* Similarly the GEF will fund all start-up costs of developing participatory management plans for Community Nature Reserves in buffer zones of the park; including survey and consultation work for the plans; capacity building and institutional strengthening of Rural Councils and VTs to monitor, enforce and implement the management plans; creating the institutional structure for a micro-credit scheme and equitable sharing of hunting and eco-tourism profits. Co-financing will cover future operational and running costs of implementing the plans. The GEF will fund the demonstration and barrier removal costs of all sustainable use activities in the output; including bush fire control; bee-keeping; eco-tourism; and marine and non-timber forest product harvesting, processing and marketing. The rational for funding these activities are detailed below. Co-financing will cover the cost of all material investments and running costs of these sustainable use activities.

*Output 4:* the GEF will fund all new infrastructural development to strengthen PA management not covered by the AGIR project; including physical delimitation of boundaries; construction of guard and observation posts and encampments; bridges and fords; transport and communications and upgrading park training centers. Already planned co-financing will contribute to some of this infrastructure and bear the full cost of maintenance for all infrastructure. The GEF will fund the costs of all capacity building, training, institutional strengthening of PA authorities and civil co-management teams, and the development of participatory PA management plans to facilitate more effective enforcement of PA resources; co-management; cost recovery and equitable distribution of funds gathered from utilization of PA resources. GEF and co-financing will share the cost of legal modifications and bio-surveys. Co-financing will cover all salaries of PA staff, including recruitment of eco-guardians. As with the other outputs the GEF will fund demonstration and barrier removal costs of all sustainable activities; including bee-keeping, straw mowing, and controlled grazing.

*Output 5:* the GEF will fund all costs of collecting additional baseline data, to monitor the impacts of the project, and training a team in biodiversity and carbon sequestration survey techniques, as well as participatory M&E. Co-financing will cover the salaries of staff during and after the close of the project to facilitate long term monitoring of the project's impacts.

*Barrier Removal and Demonstration Rational for Sustainable Use Activities.*

A number of techniques have been developed and tested successfully in rural areas of developing countries, which would increase the sustainability and productivity of farming systems in village lands, and reduce pressure on PA resources. However they are not currently normal practice among farmers in the project's target area. Other techniques are either innovative or need incremental innovations to adapt them to the Senegalese context. The GEF will fund all the costs for promoting these techniques, training and providing technical advice to farmers in the adoption of these techniques, while all material inputs, and recurrent costs will be covered through co-financing. Where investment costs are prohibitive the GEF will provide access to loans through the project's micro-credit scheme. The techniques being promoted under the project are described briefly below (and in more detail in Annex XI).

- § *Sustainable sedentary farming models*: this includes techniques that have been tested elsewhere in Africa, such as : encouraging mixed livestock and arable farming to enable farmers to maintain soil fertility with manure and feed livestock with fodder; field rotation and composting to maintain soil fertility and fix nitrogen; promote agro-forestry to boost organic soil content from leaf litter; reduce wind and water erosion of soils, provide shade for crops, and utilize space more efficiently through fodder and NTFP production, from tree canopies. The GEF will fund all the costs for testing and fine-tuning these techniques in the project sites, and training and providing technical advice to farmers in the adoption of these techniques, while all material inputs, and recurrent costs will be covered through co-financing.
- § *Livestock Fattening*: Consistent with the mixed farming model above, the GEF will fund costs of training farmers in sedentary intensive small ruminant fattening techniques, including livestock nutrition and phyto-sanitary regimes and provide access to loans for small start-up investments through the project's micro-credit facility.
- § *Pasture management*: Traditional transhumance strategies are being hindered as pastoralists lose access to pasture as exclusionary rights are allocated to the cultivators to convert pasture. The project will modify land tenure laws to accept pastoralism as a legal land use, and provide training in rest and rotation strategies, and planning of pastoral investments and corridors, to enable sustainable pastoralism to co-exist with emerging agricultural land use patterns. Co-financing will finance all pasture improvement and rehabilitation.
- § *Windbreaks and green fire breaks*: planting field and pasture hedges reduces soil erosion by wind and water, and depending on the species, protects crops and pasture resources against fire, provides non-timber forest products, and fodder for livestock. As above, the GEF will fund all the costs for promoting these techniques using endemic species, training and providing technical advice to farmers in the adoption of these techniques, while all material inputs, and recurrent costs will be covered through co-financing.
- § *Reforestation and regeneration*: Some native species have better investment returns than fast growing exotics, because they yield a number of timber and non-timber forest products, such as nuts and fodder. However they take longer to return a yield on the initial investment, because they are slower growing. Because this activity can take up to 8 years to demonstrate, the GEF will provide matching funds for farmers to invest in native species, through the project's micro-credit scheme, to encourage the uptake of this practice and demonstrate its effectiveness over the longer term. Also, the GEF will demonstrate appropriate techniques for reclamation of saline affected lands, for improved biodiversity conservation and C-sequestration.
- § *Aqua-culture*: Aqua-cultural models ranging from the simple to the more intensive will be demonstrated. For example ox-bow lakes and hand-dug ponds filled during the rains can hold rain and flood water long enough to fatten and harvest some species of fish, such as *Tilapia nilotica*. The GEF will fund the costs to provide assistance and training to local entrepreneurs in bio-friendly aqua-cultural techniques, and provide loans through the project's micro-credit scheme to buy fish and other inputs.
- § *Charcoal production*: The project will promote a green tax on wood inputs to charcoal production to encourage efficiency gains in the conversion process. The GEF will fund loans through its micro-

credit scheme enabling producers to purchase low cost equipment to improve the efficiency of charcoal production by up to 30%. The equipment will also reduce the risk of accidental bush-fire caused by the conversion process.

- § *Beekeeping*: New techniques in honey production are now available that do not require “smoking” the Bees from the hive. Instead a chemical compound can be used. The compound is cheap and avoids the risk of accidental bush-fires. The GEF will finance demonstrations, and training in the use of this technique to encourage its use, and make micro-credit available for the purchase of equipment. Although more costly than using fire, if collectively undertaken this technique will reduce the risk of losing pollinating flowers the bees depend upon to make honey.
- § *Eco-tourism and hunting*: these are strategically important activities to the project, since they are compatible with IEM objectives, and can be practiced in PA’s and surrounding buffer zones, and raise revenue for conservation management. While there is potential in Senegal for eco-tourism and hunting they have not as yet taken off. The GEF will finance activities to promote tourism in Senegal, develop, introduce and enforce eco-tourism codes of conduct for operators PA’s and buffer zones, and Community Nature Reserves. Tourist operators will cover all capital and operating costs of practicing tourism and hunting.
- § *Processing, packaging, storing and marketing natural resource based products*: As with the above, if regulated, collecting non-timber forest, rangeland and marine products can be compatible with conservation, and generate revenues for conservation management. The GEF will finance the cost of developing, introducing and enforcing, sustainable NTFP and fish collection techniques and levels. The GEF will also provide training in new or modified techniques to process and package NTFP, rangeland and marine products to increase value and, and provide micro-credit for the purchase of equipment.

## SCOPE OF ANALYSIS

The scope of analysis includes the geographic, institutional, market, policy and legislative factors impacting the projects target areas, as well as the costs and benefits generated from the project activities. This includes: (a) all 4 project sites, there buffer zones, and connecting corridors; (b) all stakeholders in the area; (c) local businesses in the four project areas utilising natural resources on (d) local and national government; (e) governments policy, legislation and plans; (f) NGO’s; and (g) other donors active in the four project areas. The temporal scope covers a 10 year period, although most of the baseline can only be predicted up to about 6 years. Table IIa summarizes the national and global benefits and costs.

## COSTS

The total project costs are USD 31.613 million. Project co-financing amounts to 68% of this total. About 85% of the co-financing has already been allocated to specific outputs. The remainder will be determined during the feasibility study. Together with the baseline activities, the total alternative scenario will cost USD 263.500 million, of which the total project costs amount to 12%. This is an IEM project building on a substantial baseline complemented by significant co-financing. The GoS is fully committed to sustaining the impacts of the project in the long term, and has shown that commitment through various policy changes, as well as committing cash (equivalent about 10% of GEF contribution).

## ANNEX III: Project Logical Framework Analysis

Objectives/Outputs	Objectively Verifiable Indicators	Verification Sources	Critical Conditions
<b>Overall Objective:</b>  Conserve and sustainably use globally significant biodiversity and enhance carbon sequestration in four representative ecosystems of Senegal to generate both global benefits and national benefits from sustainable use and equitable sharing of benefits.	Presence of globally significant animal and plant species increased by 50% at each site by Y10  Amount of carbon sequestered increased by 30% in all sites by Y10.  At least 50% of local stakeholders accruing significant benefits from sustainable use by end of Y7	Independent evaluations.	Current institutional and political stability continues to hold in the country.  Current pattern of rainfall continues to hold or improves.  Unforeseen externalities do not occur, such as civil strife in Casamance or in neighbouring countries (forcing transhumants and other refugees into cross border areas).
<b>Component 1: Policy and legal framework adapted to participatory IEM</b>			
1.1. Legal obstacles to IEM and sustainable use of biological resources removed	Land tenure laws to allow transfer of private land title, by Y3. CNRs legalized by Y3. Co-management text for PAs drafted and approved by end of Y3.	Official Journal of Senegal	Government political situation continues to be amenable to policy reform.
1.2. Sectoral development policies encourage IEM	Agricultural, pastoral, forestry, hunting and coastal development policies encourage conservation initiatives that are equitable to all actors by end of Y2. Pastoralism is recognised as a criterion for land development in RC and VT procedures by Y3. Wood tax to be instituted by Y3.	Direct observation, reports from Project, DEFCCS, DPN, eco-guards and CERPs.	
1.3 Community ownership of biological resources in CNR legally recognised.	Effective transfer of authority responsibilities for community reserves by end of Y2. Land tenure regime modified to allow effective devolution of ownership by Y3.	RC deliberations on woodland use planning	

Objectives/Outputs	Objectively Verifiable Indicators	Verification Sources	Critical Conditions
1.4 Effective environmental impact assessments in project sites	EIA Unit of ME trained in EIA monitoring by Y3. EIA guidelines improved to incorporate biodiversity issues by Y3. Environmental impact studies conducted for each future project in the project sites as early as end of Y2.	Official Journal of Senegal	
<b><i>Component 2: Sustainable development and Community Based Natural Resource Management in Village Territories</i></b>			
2.1. Stakeholders more aware, better trained and informed of techniques, tools and strategies for sustainable management of biological resources	Environmental awareness-raising, training, information and communication programme elaborated and implemented in 100 villages by Y2, and replicated in Phase 2 and 3. 100 Village Trainers identified and trained regularly each year beginning in Y1, replicated to new villages in Phase 2 and 3.	Direct observation, reports from Project, DEFCCS, DPN, eco-guards and CERPs.	No major changes in global trading patterns and international prices for commodities such as gum arabic, meat, cereals.  No major structural changes in decentralized institutions of Senegal (RC, VT, etc.).
2.2. VTs delimited and appropriate plans for local level land use planning, and eco-regional planning developed for IEM ("Management Plans")	100 VTs mapped by end of Y3. 100 VT Management Plans are produced and adopted by consensus, by Y3; replicated in Phase 2 and 3.	Direct observation, reports from Project, CSE, DEFCCS, DPN et CERPs, and RC minutes	
2.3 Effective cooperation between various stakeholders to apply rules of good IEM	100 Local Management Committees created and adopted by all stakeholders by end of Y2 4-5 RC committees established for eco-regional planning by Y2 VT and RC leadership trained in eco-regional and land use planning by Y3 RC development plans modified to reflect eco-regional concepts, by Y5.	Direct observation, reports from Project, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	

Objectives/Outputs	Objectively Verifiable Indicators	Verification Sources	Critical Conditions
2.4. Local management plans integrate appropriate pastoral issues and investments	<p>All VTs in the Ferlo region and at destination point of transhumant livestock have a pastoral management plan adopted and respected by all by the end of Phase 2.</p> <p>3 transhumant corridors are established between Ferlo and Niokolo areas and adopted by residents and transhumants, by Y5.</p> <p>Uncontrolled clearing of rangelands stopped in all VT by Y3.</p> <p>10 ponds and 5 boreholes created and managed by local pastoral management committees by Y6.</p> <p>Minimum grazing fee (estimated CFAF 50 /head/month) and water fee (estimated CFAF 100/head/month) instituted in all improved pastoral units by Y5.</p> <p>Semi-intensive enrichment and rotation system around ponds and boreholes demonstrated in Ferlo pasturelands, by Y4, and replicated through co-financing by Y7.</p>	Projects, DEFCCS, eco-guards CERPs, and RC minutes	
2.5. Supply-demand balance in domestic wood energy controlled in VTs and CNRs	<p>100 VTs have a positive balance between supply and demand of wood energy by Y10.</p> <p>At least one village nursery created in each 100 VT by Y4, and replicated in Phases 2 and 3.</p> <p>Individual and collective woodlots created in 100 VT by Y5, and replicated in Phases 2 and 3</p> <p>Windbreaks and live hedges planted at a rate of 100km/year in all project from Y4 onwards.</p> <p>10,000 improved stoves manufactured and used by local communities, of which 1000 demonstrated in Phase 1, and rest replicated in Phases 2 and 3.</p> <p>50 groups of local communities trained and using improved techniques for wood cutting and carbonization, of which 10 in Phase 1, and 40 in Phase 2.</p>	Direct observation, reports from Project, DEFCCS, and CERPs.	

Objectives/Outputs	Objectively Verifiable Indicators	Verification Sources	Critical Conditions
2.6. Land and marine coastal ecosystems development and management plan elaborated and implemented	<p>55 VT local management plans for coastal ecosystems conservation elaborated and under implementation, by Y3.</p> <p>800 ha of saline soils reclaimed and managed along the estuaries and in deltas, of which 100 in Phase 1, 500 in Phase 2 and 200 in phase 3.</p> <p>3000 ha of mangrove regenerated through direct seeding and with temporary restricted access, of which 500 demonstrated in Phase 1, 1500 in Phase 2 and 1000 in Phase 3.</p> <p>Sustainable techniques for oyster collection, without damaging mangroves demonstrated and adopted by 45 villages in Y3.</p> <p>55 VTs protecting fresh water resurgence sites in Saloum Delta to protect manatee habitat, of which 5 sites demonstrated in Phase 1, and extended to 45 in Phase 2.</p>	Projects, DEFCCS, eco-guards CERPs, and RC minutes	
2.7. Human pressures on fishing resources reduced in coastal VTs	<p>All management plans for coastal VTs include good management rules respected by all by the end of Phase 2.</p> <p>At least 50 fishermen converted to eco-guards for alternative income, trained and operational by Y3.</p> <p>At least 10 aquaculture sites functional by Y4.</p> <p>Techniques for improved fish processing and marketing (dried, smoked, salted shrimp, fish and oysters) demonstrated in 55 VTs through micro-projects by end of Phase 1, and replicated to 100 more villages by phase 3.</p>	Projects, DEFCCS, eco-guards CERPs, Fisheries Service, and RC minutes	
2.8. Bush fires managed in VTs, and integrated with PA and CNR fire management plans.	<p>50% reduction of uncontrolled fires in VTs in Y5; 80% reduction in Y7; 95% reduction in Y10.</p> <p>An Information and Rapid Warning System for eco-guards established in all VTs by Y3.</p> <p>All eco-guards equipped with communication systems by Y2.</p> <p>All 100 VTs have operational fire “vigilance” committees by Y3.</p>	Projects, DEFCCS, eco-guards CERPs, and RC minutes	

Objectives/Outputs	Objectively Verifiable Indicators	Verification Sources	Critical Conditions
2.9. Rural production systems intensified and diversified	<p>Productivity of production systems doubled through use of sustainable production techniques by Y10.</p> <p>1000 ha of arable land fertilised with improved composting, of which 250 ha demonstrated in Phase 1, and 750 replicated in Phase 2.</p> <p>7000 ha of land under intensified integrated agro-sylvo-pastoral systems, of which 2500 in Phase 1, and 4500 in Phase 2, and replicated in Phase 3.</p> <p>10,000 micro-projects for income diversification (processing, intensification, marketing, etc.) implemented through local credit system, of which 1000 in Phase 1, 6000 in Phase 2 and 3000 in Phase 3.</p> <p>1000 horticultural units in Niaye are protected from active dunes through windbreaks, hedges and other techniques, by Y10.</p> <p>A mechanism to monitor and share information on market dynamics is established between VTs, RCs and wholesalers, by Y5.</p> <p>100 VTs encouraged to promote cultural and artistic diversity (carving, weaving) to benefit tourist trade, by Y5, and replicated to 200 more villages by Phase 3.?</p> <p>Women account for at least 50% of the micro-projects in all years.</p>		
2.10 Appropriate credit and savings schemes developed and implemented in VTs.	<p>100 credit and saving schemes operational by Y4, and replicated in Phase 2 and 3.</p> <p>Each VT establishes a committee for M&amp;E on operation of credit schemes, including auditing, and evaluation of impact on biodiversity and sustainable livelihoods.</p>	Projects, DEFCCS, eco-guards CERPs, Fisheries, Agriculture and Livestock Services, and RC minutes	
2.11. Appropriate soil and water conservation techniques applied in VTs	<p>400 km of erosion control and revegetation, of which 40 demonstrated in Phase 1, 200 in Phase 2, and 160 in Phase 3.</p> <p>800 ha of wetlands protected and restored of which 80 in Phase 1, 400 in Phase 2, and 300 in Phase 3.</p>	Direct observation, reports from Project, DEFCCS, and DA	
2.12. Conflicts between crop farmers and livestock breeders managed	<p>Reduce conflicts by 40% in Y6, and 70% by Y10.</p> <p>Leaders of 100 VTs, 4 RCs and associated Pastoral Management Committees trained in conflict management by Y3.</p> <p>At least one Adjudication Court set up in each VT to handle conflicts by Y3.</p>	Direct observation, reports from Project, DEFCCS, and DA	



Component 3: Conservation and sustainable management of Community Natural Reserves			
3.1. CNRs established around PAs to serve as buffer zones	100 CNRs are delineated, and legally recognised (including protocols) by RCs, of which 20 in Phase 1, 60 in Phase 2 and 40 in Phase 3.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	Rate of population increase in Senegal remains at predictable rates.
3.2. CNRs have a participatory plan for management of biological resources, implemented with cooperation of all parties concerned	100 CNRs have adopted plans for participatory management of biological resources and implementation of plans has begun, of which 20 in Phase 1, 60 in Phase 2 and 40 in Phase 3. Each CNR regularly conducts participatory M&E. Eco-guards entirely financed through user fees and collection of fines, by Y7.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	
3.3. Sustainable use regimes demonstrated and implemented for selected resources	Identified and proven alternative techniques for sustainable harvesting and processing (charcoal, honey, wild fruits, gum arabic, hay harvesting, medicinal plants) are demonstrated in and around 20 CNR by end of Phase 1 and systematically used in all CNRs by Phase 2. A manual containing rational techniques for the management of biological resources is produced by the end of Y3. Fuelwood exploitation in CNRs is sustainable by Y6. Regeneration of vegetation with local species (and temporary restricted access) in CNR at a rate of 400 ha/year starting in Y3. 100 km of dune fixation completed, of which 20 in Phase 1, 60 in Phase 2, and 20 in Phase 3.	Direct observation, reports from Project, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	
3.4. Management plans for control of fire elaborated and implemented, and integrated with VT and PA fire management plans.	1000 km of firebreaks opened, maintained, and bordered with plantations of non-deciduous fruit trees, of which 400 in Phase 1 and 600 in Phase 2. Yearly hay collection from firebreaks by local communities in all CNRs. 100 fireless bee keeping micro-projects demonstrated and implemented in all sites by Y6.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	
3.5. Local credit and savings schemes (from Component 2) adapted to sustainable use actions	At least 1000 micro-projects financed related to sustainable use, by Y10. 100 VT and 20 CNR management committees institute a system of incentives for resource users and penalties for offenders	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	

<b>Component 4: Sustainable co-management for conservation of biodiversity in PAs</b>			
4.1. PAs delimited and marked.	19 PAs are delimited by boundary markers by actors by end of Phase 1	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	Turnover of staff in PA system and DPN kept at a reasonable minimum.  No major changes in boundaries of formal PA system during life of project.
4.2. Infrastructures and equipment improved in PAs	All equipment for PA agents and eco-guards in each of the 19 sites (communications, GPS, transportation) are in place by end of Y2 All PA operation and management infrastructures (guard camps, pontoons, vehicles, water trucks, observation towers) are completed by end of Y3. All infrastructure aimed at increasing biodiversity values (ponds, salt stations) are in place by end of Phase 1. All infrastructure for ecotourism enhanced by Y3. 2 training centers at Dalaba and Thies restored, equipped and operational by Y2.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	
4.3. Village eco-guards serving as intermediaries in the integrated management of VTs, CNRs and PAs trained and operational.	50 village eco-guards are provided each year with appropriate training in community-based biodiversity conservation techniques and approaches.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	
4.4. PA natural resources managed jointly with riparian populations	Local management committees are involved in the adoption and implementation of co-management plans at each of the 19 project sample sites by Y3. 19 PAs have new or improved co-management plans by Y2. 4 Inter-RC management committees established and functional by end of Y1. Village committees to combat poaching around PAs and in CNRs created and supported by eco-guards. Former poachers encouraged to switch to sustainable use micro-projects. Controlled grazing operations demonstrated and organised on selected land units inside PA and during appropriate periods, to reduce biomass in firebreaks and assist in germination of certain forest species by end of Phase 1.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	

4.5. Enhanced knowledge of PA biodiversity, co-management and IEM used for management planning.	Data on biodiversity and participatory M&E of co-management taken into account in adaptive management of PAs. Capacity built for eco-regional planning and IEM among all PA staff in 19 PAs.	Direct observation, reports from Project, CSE, DEFCCS, DPN, CERPs, and RC minutes	
4.6. Bush fires managed in PAs and integrated with VT and CNR plans	6000 km of firebreaks opened/maintained by Y10. 40 village groups and all PA staff trained to apply appropriate techniques in using fire as management tools by Y3. Fire early warning and prevention system (with local communities) put into place by en of Y2 in all PAs.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	
4.7. PAs have the required resources to assume operating costs and be self-supporting	Each PA effectively reaches self-reliance by Phase 3. Entrance fees increased gradually until Phase 2. Government contribution to 19 PA budgets increased by at least 100% by Y7.	Direct observation, reports from Project, CSE, DEFCCS, DPN, CERPs, and RC minutes	

## Component 5: Participatory monitoring and evaluation of the ecosystems

5.1. M&E of biodiversity and natural resources in PAs and peripheral areas	Regular inventories of plants and animals, as well as animal migration and biodiversity status, and land use, conducted every other year until Y10.	Direct observation, reports from Project, CSE, DEFCCS, DPN, CERPs, and RC minutes	Local knowledge is still viable and conducive to documentation.
5.2 M&E of carbon sequestration in all project sites	Regular carbon inventories in all project sites , on a yearly basis until Y10.		
5.3. Local knowledge taken into consideration in biodiversity monitoring and evaluation, and adaptive management.	Studies on local knowledge of biodiversity, land use, fire, pastoralism, etc., conducted and results being applied in VTs, CNRs and PAs starting in Y2.	Direct observation, reports from Project, CSE, DEFCCS, DPN, CERPs, and RC minutes	

5.4. Participatory mechanisms to monitor and evaluate project activities elaborated and implemented	Capacity built for participatory M&E in both VT and PA communities, and applied each year.	Direct observation, reports from Project, CSE, DEFCCS, DPN, CERPs, and RC minutes	
5.5 Dissemination of lessons learnt	Networking and exchange visits maintained regularly between 4 project sites until Y10. Dissemination workshops established including other Associated Projects; once every 2 years. Regular information fed to mass media at national scale, and locally through rural radio, schools, local theatres, and other cultural events.	Direct observation, reports from Project, CSE, DEFCCS, DPN, CERPs, and RC minutes	

### Annex IIIb. Project Activities and co-financing arrangements

The following table describes the list of indicative activities for the project during its entire 10 year duration; and the relative share of GEF to co-financing. Annex VI provides a breakdown of the phasing by output.

	<b>Components and Activities</b>	<b>GEF and co-financing</b>
<b>1.</b>	<b>Policy and legal framework adapted to participatory IEM</b>	<b>GEF &gt; Co-finance</b>
<i>1.1</i>	<i>Legal obstacles to IEM and sustainable use of biological resources removed</i>	
1.1.1	Identify legal constraints on natural resource conservation	GEF
1.1.2	Integrate amendments proposed in legal study to encourage private and community initiatives for conservation	GEF
1.1.3	Adapt land tenure system so as to provide incentive for agricultural intensification	GEF
1.1.4	Integrate pastoralism as eligible criterion for land tenure security	GEF
1.1.5	Develop co-management text	GEF
1.1.6	Legally acknowledge co-management text	Co-finance
1.1.7	Enact, adopt and enforce proposed legislation	Co-finance
<i>1.2.</i>	<i>Development policies encourage biodiversity conservation</i>	
1.2.1	Identify and propose policy amendments to remove constraints for agricultural, pastoral, forest, hunting and coastal fishing and encourage collective and private initiatives	GEF
1.2.2.	Adapt development policies to protect forest, rangeland, and coastal land and marine areas by establishing effective buffer zones to reduce erosion.	GEF
1.2.3	Adopt and implement above recommended policies	Co-finance
<i>1.3</i>	<b>Community ownership of biological resources legally recognized in forests and CNR</b>	
1.3.1.	Develop and disseminate idea of private and community initiatives through recognition of community ownership of CNRs	GEF
1.3.2	Transfer authority and responsibilities on CNRs	Co-finance

1.4.	<i>Effective environmental impact assessments/ studies</i>	
1.4.1	Develop/improve EIA guidelines for Biodiversity	GEF
1.4.2	Increase capacity in ME to monitor EIA on Biodiversity issues	GEF
1.4.3	Enact, adopt and implement EIA guidelines proposed by project	Co-finance
<b>2.</b>	<b>Sustainable development and Community Based Natural Resource Management in Village Territories</b>	<b>Co-finance &gt; GEF</b>
2.1	<i>Stakeholders more aware, better trained and informed on techniques, tools and strategies for sustainable management of biological resources</i>	
2.1.1	Elaborate an awareness, training, information and communication programme for sustainable use and conservation of biological resources	GEF > co-financing
2.1.2	Train trainers in awareness, training and communication for sustainable use and conservation of biological resources	GEF > co-financing
2.1.3	Implement the awareness, training, information and communication programme for sustainable conservation of biological resources in all 100 villages	GEF > co-financing
2.1.4	Identify, elaborate and disseminate lessons from experience and promote ongoing training of agents and stakeholders in biodiversity conservation techniques and strategies	GEF > co-financing
2.2	<i>VTs delimited and appropriate plans for local level land use planning, and eco-regional planning developed ("Management Plans")</i>	
2.2.1	Map 100 VT and mark boundaries of resources, including pastures	GEF > co-financing
2.2.2	Elaborate participatory development and management plans for 100 VTs to include farmland pasture, and coastal resources	GEF
2.2.3	Build Capacity for eco-regional planning in RC and VT	GEF
2.2.4	Develop eco-regional planning co-operative framework between all 4 sites	GEF
2.2.5	Adopt and implement eco-regional plans and planning principals	Co-finance
2.3	<i>Effective co-operation between various stakeholders to apply rules of sustainable biological resource management</i>	
2.3.1	Put into place an appropriate mechanism for concentration and co-operation between the stakeholders at VT level.	GEF

2.3.2	Put into place a system of fines in case of non compliance with good management rules established in VT management plans	GEF
2.3.3	Organize community discussions on management of 100 VT development plans in order to ensure flexibility and introduction of remedial measures as the need arises	GEF
2.3.4	Adopt, apply, and enforce good biological resource management rules	Co-finance
2.4	<i>Local management plans integrate appropriate pastoral issues and investments</i>	
2.4.1	Inform stakeholders of changes in development legislation and policies	GEF
2.4.2	Establish a dialogue between host farmers/transhumants and outsiders/immigrants	GEF
2.4.3	Create pastoral units outside of CNRs, and establish Pasture Management Committees as intermediates structures between VTs + RC (to include both residents and outsiders)	GEF
2.4.4	Participatory management plans for Pasture Units (both residents and outsiders), prepared and implemented	Co-finance > GEF
2.4.5	Demonstrate effective vegetation enrichment techniques for improvement of extensive pastures	GEF
2.4.6	Replicate enrichment techniques in pastoral units with high quality endemic and non-exotic forage species	Co-finance
2.4.7	Create/equip ponds and boreholes for pastoral units based on rangeland management plans	Co-finance
2.4.8	Demonstrate, and replicate rotation systems both within and between pastoral units	Co-finance > GEF
2.4.9	Create, and enforce transhumance corridors through participatory eco-oregional planning	Co-finance > GEF
2.4.10	Establish, adopt and enforce a system of payment of grazing and watering fees in improved pastoral units to ensure financial sustainability including system of fines for infractions	Co-finance > GEF
2.4.11	Put into place and implement a participatory rangeland monitoring system for adaptive management by pastoral units	GEF > Co-finance
2.4.12	Prohibit clearing of rangeland and pastures through VT management plans	Co-finance
2.5	<i>Supply-demand balance in domestic wood energy controlled in vats and CNRs</i>	
2.5.1	Demonstrate at least one village nurseries in x VT using endemic species, and replicate in X VT's	Co-finance > GEF
2.5.2	Train VT volunteers in nursery management techniques for endemic species	GEF
2.5.3	Encourage the creation, and replicate successful techniques to establish and sustainably manage village woodlots.	Co-finance > GEF
2.5.4	Demonstrate techniques to establish and manage windbreaks and live hedges in and around the fields and villages, and replicate successful techniques	Co-finance > GEF
2.5.5	Promote manufacture and massive use of improved stoves	Co-finance
2.5.6	Demonstrate and replicate the use of rational techniques for charcoal production and wood	Co-finance > GEF

	cutting	
2.6	<i>Land and marine coastal ecosystems development and management plan elaborated and implemented</i>	
2.6.1	Identify coastal sensitive sites and establish maps of mangroves and saline soils	GEF
2.6.2	Elaborate, and implement a specific plan for coastal land and marine management in each VT	GEF > Co-finance
2.6.3	Demonstrate techniques to reclaim saline soils along estuaries and in deltas	Co-finance > GEF
2.6.4	Demonstrate and invest in mangrove restoration by planting, direct seeding restricted access	Co-finance > GEF
2.6.5	Demonstrate, replicate sustainable techniques for oyster harvesting to conserve mangrove tree roots	GEF > co-finance
2.6.6	Conduct regular monitoring of plant and animal stock species in mangroves	GEF > Co-finance
2.7	<i>Human pressures on fishing resources reduced in coastal VTs</i>	
2.7.1	Put into place, and implement a programme for monitoring and evaluation of stocks, landings of coastal fisheries, and pollution by VTs	GEF > Co-finance
2.7.2	Carry out studies on species' behaviour in mangrove areas and their interrelations with marine life	GEF
2.7.3	Establish, and convene Local fishery management committee	Co-finance > GEF
2.7.4	Establish, adopt and enforce local rules for management of biological rest periods for mangrove and coastal areas	Co-finance > GEF
2.7.5	Demonstrate and adopt alternative income options for fishermen	Co-finance > GEF
2.7.6	Demonstrate, and adopt appropriate aquaculture techniques	GEF > co-finance
2.7.7	Demonstrate, and adopt improved fish processing techniques	Co-finance > GEF
2.8	<i>Bush fires managed in VTs, and integrated with PA and CNR fire management plans</i>	
2.8.1	Train trainers and eco-guards from VTs in preventive and active techniques to combat bush fires	GEF
2.8.2	Organize, and implement an information and rapid warning system with the eco-guards	GEF > Co-finance
2.8.3	Revitalize and equip village committees to combat bush fires in VT, CNR and PA	Co-finance > GEF
2.8.4	Part of the fees collected as fines, confiscation and seizure in CNRs and PA's, put back into revolving fund for financing of eco-guards and other community services	Co-finance
2.8.5	Develop, train and adopt appropriate techniques, and use fire as management tool in VTs	Co-finance > GEF
2.9	<i>Rural Production systems intensified and diversified</i>	



2.9.1	Demonstrate, promote and replicate composting systems to restore soil fertility	Co-finance > GEF
2.9.2	Promote, and replicate agro-sylvo-pastoral techniques in VTs	Co-finance > GEF
2.9.3	Demonstrate and replicate alternative options for income diversification	Co-finance > GEF
2.9.4	Provide technical assistance in and adopt cattle, sheep, goats and poultry fattening techniques	Co-finance > GEF
2.9.5	Provide technical assistance in, and adopt techniques to intensify vegetable garden crop production	Co-finance > GEF
2.9.6	Provide technical assistance in, and adopt appropriate processing techniques for dairy, vegetable and fruit products	Co-finance > GEF
2.9.7	Integrate gender approach alternatives income generation of biodiversity in PAs , CNRs and VTs	Co-finance > GEF
2.9.8	Identify and implement improved marketing channels for rural products	Co-finance > GEF
2.9.9	Encourage the replication of artistic and cultural products for ecotourism in VTs.	Co-finance > GEF
2.9.10	Establish livestock health monitoring and emergency curative programmes	Co-finance
2.9.11	Demonstrate and replicate semi-intensive fodder production and rotation system around boreholes	Co-finance > GEF
2.10	<i>Appropriate credit and savings schemes developed and implemented</i>	
2.10.1	Conduct a study to determine most suitable credit and savings schemes to ensure sustainability of activities	GEF
2.10.2	Build capacity of VTs to determine most profitable and most durable sustainable use activities for micro-projects	Co-finance > GEF
2.10.3	Capitalise and operationalise credit and saving system	Co-finance
2.10.4	Conduct a participatory assessment of micro-projects on impact on the standard of living and biodiversity evolution	GEF > Co-finance
2.11	<i>Appropriate soil and water conservation techniques applied</i>	
2.11.1	Conduct topographic surveys and develop, demonstrate, and replicate appropriate S&W conservation techniques	Co-finance > GEF
2.11.2	Demonstrate, and replicate construction of anti-erosion devices	Co-finance > GEF
2.11.3	Demonstrate, build capacity, and replicate in community protection and restoration of wetlands in VTs	GEF < Co-finance
2.12	<i>Conflicts between crop farmers and livestock breeders managed</i>	
2.12.1	Create and enforce corridors for livestock passage in VTs	Co-finance > GEF

2.12.2	Delimit grazing areas and agree and enforce access rights by all users in management plans	Co-finance > GEF
2.12.3	Demonstrate and replicate techniques for establishing and managing live fences and windbreaks around fields	Co-finance > GEF
<b>3.</b>	<b>Conservation and sustainable management of Community Natural Reserves</b>	<b>Co-finance &gt; GEF</b>
<i>3.1</i>	<i>CNRs established around PAs to serve as buffer zones</i>	
3.1.1	Local communities ratify adoption of CNRs identified in PDF B	Co-finance
3.1.2	CNRs legally recognized and boundaries materialized	Co-finance > GEF
3.1.3	Conclude agreements between RC and VT for management of CNR	Co-finance > GEF
<i>3.2</i>	<i>CNRs have a participatory plan for management of biological resources, implemented with co-operation of all parties concerned</i>	
3.2.1	Elaborate, and implement CNR sustainable use and management plans integrated with VT and PA plans	GEF > Co-finance
3.2.2	Establish and adopt rules of good management of biological resources in CNRs, including fines for infractions.	GEF > Co-finance
3.2.3	Establish and manage mechanisms for self-financing of CNR management through user fees and hunting licenses	GEF > Co-finance
3.2.4	Deleted – covered under 3.2.1	Co-finance
<i>3.3</i>	<i>Sustainable use regimes demonstrated and implemented for selected resources</i>	
3.3.1	Plan and manage fuel wood exploitation in CNRs	GEF > Co-finance
3.3.2	Demonstrate, and replicate ecosystem regeneration by direct seeding in CNRs according to management plans	GEF > Co-financing
3.3.3	Promote, and replicate plantation of multiple-use windbreaks and green firebreaks in and around CNRs as boundary markers	Co-finance > GEF
3.3.4	Replicate wood cutting and charcoal production techniques tested in 2.5.6 to CNR	Co-finance > GEF
3.3.5	Implement options for dune fixation using non-exotic species	Co-finance
3.3.6	Encourage development of ecotourism in community nature reserves adjacent to National Parks	Co-finance > GEF
<i>3.4</i>	<i>Management plans for control of fire elaborated and implemented, and integrated with VT and PA fire management plans</i>	

3.4.1	Demonstrate, and replicate fire-less bee keeping techniques	GEF > Co-finance
3.4.2	Open and maintain firebreaks in CNRs integrated with VT + PA systems	Co-finance > GEF
3.4.3	Practice hay making in firebreaks of CNRs and VTs.	Co-finance > GEF
3.5	<i>Local credit and savings schemes (from Component 2) adapted to sustainable use actions</i>	
3.5.1	Promote and replicate techniques for new value-adding processing techniques for Non-timber forest products such as leaves, gums, oils and waxes	Co-finance > GEF
3.5.2	Identify and implement appropriate techniques to lease hunting zones in CNRs with the assistance of eco-guards	Co-finance > GEF
<b>4.</b>	<b>Sustainable conservation and co-management of natural resources in PAs</b>	<b>GEF &gt; Co-finance</b>
4.1	<i>PAs delimited and boundaries marked.</i>	
4.1.1	Map PAs	GEF
4.1.2	Clearly mark PA limits on the ground	GEF
4.2	<i>Infrastructures and equipment improved in PAs</i>	
4.2.1	Create and maintain permanent ponds	GEF
4.2.2	Create and recondition PA guard camps	Co-finance
4.2.3	Rehabilitate fords, bridges and pontoons	Co-finance
4.2.4	Rehabilitate PA observation towers	GEF
4.2.5	Establish salt stations in parks	GEF
4.2.6	Improve transportation equipment for PA agents	GEF
4.2.7	Restore and upgrade communication systems for PA agents for early warning systems	GEF
4.2.8	Provide PA agents with GPS equipment	GEF
4.2.9	Recondition and equip training/retraining centres at Dalaba and Thiès	Co-finance > GEF
4.2.10	Develop ecotourism infrastructure installations in each national park and reserve to provide funding for recurring costs	Co-finance
4.2.11	Maintain all PA infrastructure	Co-finance

4.3	<i>Village eco-guards serving as intermediaries in the joint management of VTs, CNRs and PAs trained and operational</i>	
4.3.1	Identify village volunteers, and hire to serve as eco-guards using participatory approach	GEF > co-finance
4.3.2	Train trainers and animators for joint management	GEF
4.3.3	Train village eco-guards in rural animation and natural resource conservation techniques	GEF
4.3.4	Train village eco-guards in tourism and cultural guides' approaches and strategies	GEF
4.3.5	Retrain eco-guards and PA agents every six months in sustainable conservation techniques and strategies for PAs and peripheral areas	GEF
4.4	<i>PA natural resources managed jointly with riparian populations</i>	
4.4.1	Build the capacity of Council Members and RC's to make co-management decisions with PA authorities	Co-finance > GEF
4.4.2	Put into place and convene regularly in each RC a functional steering committee for PA management involving PA agents, eco-guards, CERP agents and rural producers	Co-finance > GEF
4.4.3	Develop and implement agreements with RCs involved in management of peripheral zones and community nature reserves	Co-finance > GEF
4.4.4	Demonstrate and replicate diverse community activities income generation from conservation in PAs (such as straw mowing, bee keeping, grazing, cultural rites) where allowed (see output 3)	Co-finance > GEF
4.4.5	Put into place and convene for each site an inter-RC concertation committee to ensure actors' cooperation for sustainable management of PAs' ecosystems and eco-regional planning	Co-finance > GEF
4.4.6	Establish and implement an appropriate mechanism to share profits from conservation	GEF > co-finance
4.4.7	Build capacity of village committees and eco-guards to combat poaching in PAs and in CNRs, and enforce poaching laws	GEF
4.4.8	Establish, and implement a rapid alert system to report presence of poachers, including regulations and fines.	Co-finance > GEF
4.4.9	Develop and implement a system of compensation for crop and LS damage using revenues from sustainable use and user fees.	Co-finance > GEF
4.4.10	Build capacity of sedentary and transhumant livestock farmers in elaboration and implementation of pastoral use plans in Pas	GEF
4.4.11	Monitor controlled grazing in appropriate areas in PAs to assist in PA ecosystem maintenance according to management plan	Co-finance > GEF
4.5	<i>Enhanced knowledge of PA biodiversity used for management planning</i>	
4.5.1	Inventory plant and animal species using appropriate methods	GEF
4.5.2	Integrate local knowledge to determine rates of pressure and extinction of plant and animal species.	GEF

4.5.3	Disseminate results of participatory monitoring-evaluation to VT and PA stakeholders on a regular basis to be used in adaptive management of PA	GEF
4.5.4	Conduct a study on fauna migration in the PAs and peripheral areas	GEF
4.6	<i>Bush fires managed in PAs and integrated with VT and CNR plans</i>	
4.6.1	Open and maintain firebreaks in PAs using local community participation	Co-finance > GEF
4.6.2	Develop, and implement and demonstrate appropriate techniques using fire as management tools in PA, CNR, VT	GEF > co-finance
4.6.3	Train PA agents in appropriate use of early fires in PAs	GEF
4.6.4	Equip PAs with water trucks for rapid intervention in PAs, CNRs and VTs	Co-finance > GEF
4.6.5	Put into place, and implement an fire early warning and prevention system for PA integrated with that of CNR and VT.	Co-finance > GEF
4.7	<i>PAs have the required resources to assume operating costs and be self-supporting</i>	
4.7.1	Promote development of ecotourism in PAs in partnership with private sector.	Co-finance > GEF
4.7.2	Institute a system of entrance fees for all in PAs	Co-finance > GEF
4.7.3	Government budgetary allocation increases for PA	Co-finance
<b>5.</b>	<b>Participatory monitoring and evaluation of the ecosystems</b>	<b>GEF &gt; Co-finance</b>
5.1	<i>M&amp;E of natural resources in PAs and peripheral areas</i>	
5.1.1	Conduct inventory of animal species every other year in PAs, CNRs and VTs	GEF
5.1.2	Conduct inventory of plant species every third year in PAs, CNRs and VTs	GEF
5.1.3	Carry out study on animal migration and behaviour of vulnerable species	GEF
5.1.4	Create and use databank on evolution of living resources in the PAs and peripheral areas in management plans	GEF
5.1.5	Gather information on project impacts (dynamics of biodiversity and carbon sequestration, and improvement of standards of living) in PAs, CNRs and VTs and include it in databank	GEF
5.2	<i>M&amp;E of carbon sequestration in all project sites</i>	
5.2.1	Ground based data collection in a sample of representative sites	GEF

5.2.2	Data collection through remote sensing	GEF
5.2.3	Modelling of carbon cycle in all project ecosystems	GEF
5.2.4	Training of PA staff in monitoring of carbon sequestration	GEF
5.3	<i>Local knowledge taken into consideration in biodiversity monitoring and evaluation, and adaptive management</i>	
5.3.1	Investigate local knowledge and integrate in monitoring and evaluation of biodiversity in PAs and peripheral areas	GEF
5.3.2	Integrate traditional healers, traditional hunters and women in monitoring and evaluation of biodiversity	GEF
5.4	<i>Participatory mechanisms to monitor and evaluate project activities elaborated and implemented</i>	
5.4.1	Create village committees for biodiversity monitoring and evaluation under supervision of eco-guards	GEF > Co-finance
5.4.2	Organize local debates on evolution of biodiversity in PAs and peripheral areas	GEF > Co-finance
5.4.3	Ensure regular participatory monitoring of biodiversity evolution to determine project impacts	GEF > Co-finance
5.4.4	Redirect project activities in PAs, CNRs and VTs based on the result of monitoring and evaluation	GEF > Co-finance
5.5	<i>Dissemination of lessons learnt</i>	
5.5.1	Publish results of evaluation of biodiversity taking into consideration local knowledge through debates, reviews cultural events and in the media	GEF
5.5.2	Regular networking and exchange visits between 4 project sites and with associated projects	GEF



## Annex IVa. STAP Roster Review

Project Number: 1148  
Project Title: **Integrated Ecosystem Management in Four Representative Landscapes of Senegal**  
STAP Reviewer: Dr. Kenton Miller, Vice President for International Conservation and Development, WRI, Washington D. C.  
Date: February 24, 2001

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### Key Issues:

1. **Scientific and Technical Soundness of the Project.** Project design draws upon current theory and practice of Conservation Biology and Landscape Ecology. It reflects current scientific guidelines to shift management scale to that of whole ecosystems and landscapes. On the social side, it reflects current guidelines from research and practice in terms of shifting to decentralized approaches to wildland management, including participatory mechanisms with resident communities.
2. **Identification of the Global Environmental Benefits and/or Drawbacks of the Project.** The benefits to the global community from success are clearly identified, namely the long-term protection and maintenance of the wild flora and fauna unique to the greater ecosystems (Ecoregions) found in Senegal. This includes the biota of the coastal, estuarine, and riverine ecosystems targeted by the project. With project success, the global benefits will expand to regions beyond the four project field sites through demonstration and replicability.
3. **Fit of the Project within the Context of the Goals of GEF, Operational Strategies, Program Priorities, and relevant Conventions.** Project fits well within the goals, strategies and priorities of the GEF. It also fits well within the objectives and provisions of the Climate, Biodiversity, and Land Degradation Conventions.
4. **Regional Context and Replicability.** The project represents an important experiment in the design, testing, and application of new models for biodiversity conservation while fostering positive carbon balances, and the reduction of land degradation. It has a clear focus on poverty reduction and achieving more sustainable livelihoods. The selected project sites are reasonably similar to ecosystems found elsewhere in neighboring countries. Thus, the project is of direct interest and potential replicability to the greater region of West Africa.
5. **Sustainability of the Project.** The odds of achieving sustainability are reasonably high for several reasons. First, the project plans to extend over a 10-year period, allowing for meaningful M&E, and adaptive management. Second, plans include mechanisms for the self-finance of the protected areas, the community-managed



buffer zone reserves, and the village-level programs. Third, the project proposes to develop mechanisms to capture rents from the natural resources, and ways to distribute them so as to generate stewardship among local residents. Fourth, the project has the engagement of national, regional, and local government, NGOs, and local communities. And fifth, the sources of support are diverse suggesting broad-based involvement of donors and technical assistance groups.

6. **Contribution to Improved Definition and Implement of GEF's work.** Again, this project is an important experiment in the design, testing and application of current conservation theory and practice. The lessons learned from this project can have major implications for future GEF-supported projects. Unfortunately, while mentioned briefly early on in the project brief, the document does not expand on or explain how the "lessons learned" will be analyzed, synthesized, and then shared within and around Senegal, and beyond. This is an important point that warrants some further elaboration in the document.

### **Secondary Issues:**

7. **Linkages to other Focal Areas.** The project includes clear linkages to carbon management opportunities and the reduction of land degradation. One could imagine some specific reference to watershed management and water conservation.
8. **Stakeholder Involvement.** Efforts during the PDF B appear to have provided adequate involvement of stakeholders, particularly in the selection of the four project sites, in overall project design, and within the project sites. Then, the project brief provides for continuing and expanding stakeholder engagement in resource management, sharing in both the exercise of authority and responsibility.
9. **Capacity Building.** Generally, the proposal covers adequately the steps to be taken for building capacity at local, regional and national levels. I would like to have seen greater clarity on just how capacity will be built in the areas of "ecoregional planning", and management planning. This will be a massive effort requiring hundreds of trained individuals to meet project goals.
10. **Innovativeness of the Project.** As noted above, this project is clearly innovative in seeking to apply current science and practice in the biological, ecological, social, economic, and institutional aspects of wildland management. It is very ambitious and the risks are not negligible; however, by extending the work over 10 years, the odds are high for success.

### **Specific Comments:**

1. **Project Management Capacity.** The project features a very large number of activities in various geographic locations, with many communities. It is not clear to me who will actually work on the ground to work with all these communities, and how will they be trained? Surely, the project will require hundreds of workers trained in all the many fields involved. There must obviously be a sequenced series of training

activities to build the cadres necessary for implementing all the diverse activities. This is a potential bottleneck for project delivery unless well managed. It would be helpful to have a flow chart showing how the project planners envision building this capacity over a schedule consistent with plans for project implementation.

2. **Limited Entry.** In several places, starting on p. 8, para 18, there is reference to the problem of preventing settlement and entry into reserves and parks. In Annex XI. 1, reference is made to the "bias against non-resident transhumants." There is little chance of project success if the capacity to control land use is not established. Why not have a bias against non-resident mobile communities? Otherwise, as with earlier ICDP's and buffer zone projects, people will move into areas where livelihoods hold greater promise than their current situations thereby diluting project gains. This needs clarification.

3. P 9, para 21, has an apparent contradiction. **Poaching** has led to the disappearance of certain wildlife species...due in great part to various causes including "rigidity of the legal status of these areas." What does this mean?

4. P 11, para 30. **Transfer of Authority to local communities.** Later on p 18, point 1.3.2, transfer of authority and responsibility. Surely you mean this later throughout the document; that is, transferring only authority without responsibility lacks the *raison d'être* for decentralization and devolution – to promote stewardship.

5. P 12, para 37. **Perverse Policies.** The first sentence is very significant and warrants some explanation. The government removes subsidies for traditional agriculture and as a result pressures increase on wildlands by expanding extensive land uses. Why reduce the subsidies if they are perverse to biodiversity conservation?

6. P 15, para 51. **Lessons Learned.** Here and elsewhere, reference is made to lessons learned. This is a particularly important aspect of the project. There will be much learning. How will this be captured, analyzed, synthesized, and shared within Senegal and beyond? (see also p 21, para 71; p 24, para 84, etc.)

7. P 16-17, para 56. **Spatial Units.** This is a very sound scheme.

8. Same. **Village Territories.** The vision at the end of this paragraph is extremely optimistic!

9. P 18, para 60. **Eco-regional Planning.** Here and elsewhere reference is made to this approach to planning. Is it widely understood what this means? I doubt that many PA managers are aware of this; more known is the "ecoregion" scheme of WWF and employed by TNC as a useful way to classify units of land for conservation purposes. Perhaps a note is needed to explain the approach. Is it the same as "bioregional planning" as employed in Australia, west coast USA and Canada, etc.?

10. P 21, para 71. **Biodiversity Evolution.** The third sentence is not clear.

11. P 22, para 75. **Good, sustainable NRM.** Sounds rather subjective.

12. P 22, para 76. **Revenues.** How will local people pay for grazing and watering fees? Do they gain sufficient cash income?

13. P 24, para 83. **Feasibility Study.** Are there still more feasibility studies to come?

14. Annex II. Under Global Environment Objective paragraph, "...introduce eco-regional planning and buffer zone management principals in areas between Pas." This sounds like **corridors and connectivity**, which does not show up in the document until p 4 of Table IIa, and in p 3 of the GEF increment. Could use this language here and be more specific and direct. Packaging such an important concept under "eco-regional planning" obfuscates the point which has significant implications for land use planning.

15. P 3 of Annex II, under GEF Increment, second bullet: what are **PA resources** that can be equitably distributed? Good to list a few to avoid the impression that you mean extraction of timber, hunting, etc.

16. P 8 of Annex II, under Barrier Removal, ninth Bullet: suggests that there will be **hunting in PAs**. Would be good to explain which category of PA to avoid the impression that National Parks will be opened to hunting.

17. Annex III. Point 1.3, insert "and **responsibility**" after authority.

18. Annex III, p 10: **Overall Objective**. Correct word "generate".

19. P 25, 4.5.3. Not clear how to use M&E to adapt management, as presented here.

20. P 25, 5.1. **Inventory**. Who and how will all this inventory work be done?

21. P 25, 5.1.5. What does this mean?

22. Annex Via, p 36: The project calls for a very large number of **management plans**. Who will lead these exercises? How will they be trained? Are these local people, expatriates? This could easily become a bottleneck to progress.

23. Phase III. For VTs and CNRs, the language here says "provided with management plans." Surely you mean that they themselves will develop their management plans, no?

24. P 54. **Mining Policy**. You might want to reference the IUCN/World Commission on Protected Areas Policy on Mining and Protected Areas, and the IUCN Resolution on Mining and Protected Areas, Amman, Jordan, October 2000.

25. P 72. **Capturing Rents**. How will local people, the VTs and CNRs capture rents from ecotourism, hunting, and other fees? Especially if, as noted here, ecotourism expenditures are gathered as package deals in the home country of the traveler?

26. P 73. **Profits**. Still not clear from where the "profits" will come?

This is an outstanding project design, and I look forward to following its implementation.

## Annex IV b. Response to STAP Roster Review

The STAP review has recognized the innovativeness and scientific soundness of the project design. In addition, it has highlighted the project's fit with GEF program priorities; contribution to GEF's work; and the potential sustainability and replicability of the project. Several constructive comments were provided on improving the clarity of the proposal, and these have all been addressed in this revised proposal. These are :

- **Lessons learnt (point 6 of Key Issues, and point 6 of Specific Comments):** *How will the lessons learnt be analyzed, synthesized, and then shared within and around Senegal?* Already quite a lot of lessons learnt have been distilled into the innovative design of the project. Annex XI is devoted to summarizing these and showing how the project will build upon these lessons learnt. In addition, lessons learnt during project implementation will be distilled through the M&E processes (para. 84). An entire component (5) is devoted to synthesizing and disseminating these lessons learnt. The project's Scientific and Technical Committee (para. 80) will be instrumental in ensuring high quality analyses and syntheses, and in assisting in dissemination in scientific journals and professional networks (para. 71). The project will engage dedicated personnel for M&E (both project staff and in local communities), the details of which will be presented in the Project Document.
- **Linkages to watershed management and water conservation (point 7 of Secondary Issues):** Throughout the Brief, 'natural resources' refers to land, water and biological resources, and NRM refers to their management. As an integrated ecosystem management project, water resources and watershed management are included whenever there is reference to natural resources. Most of the activities will address watershed management as it is a major factor in drylands (e.g. output 2.4; and Component 3); water conservation will be a major issue in rehabilitation of vegetation (e.g. output 2.11).
- **Specific comments 1, 13, 20 and 22:** Details on operationalizing the project design (e.g. project staffing, sub-contracts, partnership arrangements, training modalities, who will lead what, etc.) will be detailed out in the UNDP Project Document (PRODOC). STAP review comments on scheduling of training are very constructive and will be taken into account in the PRODOC. This will be developed during a "feasibility" stage during approximately one month after Council approval of the project. These are not research or scientific studies, but standard consultations on operationalizing a project design.
- **Clearer definition of 'eco-regional planning' (point 9 of Secondary Issues; point 9 and 14 of Specific Comments):** This is a very good point as it highlights the different definitions that exist for this term. In the context of this project, the term is used to combine two different scientific streams : (a) classical regional planning (including economic stratification; regional land use planning; population and infrastructure nodes and links; etc.) and (b) bio-regional planning, (including corridors and connectivity between protected areas). The first aspect is currently part of government planning processes, however it does not incorporate biological and ecosystemic factors. Therefore, the project will incorporate these additional concepts into classical regional planning. This will indeed require considerable capacity building, which has been envisaged in components 2,3, and 4, but the focus in Phases 1 and 2 will be on demonstrating the eco-regional linkages only between two landscapes : Ferlo and Niokolo, where the highest linkages exist. In Phase 3, capacity building will continue as

needed and it is expected that the Government will continue to incorporate the approach in other landscapes. Annex XI now includes a section describing this approach, and para. 45, 56, 59, and 67 have been revised accordingly.

- **Concerns about capacity building:** Any project that intends to promote an innovative approach has to involve considerable capacity building. As the project is spread over 10 years, ample time is available to not only build the capacity in crucial areas (eco-regional planning; management plans for VTs, CNRs and PAs; innovative technologies; participatory M&E; etc.), but also to monitor the effectiveness of the exercise, and take remedial action where necessary. Most of the initial capacity building (Phases 1 and 2) will focus on building expertise within national ministries, regional authorities, Rural Councillors, protected area staff, and VT Councillors. This will be carried out first by international experts as trainers of trainers, and then by national and local experts for wider dissemination. Hands-on experience in developing land use and management plans will be crucial in internalizing this capacity at all levels. The project will provide long term technical advisors for this (national and where necessary international). Other beneficiaries in these early phases are local communities in the selected sites, and their capacity will be built through environmental awareness campaigns and hands-on experiences. These operational details will be finalized in the Project Document.
- **Greater clarification (Specific comments points 3,4,5,10,11, 17,18, 19, 21, 23,24):** All of these points are well taken and the relevant paragraphs and texts have been clarified and/or modified.
- **Limited Entry (point 2 of Specific Comments):** The reference to not having a bias against non-residents is based on experience in pastoral natural resource management projects elsewhere in the Sahel (e.g. northern Burkina) and in Morocco, where it has been shown that non-residents who traditionally have access rights must not be excluded. This does not mean that they are accorded the same status as residents, but that their rights and responsibilities should be clearly defined. Land users who have no traditional rights can only have access pursuant to negotiation with residents. The project will work to establish fair and equitable rights and responsibilities of stewardship.
- **Revenues (point 12 of Specific Comments):** The calculation of revenues from grazing and water fees in the Ferlo (para.76 and Annex XI) are based on estimated fees that stakeholders have agreed to pay, during the PDF B. This should be seen as a “willingness to pay” exercise, and final fee levels will be determined in a participatory fashion during project implementation. Livestock sales in the Ferlo are considerable, and the local economy is sufficiently based on a cash system to allow payment of these fees. A parallel GTZ project has had some initial success in ensuring collection and management of fees, and the GEF project will build on this important breakthrough.
- **PA resources (points 15 and 16 of Specific Comments):** The PA resources refer to all sustainable harvesting resources, such as fuelwood, non-timber products, medicinal plants, thatch, as well as hunting. The range and degree of utilization of these resources depends on the type of protected area (NP, SPR, WR, FR) and rules and regulations to be established in the management plans of these areas. This ranges from strict protection in core areas of NPs, to some form of sustainable harvesting of natural resources in the other categories.

- **Management Plans (point 22 of Specific Comments):** There will be different kinds of management plans covering Village Territories (mostly land use planning and zoning, access rights and responsibilities); CNRs in corridors and buffer zones (mostly boundary demarcation, access rights and responsibilities); and PA management plans (ranging from strict conservation to sustainable use regimes). These will be developed by relevant stakeholders : in VTs by village leaders in consultation with CERP and RCs; in CNRs by the latter and also in consultation with PA staff; and in PAs by PA staff and peripheral village leaders. Capacity will be built through national and some international expertise over the first 5 years. Details on how these will be done will be contained in the PRODOC.
- **Capturing rents and making profits (points 25 and 26 of Specific Comments):** Rents from eco-tourism refer to sharing park entrance and other fees between PA and peripheral VTs. Although most ecotourism is a package deal gathered in home country of the traveler, there is significant scope for income generation at the local level through : sale of crafts; offering touristic attractions, such as fêtes, dances and theatrical shows; and offering accommodation and other services. Other sources of revenue will be from granting controlled hunting licences (both for CNR and PAs), and from fines and confiscations. This has been clarified in Annex XI.

## ANNEX V: Details on Baseline funding for ongoing activities at project sites

Project Outputs Contribution to	Baseline Projects	Total Funding	Starting Year	Duration Year	Activities	GOS ( US\$ million)	Beneficiaries (US\$ million)	Development Partners ( US\$ million)	
		(US\$ million)						Costs	Institution
<b>Output 1: Policy and legal frame- work adapted to participatory IEM</b>					Planned				
<b>Subtotal O1</b>									
<b>Output 2: Sustainable development systems and community based natural resource management in Village Territories</b>	Promotion of Agricultural Intensification	7.100	On 1998	On 2003	Promotion of private and collective initiatives for agricultural intensification and transformation.	0.398	1.181	5.521	IDA
	Village Management and Organization	1.754			Restoration of the productive capacities of farmlands, and institutional strengthening of VT in Peanut Basin.	0.022		1.732	IFAD
	Agricultural Development in Matam (PRODAM)	3.771	03/93	7	PRODAM works in the northern Ferlo on the Senegal River to promote 1] food security and increase of income; 2]insertion of returning expatriates; 3] improved irrigation on small plots; 4] promotion of animal traction and diversification of agriculture; 5]livestock improvement and rangeland management; 6] strengthening Village organizations and capacities through a participative approach; 7] infrastructure development.	0.044		2.892	IFAD
								0.834	BOAD
	Improvement of Agricultural Services	84.141	On 2000	6	Reorganization of the Ministry of Agriculture and Livestock, improving the National Agricultural Researches Fund, supporting Counseling for the Rural World (ANCAR), and supporting peasant organizations	38.351		45.790	WB
	Rural Self-Promotion	2.122			Assistance to farmer's organizations in the Peanut Basin and capacity building on improved marketing and processing.	0.044		2.078	FRG / GTZ
	Rural Infrastructure	21.122	On 2001	4x3	Support for the process of rural decentralization, organization of a rural investment fund, rural roads, and monitoring and evaluation.			21.122	WB

Project Outputs Contribution to	Baseline Projects	Total Funding (US\$ million)	Starting Year	Duration Year	Activities	GOS ( US\$ million)	Beneficiaries (US\$ million)	Development Partners ( US\$ million)	
								Costs	Institution
					Planned				
	Village Self- Management and Dev	10.960			Strengthening capacities for economic planning, organization, and management of the VT and intensification of the agricultural production in the Peanut Basin.	1.478	0.244	7.998	IFAD
								1.240	BOAD
	Nat. Project to Fight Poverty	0.103			Stimulate growth with implementation of labor intensive micro-projects and community works. Improve the supply of basic social services and analyze the impacts of public policies on populations and encourage better coordination of social investments.	0.103			
	Local Development Funds	2.098	On 1997	4	Development and the implementation of municipal investment plan for Kédougou, and local development plans for its suburbs. Partnership with the Agency for Popular Credit to finance income generating activities in Kédougou.			0.254	UNDP
	Project to Fight Poverty	8.167	On 1998	4	Build capacity in government, civil society, private sector and local governments to better fight against poverty. This UNDP assisted project intervenes in Diourbel, Tambacounda, Dakar, and Saint Louis. With assistance from the LIFE program, a line of financing is provided for micro-credit for sustainable income generation. The project works through a partnership with the American Foundation for Development, the Senegalese Association for Credit support, and AFRICARE .	0.782		7.385	AfDB
	Rehabilitation of Borehole Equipment	2.433			Rehabilitation of 5 boreholes and promotion of community organizations for management in Northern Ferlo. Communities and government match funds to cover recurring costs.	0.114		2.319	Belgium
	Reinforcement of Borehole Management	9.914			Creation of boreholes, maintenance of the equipment, and training and sensibilization of the local communities in suburbs of Dakar.	0.141	1.620	8.153	CFD
	Fight Against Locusts (LOCUSTOX)	2.393			Locust control using chemical and biological methods, in all agricultural systems in the country.	0.015		2.378	Netherlands AIEA DPV



Project Outputs Contribution to	Baseline Projects	Total Funding (US\$ million)	Starting Year	Duration Year	Activities	GOS ( US\$ million)	Beneficiaries (US\$ million)	Development Partners ( US\$ million)	
					Planned			Costs	Institution
	Community-based NRM	10.836 (+1.000)	01/94	7	Assist 30 rural communities to identify decentralized approaches to and plan for effective natural resources management and stimulation of economic growth. The objective is to secure the participation of rural communities in the identification, planning, utilization, and protection of natural resources to : 1) define rural community management issues in a holistic framework; and 2) to make available to local government structures the means to strengthen their capacity for effective intervention. Some activities will be carried out in the UNDP-GEF project sites and these will be re-programmed to constitute co-financing for the project	1.639		5.788	USAID
	Pastoral Self- Promotion in the Ferlo	5.090 (+0.400)	On 1994	16	Strengthening educational system notably basic education and technical training for transhumants and agropastoralists; increase capacities for management of pastoral investments; institute a pastoral land tax; and assist in drought adaptation. The Project is at present in its 2nd phase ( 1999-2003 ) and covers mainly the northern and western Ferlo. Some activities will be carried out in the Sylvo-Pastoral Reserves which will be re-programmed to constitute co-financing for the project.	0.019		5.071	FRG / GTZ
	Forestry Sector Support Programme	9.995 (+0.594)			Project will improve planning, restoration and management of classified forests of Senegal with technical supports to Ministry and local governments. Some activities will be carried out in the UNDP-GEF Project Sites and will be re-programmed to constitute co-financing for the project.	4.386		5.609	Netherlands
	Self-Promotion of NRM	1.643			Improvement of the management of the natural resources in Sine Saloum through rural advisors, peasant associations and other village structures.	0.007		1.636	FRG / GTZ
	Support to Farmer Entrepreneurship	3.739	On 2000		Increase horticultural processing and marketing in Niayes, and some assistance to the regeneration of the filao ( <i>Casuarina equisetifolia</i> ).	0.354		3.385	CIDA
	Support Artisanal Fisheries	7.983	On 2001	4	Infrastructure improvement for artisanal fishing (loading and landing sites) along the "small coast" from Mbour to Ziguinchor, and in the islands of Saloum; training of fishermen organizations, and intensification of production.			5.029	EDF
	Saint Louis Fishing Complex	5.267			Rehabilitation of Saint Louis fishing port.			5.267	Japan

Project Outputs Contribution to	Baseline Projects	Total Funding (US\$ million)	Starting Year	Duration Year	Activities	GOS ( US\$ million)	Beneficiaries (US\$ million)	Development Partners ( US\$ million)	
								Costs	Institution
	Envrionmental Education and Information (PFIE)	2.770	1990	11	Planned Environmental awareness and training program for schools, training of trainers in primary schools; development of environmental education tools and materials for teachers, school children, and parents; training for seedling, nurseries and school afforestation; exchange field trips in Sahelian countries for parents, school children, and teachers.			2.770	Japan
	National Forest Seeds (PRONASEF)	2.936			Research on forest seeds and seedlings quality and resistance to drought, and dissemination for better success in aforestation programs. Community training on nursery development and implementation. Creation of a selected national forest seeds and seedling stock.			2.936	Japan
	Research and development of improved bee keeping	0.329			Research on alternative options for bee keeping activities without fire, and dissemination of new adapted techniques on bee keeping along with incentives to adopt these new techniques.			0.329	Japan
<b>Subtotal O2</b>		<b>206.666</b>				<b>47.897</b>	<b>6.454</b>	<b>152.315</b>	

<b>Output 3: Conservation and sustainable management of Community Nature Reserves.</b>	Coastal Zone Reforestation	<b>9.888</b>	07/2001	5x2	The project objective is dune stabilization in the northern littoral zone (Zone des Niayes), which includes the regions of Thies and Louga, and aims to protect basins and wetlands and, as a consequence, will improve quality of life for local inhabitants. Measures will seek to minimize dune mobility. Protection of littoral belts consisting of 2,037 ha of dunes over a period of ten years by way of a contract with a private firm to stabilize dunes and protect basins and wetlands. The project is implemented in the context of climate change and specifically in relation to Article 12 of the Kyoto Protocol. About one fourth of the project will be redirected to address the UNDP-GEF project objectives, and therefore will count as co-financing.	<b>0.132</b>		<b>9.756</b>	JICA
<b>Subtotal O3</b>		<b>9.888</b>				<b>0.132</b>	<b>0.000</b>	<b>9.756</b>	

<b>Output 4: Sustainable conservation and co- management of natural resources in Protected Areas</b>	Equipment for Fighting Against Bush Fires	3.906			1] prevention of wild fires through awareness raising; 2] organization and equipment of village committees (hand tools) 3] opening firebreaks in PAs and VTs; 4] use of water cisterns where possible.	3.906			
	Rehabilitation of Niokolo-Koba National Park	0.608	05/1997	4	The project will create effective ecological, economic, institutional, and social management regimes for PNNK and its buffer zones, including : 1) rehabilitaton works for park infrastructure, 2) capacity building for national parks, 3) strengthening programs for enhanced tourism , 4) management of hunting in the buffer zone. Activities of the project meet some but nt all the infrastructure and capacity building needs of PNNK and cover only 16,000 sq. km. of rural communities in the northwest and southwest portions of the park.			0.608	FAC / FFEM
	Support to integrated NRM in the Niger and Gambia River Basins (AGIR)	3.877 (+1.105)	On 2000	4	Studies and evaluation of management of the biological resources of the PNNK; Investments in the improvement of infrastructures and equipments of the PNNK ; Support for socio economic activities and production intensification, elimination of illiteracy, improved communication. Some activities of this project will be redirected to address UNDP-GEF project goals, and therefore will count as co-financing.			3.877	CCE-8TH FED
	ENDA TM	N/A	Since 1977	Ongoing	Enda Energy is a program of the Enda Tiers Monde organization. Designed to promote efficient energy use through research and advocacy at all levels.				
	Centre of Ecological Monitoring (CSE)	N/A	Since 1989	Ongoing	GIS data base of Senegal for the National Program of Fight Against the Poverty; Long term studies of the state of environment and socio economic changes in the Kolda and Niayes regions after the reference studies of 1989 with Canadian cooperation.				

	DRPF / ISRA	N/A		Research on technologies for sustainable management of the natural resources concerning notably agro forestry, forest fallows, restoration of the soil fertility through leguminous plants, the rotation of crops, and other intensification techniques.				
<b>Subtotal O4</b>		<b>8.391</b>			<b>3.906</b>	<b>0.000</b>	<b>4.485</b>	

<b>Output 5:</b>	Fishery Research Ship	6.942	2000	Evaluation of species stock and environmental habitat evolution in industrial fisheries, marine ecological research, fish species migration studies used to determine fishing quotas.			6.942	Japan
<b>Participatory Monitoring and Evaluation of the ecosystems</b>								
<b>Subtotal O5</b>		<b>6.942</b>					<b>6.942</b>	
<b>TOTAL BASELINE</b>		<b>231.887</b>			<b>51.935</b>	<b>6.454</b>	<b>173.498</b>	

## ANNEX VI : PROJECT PHASES

Indicative benchmarks and financing plan for each phase are provided in Table VIa according to the major outputs of the project. The breakdown of measurable indicators per phase is given in Annex III (Logical Framework). The benchmarks and indicators will be fine-tuned if necessary during the feasibility study prior to project start-up. Table VIb provides a breakdown of the project financing according to the three phases and per output.

### Annex VI a. Phases and Benchmarks

PHASE (US\$ million)	OUTPUT 1	OUTPUT 2	OUTPUT 3	OUTPUT 4	OUTPUT 5
<b>ONE</b>	All legal and policy instruments established to encourage community based biodiversity conservation	100 VTs delimited, and provided with participatory land management plans.	CNRs legally established; protocols drawn up between VT and RC.	19 PAs mapped, boundaries marked, equipped with basic infrastructure.	Data bank on project sites designed and established.
<b>(3 years)</b>	Capacities for environmental impact studies created; EIAs systematically conducted prior to implementation of any new project	Capacity for eco-regional planning established and functional in RCs.	Capacity of local communities enhanced for adaptive planning , monitoring and enforcement	Capacity of PA, CERP, and other civil servants enhanced for co-management and eco-regional planning.	Monitoring protocols drawn up and initiated; baseline information on biodiversity in VT, CNR and PA exists.
<b>GEF = 4.000</b> <b>GoS = 2.350</b> <b>UNDP = 1.650</b> <b>EU = 0.900</b> <b>JICA = 1.100</b> <b>Dutch = 2.000</b> <b>Other = 2.500</b>  <b>TOTAL = 14.500</b>					

	<p>Appropriate models for local level micro-credit schemes created and tested.</p> <p>Pilot NRM activities not requiring prior removal of legal, policy and capacity barriers are conducted, using micro-credit where necessary.</p> <p>Sustainable harvesting regimes established for selected resources in CNR and PAs.</p> <p>Pastoral needs and issues integrated in all plans, including establishment of corridors.</p> <p>Design elements for early warning systems for fire management developed; eco-guards, PA agents and village vigilance committees trained through experiments and trials.</p>	<p>Study on integration of local knowledge in management plans completed and results incorporated into VT, CNR and PA plans.</p> <p>Biodiversity indicators also take into account local knowledge.</p>
	Environmental Awareness, training, information and communication programme is elaborated and initiated in all project sites.	
	Independent Monitoring and Evaluation at end of Phase 1.	

<p><b>TWO</b></p> <p><b>(4 years)</b></p>	Legal and policy changes disseminated to wide stakeholdership.	100 more VTs are delimited and provided with participatory land management plans.	20 CNRs delimited, and provided with participatory management plans that are integrated with VT and PA plans.	19 PAs provided with co-management plans, which are also adopted by local stakeholders.	A second inventory of biodiversity in all project sites conducted.
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**GEF = 4.320**  
**GoS = 2.357**  
**UNDP = 1.200**  
**EU = 0.205**  
**JICA = 1.100**  
**Other = 1.000**

**TOTAL =**  
**10.182**

	Transboundary agreements reached in the case of Niokolo-Koba	Local level micro-credit systems systematically applied in all 100 VTs. Micro-projects comply with participatory approved sustainable harvesting regimes and generate alternative income. Fire management and early warning systems in place and operational. Incidence of uncontrolled fire reduced by 50%. Mechanisms and incentives for financial sustainability of project activities tested.			VT, CNR, and PA management plans modified as required.
	Environmental awareness, training, information and communication programme continued and extended to 100 more VTs.				
	Analysis of interim lessons learnt carried out and disseminated within and outside project.				
	Independent Monitoring and Evaluation at end of Phase 2.				
<b>THREE</b>  <b>(3 years)</b>  <b>GEF = 1.400</b> <b>GoS = 3.609</b> <b>UNDP = 0.342</b> <b>JICA = 1.098</b>  <b>TOTAL = 6.449</b>	Legal and policy framework, including EIA system, reviewed and revised if necessary.	100 more VTs are delimited and development of participatory land management plans.	20 more CNRs delimited and provided with participatory management plans that are integrated with VT and PA plans.	Financial sustainability of all PA system assured.	A third inventory of biodiversity in all project sites conducted. VT, CNR and PA plans revised where necessary.
	Environmental awareness, training, information and communication programme continued and extended to 100 more VTs.				
	Analysis of all lessons learnt carried out and disseminated within and outside project.				
	Mechanisms and incentives for financial sustainability of project activities applied.				
	Preparation of total disengagement of project.				
	Independent Monitoring and Evaluation at end of Phase 3.				
<b>PDF B = 0.482</b>					
<b>GRAND TOTAL = 31.613</b>					

**Annex VIIb. Breakdown of project financing by output and by phase (in US\$ million)**

<b>Phase</b>	<b>Output</b>	<b>TOTAL</b>	<b>GEF</b>	<b>GOS</b>	<b>UNDP</b>	<b>EU</b>	<b>Nether lands</b>	<b>JICA</b>	<b>OTHER</b>
<b>ONE</b>	<b>1</b>	0.098	0.078	0.010	0.010				
	<b>2</b>	6.330	0.380	1.285	1.265		0.900		2.500
	<b>3</b>	2.762	0.612	0.100	0.350		0.600	1.100	
	<b>4</b>	5.120	2.800	0.920		0.900	0.500		
	<b>5</b>	0.190	0.130	0.035	0.025				
<b>Subtotal</b>		<b>14.500</b>	<b>4.000</b>	<b>2.350</b>	<b>1.650</b>	<b>0.900</b>	<b>2.000</b>	<b>1.100</b>	<b>2.500</b>
<b>TWO</b>	<b>1</b>	0.035	0.010	0.015	0.010				
	<b>2</b>	3.450	0.320	1.205	0.925				1.000
	<b>3</b>	2.300	0.740	0.210	0.250			1.100	
	<b>4</b>	4.202	3.100	0.897		0.205			
	<b>5</b>	0.195	0.150	0.030	0.015				
<b>Subtotal</b>		<b>10.182</b>	<b>4.320</b>	<b>2.357</b>	<b>1.200</b>	<b>0.205</b>	<b>0</b>	<b>1.100</b>	<b>1.000</b>
<b>THREE</b>	<b>1</b>	0.030	0.010	0.010	0.010				
	<b>2</b>	2.211	0.220	1.776	0.215				
	<b>3</b>	1.825	0.220	0.400	0.107			1.098	
	<b>4</b>	2.233	0.860	1.373					
	<b>5</b>	0.150	0.090	0.050	0.010				
<b>Subtotal</b>		<b>6.449</b>	<b>1.400</b>	<b>3.609</b>	<b>0.342</b>	<b>0</b>	<b>0</b>	<b>1.098</b>	<b>0</b>
<b>PDF B</b>		<b>0.482</b>	<b>0.350</b>	<b>0.081</b>	<b>0.051</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>GRAND TOTAL</b>		<b>31.613</b>	<b>10.070</b>	<b>8.397</b>	<b>3.243</b>	<b>1.105</b>	<b>2.000</b>	<b>3.298</b>	<b>3.500</b>



## ANNEX VII. Description of biodiversity status at Project Sites

### Site Selection

In 1998, during the formulation of the Senegalese biodiversity strategy and its action plan (BSAP), there was a consensus that more than 90% of plant and animal species, almost all endemics, and critical habitats are found in 4 major ecosystems in the country. The BSAP conservation priority entails protection and sustainable use of the habitats and species found in these four key ecosystems and to involve local communities in the care taking of biodiversity resources. Henceforth in 1999 and 2000 during the PDF B, participants at regional and national workshops followed suit to make and confirm original site selection to cover (a) most representative habitats of the country, (b) inside and outside protected areas boundaries, (c) in a manner to involve and entrust conservation of biodiversity primarily in the hands of adjacent communities to the protected areas, and (d) to provide global benefits from carbon sequestration. This is crucial as most threats to vegetation and globally significant biodiversity in Senegal originate from resource and land use by the villagers that surround protected areas, it is essential to improve productivity of the land and optimize resource use through community management. The critical habitats found in the four main ecosystems of the country are respectively: (1) steppes, grassland and woodland savannahs in the north and eastern region covering the Ferlo; (2) dry sub-guinean open forests in the south of the country around the Niokolo Koba National Park; (3) coastal and littoral habitats, also known as the Niayes ecosystem made of coastal dunes, which are located along the country's Atlantic coastline; (4) and the land and marine ecosystems of the Saloum Delta and Lower Casamance National Parks, whose habitats span from palm groves, bamboo groves, mangroves and wetlands.

The Table A7-1 provides a summary of the protected area status of these four ecosystems, and the samples selected for the first phase of the project. Table A7-2 provides the population, number of villages in the project area and the sample selected for the first phase. As a result of a GoS decision on 5<sup>th</sup> February 2001, the IEM project will focus its activities on sites and villages on terrestrial ecosystems. The following is a description of the four landscapes, their protection status, and the specific sites to be selected in Niayes and Saloum.

### Site I: Ferlo

The eastern Ferlo site has a total of 84 protected areas covering 4,156,680 ha of relatively undisturbed shrub savanna. The sample PA chosen in this site are : (a) the North Ferlo Faunal Reserve (332,000 ha), which is under DPN (Directorate of National Parks) management; (b) the South Ferlo Faunal Reserve (663,700 ha); (c) two adjacent classified forests (54,980 ha); and (d) 5 sylvo-pastoral reserves extending over a total of 1,514,000 ha. There are 14 other sylvo-pastoral reserves in western Ferlo. Depending on the soil and relief, species such as *Acacia senegal*, *Commiphora africana* and *Combretum glutinosum* appear and may even dominate. The most common grass are *Cenchrus biflorus*, *Schoenefeldia gracilis* and *Dactyloctenium aegyptium*. The lateritic Ferlo region shows a relatively dense tree stratum, dominated by *Pterocarpus lucens*, often in relatively pure formations. These are associated with other species such as *Acacia seyal*, *Combretum mivranthum*, and *Combretum nigricans*, depending on soils and relief. The soils are mainly of the ferruginous type over the entire area, with intersected sandy valleys and sandy clay depressions, adjacent to which the villages and camps are generally established. The lower vegetation stratum is dominated by *Loudetia togoensis* on gravel soils. Under normal rainfall conditions, these form pastures that meet livestock feeding needs, but bush fires destroy much of the grass biomass. Dry biomass production ranges from a maximum of 1,280 kg of dry matter per hectare in the Tiel pastoral

unit to 837 kg of dry matter per hectare in the Téssékéré pastoral unit. Average production revolves around 0.58 UBT per hectare while average real load is approximately 0.37 UBT per hectare (PRODAM, 2000). The vegetation in former stream valleys shows signs of the presence of important gallery forests up to a relatively recent past. These vast ecosystems are the only remaining locations in Senegal with wild ostriches, under severe threat. The Ferlo Reserves are also one of 12 sites in the world with Dama-Mhorr gazelles. The region also provides habitats and wintering grounds for several migratory palearctic bird species. The Ferlo reserves constitute preferred site for transhumant and sedentary pastoralism, particularly centred around waterholes. The Ferlo site includes 4 community reserves (RCs) with 162 villages and a total population of approximately 87,400. Bush fires are frequent in the Ferlo.

Several animal species have disappeared from the Ferlo including *Damaliscus lunatus*, *Gazella dama*, *Hippotragus equinus*, *Panthera pardus*, *Giraffa camelopardus*, *Crocodilus niloticus* and *Orycteropus afer*. The Ferlo area used to provide winter quarters for large herds of wildlife moving northward from the Niokolo-Koba National Park. These migrations were observed in the winter seasons and lasted until the end of the rainy seasons. The obstacles to wildlife migration from PNNK to the Ferlo area are related to: (1) extensive livestock often practised by farmers who kill wild carnivores to protect their herds and even herbivores for food; (2) encroachment on wild habitats by wells and boreholes with frequent breakdowns of equipment causing livestock concentration and overgrazing over several tens of square kilometers; (3) rapid drying of ponds with livestock concentration around remaining ponds; (4) implantation of new villages fragmenting the natural habitats for the migrating wildlife; (5) collection of ostrich and guinea fowl eggs; (6) capture of juveniles; and (7) late bush fires that destroy forage (PDF B, 2000).

The endemic plant species of the Ferlo are: *Abutilon macropodum*, *Digitaria aristulata*, and *Nesaca dodecandra*. The endangered plant species of the Ferlo that appear on the IUCN red lists are: *Justicia niokolo-kobae*, and *Digitaria aristulata*. Threatened animal species in the Ferlo reserves include: *Lycaon pictus*; (African wolf), *Felis leo*; (Lion), *Taurotragus derbianus*; (Derby eland), *Syncerus caffer*; (Buffalo), *Hippotragus equinus*; (Roan antelope), *Hippopotamus amphibious*; (*Hippopotamus*, *Loxodonta africana*; (Elephant), *Pan troglodyte* (Chimpanzee), *Neotis cafra denhami*; (Denham bustard), *Bucorvus abyssinicus*; (Land calao), *Terthopius ecaudatus*; (Bateleur eagle), *Dendrocygma viduata*; (White-faced whistling duck), and *Polemaetus bellicosus*; (Martial eagle).

## **Site II: Niokolo-Koba National Park and surroundings**

Located in the south-east of Senegal, Niokolo Koba project zone has 6 PAs that occupy a total area of 2,981,250ha including the Niokolo-Koba National Park with an area of 913,000ha, which is surrounded by four Classified Forests (CF) covering 132,250 ha, and the Falémé Hunting Reserve covering 1,936,000 ha.. Niokolo-Koba National Park (NKNP) has been designated as both a World Heritage Site and a Biosphere Reserve. It is adjacent to the Badiar National Park in Guinea of a total surface area of 194,000 ha, both form a large ecological complex, that is one of the largest conservation area in west Africa. On the Senegalese side of the border, this ecological complex is girded by nine community reserves (CR) containing a total of 304 villages with a population of approximately 92,000 people. The sample PAs chosen for this project zone are : PNNK and 4 Classified Forests.

Niokolo-Koba comprises representative large extents of the savannas habitats of the country; and these are mainly grassland (dominated by *Andropogon* and *Pinnesitum*), shrubland (dominated by *Combretum glutinosum* and *C. nigricans*), open woodland (dominated by the woody *Bombax*, *Azelia*, *Pterocarpus*, *Xerroderris*; and *Diheteropogon* for grass species); and closed woodland (dominated by the following trees: *Pterocarpus*, *Terminalia*, *Erythrophleum*) savannas, and open (dominated by *Pterocarpus*, *Anogeissus*, and *Piliostigma*) and closed gallery forests, which make up to 78% of the Senegalese gallery forests.

Niokolo-Koba National Park contains 1,500 out of the 2,100 species of flowering plants known in Senegal. There are also 80 mammal species (out of 192 in Senegal), 330 bird species, 36 reptilian species, 2 amphibian species, 60 fish species and myriad of invertebrate species. Niokolo-Koba is also the last refuge for elephants in Senegal. It contains endemic and threatened species as follows. The endemic plant species of Niokolo-Koba are: *Acalypha senensis*, *Bauhinia senegalensis*, *Cyperus laberiticus*, *Ilysambles cangesta*, *Indigofera leptoclada*, *Lauvembergia villosa*, and *Naseae dodecandr*. The endangered plant species of NKNP, which appear on the IUCN red list, are: *Hygrophila micrantha*, *Justicia niokolo-kobae*, *Cyperus calocarpum*, *Indigofera leptoclada*, *Berhantia senegalensis*, *Measa nuda*, *Pavetta cinereifolia*, and *Striga bilabiata*. The highly threatened animal species of Niokolo-Koba are: (for the mammals) *Lycaon pictus*; (wild dog), *Felix leo*; (Lion), *Taurotragus derbianus*; (Derby eland), *Syncerus caffer*; (Buffalo), *Hippotragus equines*; (Roan antelope), *Hippopotamus amphibious*; (Hippopotamus), *Loxodonta africana*; (Elephant), and *Pan troglodyte* (Chimpanzee); and *Neotis cafra denhami*; (Denham bustard), *Bucorvus abyssinicus*; (Land calao), *Terthopius ecaudatus*; (Bateleur eagle), *Dendrocygma viduata*; (White-faced whistling duck), and *Polemaetus bellicosus*; (Martial eagle) for the birds.

### Site III: Niayes Coastal Habitats

The Niayes are located along the northern coast of Senegal. They consist of a series of interdunal depressions bordered by coastal and continental sand dunes with sub-guinean climate that occurs only north of the 13th parallel. The Niayes project site has 8 PAs covering 29,411 ha of sub-guinean forests in the heart of the Sahel and includes six classified forests (CFs) covering 25,880 ha, two (national parks) NPs covering 2,720 ha, and one 16-ha botanical reserve. The area stretches over some 135 km along the Atlantic coast. With its humid climate of the sub-guinean type, the Niayes are characterized by a complex flora, unique in the Sahel with one of the highest occurrence of endemics in West Africa (Sambou, B.2000). The Niayes extends the coast of Senegal from Dakar to Saint Louis. They stretches over nearly 180 km and cover a narrow width from 30 to 35 km. The Niayes are bordered by eight community reserves (RCs) and have 449 villages with 200,500 people.

The sample of PA chosen in the Niayes site include 4 CFs and one Wildlife Reserve in terrestrial habitats characterized by a succession of dunes and interdunal depressions frequently containing ponds, that appear as the water table rises. The Niayes distinguish themselves from the rest of the country by a humid, maritime climate and strong, but relatively constant winds. The climate is of the sub-canary type, dominated by marine trade winds and the monsoon. Average yearly temperatures range between 23.7 and 27° C. Average rainfall varies from 300 to 500 mm, generally with a three-month rainy season. There is no specific hydrological regime in the Niayes. The depth of the water table varies between 0 and 60 metres, although there are areas where water is brackish to salty. Ancient sea arms have been transformed into depressions or lakes such as Lakes Retba, Tamna, Notto, Meckhé and Loumpoul-Kayar. Humid interdunal depressions alternate with the sand dunes, corresponding either to actual interdunal spaces or to traces of former hydrological networks. These low-lying areas are flooded by runoff from the water table during the rainy season. They dry up subsequently more or less rapidly according to their position. The hydrological regime often varies from one Niayes to the next, but in all of them the humidity level is particularly high. As a result, the Niayes region is a unique site, the richest one in terms of biodiversity north of the 13th parallel.

The dunes, which are sterile and active on the coast (white dunes), stabilize gradually as one progresses towards the interior (red dunes) with the appearance of a very fragile vegetation cover. In the interdunal depressions, the soils are rich and suited for the cultivation of vegetables and fruits, which constitute the

mainstay of the production system. The Niayes constitute the vegetable gardens of Senegal, and their productive environment integrates on-shore fishing, livestock farming and pluvial crops which are of major importance outside the flooded depressions during the rainy season.

The vegetation is of the sub-guinean type, with *Elae guinensis*, that dominates in the southern section of the Niayes. However the vegetation has been severely degraded due to human activities and droughts, which have now caused a drop in the water table level, gradual salinization and an acceleration of the encroachment on biodiversity rich dunes from cultivation of low-lying vegetables. Despite measures implemented to protect the area, the viability of these unique habitats remains uncertain. The Niayes habitats were originally abundant and very diversified, but their vegetation is in sharp regression, both in area covered and in the number of species.

The flora of the Niayes contains over thirty families for a total of nearly eighty broadly distributed ligneous species. The Niayes habitats contain nearly 20% of the entire flora of Senegal, a diversity level encountered nowhere else in Senegal nor north of the 13th parallel. Of the 31 plant species endemic to Senegal, 13 were found in the Niayes and 10 of them are threatened. The threatened species are: *Ceropegia praetemissa*, *Ceropegia senegalensis*, *Polycarpeae linearifolia*, *Polycarpon prostratum*, *Salicornia senegalensis*, *Lipocarpa prieuriana* var. *crassifolia*, *Scirpus grandispiscus*, *Scleria chevalieri*, *Eriocaulon inundatum*, *Rhynchosia albae-pauli*. The three endemic species, as yet not threatened, are: *Crotalaria sphaerocarpa*, *Urginea salmonea* and *Ficus dicranostyla*. The two species of the genus *Ceropegia* are also included in the 1996 CITES list. Two other non-endemic species (*Pluchea lanceolata* and *Digiraria arstulata*) are considered threatened in Senegal according to IUCN (1997 Red List).

The fauna of the Niayes is poor, probably because these habitats have already been severely degraded mainly in the northern section of the area, however, in the Gueumbeul Game Reserve and the Langue de Barbarie National Park, animal diversity is remarkable. The Gueumbeul Game Reserve is located near the coast, in the Rao District, some 12 km away from Saint-Louis. The Niayes are globally significant as a wintering area for thousands of birds, mainly waders. Important species found in the game reserve include the avocet (*Pluvialis squatorala*), the European spoonbill (*Platalea leucorodia*) and the greater plover (*Charadrius hiaticula*). The Langue de Barbarie National Park is located at the mouth of the Senegal River, 25 km south of Saint-Louis. It contains many marine avifauna, including numerous grey pelicans (*Pelecanus rufescens*), white pelicans (*P. onocotalus*), 3,000 pairs of grey-headed gulls (*Larus cirrhophalus*), the Caspian tern (*Hydroprogne caspi*), the royal tern (*Thalasessus maxims*), 2,000 species of slender-billed gulls (*Larus genei*), the Hansel tern (*Gelochelodon nilotica*) at the northern limit of its nesting area, the sooty tern (*Sterna fuscata*) and the little tern (*Sterna albifrons*) at the southern limit of its nesting area. The park is also a sanctuary for ducks and migratory waders. The marine fauna of the Niayes includes the green turtle, (*Chelonias mydas*), the leatherback turtle (*Dermochelys coriacea*), the loggerhead turtle (*Caretta caretta*) and the common dolphin (*Delphinus delphis*), all of them globally threatened and protected, which are sold for food on local markets and in the Saloum Delta.

The Niayes provide habitats both to a number of endemic species and globally threatened species included on the IUCN Red List. The threatened species are: *Ceropegia praetemissa*, *Ceropegia senegalensis*, *Polycarpeae linearifolia*, *Polycarpon prostratum*, *Salicornia senegalensis*, *Lipocarpa prieuriana* var. *crassifolia*, *Scirpus grandispiscus*, *Scleria chevalieri*, *Eriocaulon inundatum*, *Rhynchosia albae-pauli*. The three endemic species, as yet not threatened, are: *Crotalaria sphaerocarpa*, *Urginea salmonea* and *Ficus dicranostyla*. Two other non-endemic species (*Pluchea lanceolata* and *Digiraria arstulata*) are considered threatened in Senegal according to IUCN (1997 Red List). Important species found in the protected areas of the Niayes include the avocet (*Pluvialis squatorala*), the European spoonbill (*Platalea leucorodia*) and the greater plover (*Charadrius hiaticula*).

The endemic plant species found in the Niayes are: *Ceropegia pratermissa*, *Crotalaria sphaerocarpa*, *Ficus dechranostyla*, *Laurembergia villosa*, *Lipocarpa priemiana*, *Polycarpaea linearifolia*, *Rhonchosia alba-pauli*, *Sakucarnia senegalensis*, *Scirpus grandicuspis*, *Urginea salnidea*, and *Vernonia bambilarcensis*. Threatened bird species found in the Niayes include: *Pluvialis squatorala*; (Avocet), *Platalea leucorodia*; (European spoonbill), *Charadrius hiaticulata*; (Greater plover), *Pelecanus rufescens*; (Grey pelican), *Pelecanus onocrotalus*; (White pelican), *Larus cirrhophalus*; (Grey-headed gull), *Hydroprogne caspi*; (Caspian tern), *Thalasassus maximus*; (Royal tern), *Larus genei*; (Slender-billed gull), *Gelochelodon nilotica*; (Hansel tern), *Sterna fuscata*; (Sooty tern), and *Sterna albifrons*; (Little tern). The threatened turtles found in the Niayes are: *Chelonias midas*; (Green turtle), *Dermochelys coriacea*; (Leatherback turtle), *Caretta caretta*; and (Loggerhead turtle). Also the common dolphin, *Delphinus delphis*, is threatened and found in the Niayes.

Based on a GoS proposal, this project will concentrate on the in-land (red dune) areas as well as the Wild Reserve of Guembeul, while all other coastal areas will be included in the GEF/WB CZM project.

#### **Site IV: Saloum Delta and Lower Casamance National Parks**

The second project site covers both the Lower Casamance and Saloum Delta National Parks and their vicinities. The Lower Casamance National Park (5,000 ha.), the last rainforest in Senegal. It is home to over 50 mammal and 200 bird species. There are monkeys, such as Campbell's and the colobus monkeys, and several species of antelopes, such as the yellow-back duiker. The park also provides important nesting grounds for many bird species and a refuge for several eagle species. Biodiversity degradation in the Saloum Delta originates from overgrazing, logging, erosion, bush fires and drought.

The Saloum Delta National Park (SDNP) extends over a total area of 180,000 ha consisting of three major habitat types: (a) mangroves and wetlands, (b) dry forests and savannas, and (c) the ocean, estuarine delta and islands of sand strings. The park is part of the Saloum Delta Biosphere Reserve. It is covered on two thirds of its territory by the largest mangroves in Africa. These mangroves serve as regulators for floods and tides. They also provide reproductive habitats for numerous species of fish, dolphins, sirens, waterfowl and palearctic migratory birds. The park has also been designated a Ramsar site. Not far from the Saloum Delta National Park is located the Keur Samba Dia Biosphere Reserve (800 ha). Also 4 Classified Forests (CF) are adjacent to the SDNP covering 53,140 ha, in addition to coastal and insular areas that are contiguous to the park. The agricultural system is characterized by a southern multi-cropping regime, with pastoral, fishing and hunting activities on the increase due to favourable arable soils and better rainfall patterns than in the rest of the country. The complex consists of three Community Reserves (CR) with 99 villages surrounding the Saloum Delta National Park, with a population of 45,800. Despite numerous and intense anthropogenic pressures, the site still contains a number of endemic species and globally threatened species. Three of the 31 species endemic to Senegal can be found in the area. These endemics are *Lipocarpa prieriana*, *Scleria chevalieri* and *Ficus dicranostyla*. Threatened and rare species are (IUCN 1999 list): *Eriocaulon inundatum*, *Hygrophila micrantha*, *Uvaria thomsasii*, *Kigelia africana*, *Albizzia ferrutinea*, *Treculia africana*, *Pouchetia africana*, *Fagara rubescens*, *Parinar excelsa*, *Diospyros frrea*, *Mesneurum benthamianum*, *Tetrapleura tetraptera*, *Malacantha alnifolia*, and *Bridelia micrantha*.

Mangroves extend over 75% of the surface area of the Delta of Saloum National Park. Mangroves occupy part of the estuary (muddy grounds under daily tide influence) and grows in the intertidal zones, in particular in the low muddy sections of the channels. Its flora consists essentially of *Rhizophora racemosa* and *Rhizophora harissonii* (large trees bordering the bolongs), *R. mangle*, and *R. racemosa*, *Avicennia africana* and *A. nitida*. *Laguncularia racemosa* and *Conocarpus erectus* are considerably less represented and occupy an area exceptionally flooded by syzygy tides. There are also salt-tolerant vegetation (*Sesuvium*

*portulacastrum* and *Philoxerus vermicularis*). The southern part of the mangroves is luxuriant, particularly well protected and contains tall mangrove trees. It provides resting and sleeping shelter for many bird species. It is also a refuge for several animals, such as hyenas, and spawning and feeding grounds for fish.

The dry forests and savannas of the Delta of Saloum National Park are characterized by the presence of Guinean species in a biogeographically Sudanian area. These habitats consist mainly of gallery forests, open forests, savanna woodland and shrub savanna. The Fathala Classified Forest is the most important forest formation. The most common species of upland trees include: *Daniellia olivieri*, *Pterocarpus erinaceus*, *Prosopis africana*, *Terminalia macroptera*, *Lannea acida*, *Cordyla pinnata*, *Bombax costatum*, *Khaya senegalensis*, *Parkia biglobosa*, and *Sclerocaria birrea*. There are also *Azelia africana* and *Ceiba pentandra*.

The islands of sand strings and terraces contain diversified flora with Guinean species at the northern edge of their distribution area. The *Phoenix reclinata*, *Lophira lanceolata* and *Prosopis africana* stands found there are probably the last ones in the country and the sub-region. According to Lykke (1996), in the Fathala forest, there are at least 400 plant species, 160 tree species belonging to 39 families. The most diversified families are Moraceae (13 species), Cesalpiniaceae (12 species), Mimosaceae (11 species), Combretaceae (11 species), Anacardiaceae (8 species), Rubiaceae (6 species), Euphorbiaceae (6 species), and Meliaceae (5 species). There are also wildlife species dependent upon terrestrial plant formations, except for the clawless otter (*Aonyx capensis*), the marsh mongoose (*Herpestes paludinosus*), the African green monkey (*Cercopithecus aethiops*) and, obviously, the manatee, all of which have adapted to mangrove formations (A. Dupuy, 1982).

In the waters of the three delta/sea arms of the Saloum Delta, fish populations are dominated, both in numbers and in biomass, by a small number of species belonging to the *Clupeid*, *Pristigasterid*, *Gerreid* and *Carrangid* families. They are essentially estuarine forms of marine and estuarine fish species (as defined by Albaret and Diouf, 1994). Specific abundance is relatively high in the Saloum Delta, as evidenced by a comparison of the number of species recorded in the Saloum Delta and the numbers observed in 60 estuarine and lagunar environments world-wide which shows only six of those with higher specific abundance (Diouf, 1996).

The most diversified fish families found in the estuaries of the delta are *Carrangid* (11 species), *Mugilid* (7 species), *Haemulid* (6 species), *Cichlid* and *Clupeid* (4 species each), followed by *Ariid*, *Cynoglossid*, *Dasyatid*, *Ephippidae*, *Polynemid*, *Soleid* and *Sparid* (3 species each). Another factor accounting for the wealth of species in the delta is the high habitat diversity (major arms, numerous *bolongs* of all sizes, presence of mangroves on certain banks and absence on others, diverse bottom sediment, and space and time variations in physico-chemical factors).

Fishery resources include marine vertebrates, consisting of fish (cartilaginous and bony) and mammals. Cartilaginous fish (sharks and rays) are represented by 80 species belonging to 30 families. Bony fish (*teleosteans*) number nearly 470 species and 110 families. Inventoried marine mammals include whales (*Balaenoptera*), dolphins (*Delphinus tursiops*) and manatees (*Trichechus senegalensis*). Other mammals species were also observed (in this Senegalese designated exclusive economic zone of the delta), such as porpoises, pilot whales (*globicephales*) and monk seals.

Marine invertebrates (molluscs and crustaceans) are represented by bivalve, gastropod and cephalopod species. Among the crustaceans are some fifty species of lobsters, crayfish, slipper lobsters, shrimp, crabs and stomatopoda. However many marine species are still little known mainly due to their current lack of economic interest. The species populating the deep ocean floor (lower edge of continental slope and large abyssal plain) have not been inventoried as these depths are thought to be poor in biological resources. The

littoral fringe area also contains several marine invertebrate groups which have been the subject of very few inventories (sponges, sea cucumbers, sea urchins, starfish, corals, molluscs and various coelenterata).

Three fish species or groups of species have disappeared or have become extremely rare: the tarpon (*Tarpon atlanticus*), the sawfish (*Pristis spp*), and the straw-fish (*Rhynchobatus lubberti*). This is probably linked to fishing pressures, all the more so as the last two species have low fertility and very long gestation periods. Some species have become rare, including: (1) manatees, decimated by human populations but also impacted by the disappearance of fresh water resurgences; (2) *Lisa bandialensis*, formerly very abundant according to fishermen, but currently limited to a few (2 or 3) bolongs, the main one being that of Baguadadji. This species is highly dependent on fine sandy sediment and would be endemic to the Sine Saloum; (3) red carps (or yaakh) and groupers (*Epinephelus aenus*) or Thiof, highly sought after by Senegalese consumers, and almost as much *Lutjanus spp*, also in marked regression.

Several littoral species around the Saloum Delta have decreased in numbers. This is true particularly of sharks, *Caranx hippos*, *Tilapia guineensis* and turtles. The reduction in numbers of marine turtles is linked to disturbances in their nesting areas and their overexploitation. It should also be noted that within the Saloum Delta, these are protected species, but that they are nevertheless captured, sold and eaten by local populations. Sharks and rays, whose fins have a high commercial value, are subject to intense fishing pressures.

Endemic plant species in the Saloum Delta are: *Alechva basserei*, *Crotalaria aphaerocarpa*, *Eriocanlan inumdatum*, *Ficus dichanostyla*, *Laurembergia villosa*, *Lipocarpa priemviana*, *Polycarpaea linearifolia*, and *Scirpus grandicuspis*. Endangered and IUCN red listed plant species for the Saloum Delta site are: *Hygrophyla chevalieri*, *Livaria phomasii*, *Scleria chevalieri*, and *Lipocarpa prienriana*. Highly threatened animal species include: *Caranx hippos*; (Shark), *Trichechus senegalensis*; (Manatee), *Souza teuszii*; (Hump-backed dolphin), *Delphinus delphis* (Common dolphin), *Delphinus tursiops*, *Balaenoptera* (Whale), *Aonyx capensis*; (Clawless otter) *Herpestes paludinosus*; (Marsh mongoose), *Cercopithecus aethiops* (African green monkey). The endangered fish species are: *Tilapia guineensis*; (Tilapia), *atlanticus*; (Tarpon) *Pristis spp*; (Sawfish), *Rhynchobatus lubberti*; (Strawfish), *Lisa bandialensis*, *Epinephelus aenus* (Grouper), *Lutjanus ssp*.

Based on a GoS proposal, this project will select villages and landscapes in the dry savanna and mangrove habitats only, leaving the remainder for the GEF/WB CZM project.

**Table A7-1: Protected Areas in 4 project sites, and sample chosen for first phase of project.**

Ecosystem	National Parks		Classified Forests		Wildlife Reserves		Biosphere Reserves		Sylvo-pastoral Reserves		TOTAL
	No.	Hectares	No.	hectares	No.	hectares	No.	Hectares	No.	Hectares	Hectares
Ferlo			2	54,980	2	995,700			80	3,106,000	4,156,680
Niokolo	1	913,000	4	132,250	1	1,936,000					2,981,250
Niaye	2	2,720	6	25,875	2	816					29,411
Saloum	1	180,000	4	53,140			1	800			233,940
TOTAL	4	1,095,000	16	265,449	4	2,932,516	1	800	80	3,106,000	7,401,281

Project Sample											
Ferlo					2	995,700			4	1,514,000	2,509,700
Niokolo	1	913,000	4	132,250							1,045,250
Niaye			4	22,462	1	800 <sup>2</sup>					23,262
Saloum	1	100,000 <sup>3</sup>	3	2,340							102,340
TOTAL	2	1,013,000	11	157,052	3	996,500			4	1,514,000	3,680,552

<sup>2</sup> Sample site covers only the Wildlife Reserve of Gueumbeul, which contains the northern most population of mangroves in Africa.

<sup>3</sup> Sample site covers only the continental parts of the Park, including mangroves.



**Table A7-2 : Villages and populations in 4 project sites, and sample selected for first phase.**

<b>Ecosystem</b>	<b>Estimated Population</b>	<b>No. of Villages</b>	<b>No. of Community natural Reserves</b>
Ferlo	87,400	162	
Niokolo	92,000	304	
Niaye	200,500	449	
Saloum	45,000	99	
<b>TOTAL</b>	<b>424,900</b>	<b>1014</b>	

<b>Sample for project</b>			
Ferlo	8,700	15	6
Niokolo	9,200	30	5
Niaye	20,000	45	5
Saloum	4,500	10	4
<b>TOTAL</b>	<b>42,400</b>	<b>100</b>	<b>20</b>

## ANNEX VIII: Detailed Socio-Economic Context of the Senegal Protected Areas Project

### I. Introduction

Four sites have been selected for the implementation of the Senegal protected areas project. These sites are the following: (a) Ferlo Game Reserves and vicinities; (b) Niokolo Koba National Park and surroundings; (c) the Niayes coastal habitats; and (d) Basse Casamance and Saloum Delta National Parks and adjacent areas. This annex presents the socio-economic context for each of these four project sites, and some concluding remarks.

### II. Ferlo Game Reserves and Vicinities

The first Senegal protected areas project site is centered around two Ferlo Game Reserves, one in the north and the other in the south, and it also encompasses four community reserves (CRs) and 162 villages with a population of 87,400. The Ferlos and their surroundings constitute the livestock center for Senegal, and they are known as the sylvo-pastoral zone. Over the past five years, the Ferlo have contained 676,000 heads of cattle, 1,096,000 sheep, 96,000 horses and 78,000 asses, on average.

Traditional socio-economic activities of the sylvo-pastoral zone revolve around three main axes: livestock, agriculture and tapping of Arabic gum. However the situation is more complex, as these three axes can be combined with two distinct lifestyles the sedentary and nomadic ones. On the one hand people like the Wolof, Toucouleur and Sarakollé are sedentary and they cultivate by clearing the land; and on the other hand there are nomadic Peuhl, who are transhumant pastoralists. Indeed, this is an oversimplification, as the first lifestyle does not exclude livestock production, and the second one implies forest clearing to some extent, as the some motivated pastoralists of the Ferlo also practice crop farming. The Peuhl of the Ferlo sylvo-pastoral zone complement their livelihood through livestock farming that provides a relatively important share of their subsistence. Crop farming, essentially of grain, is the mainstay activity that allows sedentarians to meet their basic needs. Gathering and collecting gum Arabic from acacias (*Acacia senegal*) complement the income of sedentary and nomadic households. The two Ferlo reserves hold together an intricate socio-economic system that is hinged around livestock that make movements between the northern and southern reserve, following rainfall patterns, availability of forage and water, cereal cultivation cycles, and tapping activities for the collection of Arabic gum.

First of all, livestock is accorded greater value than any other economic activity in the sylvo-pastoral zone, as livestock is the preferred way of saving wealth and regulating social relationships. Besides sedentary livestock, there is the traditional pastoralism, that is characterized by continuous mobility of the animals and people as a strategy for risks abatement. Risks are linked to climate, health, policy and environmental conditions that often happen to be harsh. Fortunately livestock movements are well adapted to the stress from the Sahelian environment, as a land use strategy transhumance makes the most out of the potential and biological diversity of the Sahel. In addition, it provides pastoralists with the opportunity to enter into exchange relationships with farmers and to take advantage of the various local markets, found along their transhumance path, to sell livestock products and by-products (milk and dairy products) wherever needed.

Livestock plays a central role in pastoral activities, it ensures food and income. Also livestock plays a crucial role in regulating the constitution and dismantlement of the social groups in that it structures all exchanges, such as gifts, loans and other forms of mutual aid. Herd management based on mobility (nomadism and transhumance) result in regrouping the animals when environmental constraints are acute, and oblige the herd to move away, where water and forage can be found. Pastoralists with large herds tend to keep their animals away from crop areas and their home base of origin. Transhumant households that possess several hundreds of heads of cattle (or small ruminants) settle with their livestock close to large ponds/ waterholes and devote all of their time to pastoral activities. For these groups, the herd locations vary from year to year depending on resource availability; on the contrary, the vast majority of farmers are sedentary.

Transhumants as well as sedentary farmers cultivate cereal crops, while they look after their herds. Herds are actually under strict supervision only at night. In the day time, cattle are not closely watched, and the farmers as well as the transhumants take care of their crops. The animals are generally left free to graze but away from the fields. At the end of the day, the shepherd bring livestock back to camp. Then, after the evening meals, herds are taken back to pasture and they are watched by another shepherd, who returns to camp in the early morning. During the entire wet season, animal movements remain circumscribed to the camp vicinity. The water resources and pasture lands available within 4 to 5 km around the living quarters are generally sufficient to meet livestock needs. During the wet season, livestock is often brought to the Waalo areas to lick salt.

At the end of the wet season, waterholes dry off and cause changes in the herd movements. Movements become increasingly long and stressful as forage reserves are depleted. While the transhumants move, the sedentary farmers do not move during the dry season. Also certain groups of transhumants elect to stay, and their cattle use their fallow fields to fertilize the soil. Immediately after the harvest, young herders build shelters in the fields (one or two huts made from millet stalks covered with straw). In the evening, the animals are gathered on a specific section of the field. In order to keep the herd together during the night, some herders make fire in the middle of the field, while others tie up the calves to tree stumps with ropes. The herd is moved periodically from one section of the field to the other in order to fertilize the entire parcel. When the livestock belongs to the sedentary field owner, the animals are kept in the field until sowing. When the herd is transhumant, land fertilization may cease sooner due to the depletion of forage or an elder decision to move to other areas that have received early rains.

During the dry season, nomadic people generally apply the “centrifugal grazing method” which consists in making the livestock to graze the periphery of the boreholes, and in letting it move gradually to more remote areas, far away from waterholes. Thus, as soon as the ponds dry up, most pastoralists leave their wintering sites to move closer to permanent water supply points. This would shorten the distance to be covered from the watering point to the grazing grounds, thus leaving more time to search for food. Centrifugal grazing allows to limit waste, which are caused by trampling the soil in the paths that lead to the waterholes. Land use in the sylvo-pastoral systems of Senegal is organized around water for livestock, and it pays attention to a careful use of the land around the watering point.

Access to the remote dry-season pastures is facilitated by a hydraulic infrastructure along the transhumant pathways. Several boreholes were placed in service over the past decades. Also cemented wells were constructed, most of them at the pastoralists’ initiative but with support from the Water Department and NGOs. The increased water supply brought about improved control and land management, with the advantage of reducing the distance the herds need to cover between each watering. The disadvantage is that the enhanced availability of water attracts

numerous pastoralists from surrounding areas, resulting in the overgrazing and saturation of the space in the well-watered sectors, while other places remain practically unused. Competition for access to water and pastureland between the sedentary and nomadic pastoralists is particularly keen around certain boreholes, e.g. at Ranérou, Gaay Kaadar, and Luumbi. Around these watered sectors, transhumant herders set up their temporary camps 10 to 15 km away from the borehole, and they get readily access to good pastures and still get access to the waterhole within a walking distance for the livestock. However, the sedentary pastoralists claim that this transhumant strategy is conducive to the reduction of overall pastoral space. Sedentary pastoralists, while recognizing that they cannot legally oppose the seasonal settlement of transhumants on their territories, they complain with despair of the influx of transhumant livestock that come to pasture their rangelands and depart when there is no grass left, leaving the land and their own livestock in poor conditions. In the south-eastern of the sylvo-pastoral area, more particularly in Lambango and Denndudi, measures have been taken to regulate the movements of outside herds. The Egge Egge and alike transhumant herders arriving in large numbers during the dry season are restricted to a few sectors, and they are not allowed to access the best available grazing grounds. This confines the transhumant livestock on a relatively small portion of the territory, leaving sufficient grazing area for the sedentary users.

In other areas, sedentary users do not seek to penalize the transhumant newcomers, but they organize themselves to prevent competition among themselves. Such a competition might prove favourable to incoming herds. At Gaay Kaadar, Njayeen Fuuta and Ranérou, for example, newcomers must use pre-existing camps or settle in harvested fields and refrain in any event from settling near farmed pasturelands. In order to circumvent the control exercised on land by sedentary users, some Egge Egge transhumants go to the Water and Forestry Department in charge of the wildlife/game reserves to request permission to use these public grounds. Granting permission to graze on public grounds has drawn protests from the sedentary pastoralists, who have demanded that local regulations be followed, even in the public grounds. Conflicts over pastureland and waterholes between local and outsiders remain unresolved and dormant, and on and often incidents flare-up and cause grievance between sedentary and transhumant herders.

The traditional livestock systems here have evolved from experiences gained from transhumant to sedentary and vice-versa. As an example, according to sedentary pastoralists, the increase in the number of sheep and goat herds is due to the massive influx of Waalwaalbe families, traditionally specialized in sheep and goat farming. Since the climate crisis of 1972-73, these transhumants have settled in the area, although without fixed camps. Their nomadic lifestyle, even restricted, and the perpetual mobility of the herds explain, to a large extent, the good results of this system of animal farming. Their successes have motivated sedentary livestock farmers to start raising, with restricted mobility, sheep and goats. This situation has been also in response to the dramatic droughts that occurred in the area over the past few years. Indeed, repeated droughts have proven the remarkable resistance of small ruminants, their ability to recover and grow rapidly in numbers, and their contribution for food and commercial purposes. Pastoralists willingly recognize the advantages of small livestock production. Sheep and goats serve as a short-term investment within family farms, both a highly profitable and easily realizable one. This livestock is present in all categories of farms and constitute a means, according to the classical scheme, to reinforce the cattle herds or to limit their expansion.

Cattle raising can contribute to the inception and development of smaller ruminant farming. Indeed a number of households have purchased small ruminants with the proceeds from the sale of cattle or by exchanging cattle for sheep/goats. Small ruminant farming constitutes a means to protect the income derived from gathering activities and sales of surplus crop production. If small ruminant farming appears very interesting under present conditions, its development is

nevertheless difficult because of diseases and herding style. Contrary to cattle which is allowed to graze freely most of the time, smaller livestock must be strictly controlled throughout the year. The generalized presence of crops around camps requires close surveillance of sheep and goats during the growing season. These also need to be closely watched during the other seasons because of predators such as hyenas and jackals, and to limit the risks of theft. For these very reasons, small ruminants are taken back to the camp at the end of the day and gathered in pens close to human quarters for the night.

Extensive livestock farming is practised in the Ferlo region, with transhumance varying in range and in duration according to availability and quality of water and therefore of rainfall regime. During good rainfall years, the livestock is concentrated around the ponds where forage and water are to be found. Hamlets become established in the vicinity of large ponds, with subsistence (grain) and commercial crops that are marketed weekly. Animal farming are concentrated first around ponds before moving toward permanent water points as the rain generated ponds dry up. Then livestock concentrations become so high that large degraded areas are found over a radius of several kilometres around the wells and boreholes. The degradation of the sylvo-pastoral ecosystems is compounded by frequent breakdowns of hydraulic equipment resulting in higher herd concentration, hence more severe degradation of the vegetation cover. As a result, the grazing grounds around the boreholes are of poor quality. The toxic and neglected plants by the animals, such as *Calotropis procera* and *Ademium obesum* strive and expand to reach hundreds of hectares at places. To solve this problem, large herd owners chose transhumance as a strategy, with departures generally linked to the quality of local winter conditions. During rainy seasons, the abundance of forage and availability of water in the ponds allow livestock farmers to keep their herds longer in the Ferlo region. At the same time they remain confident that when the rain dry out in the Ferlo, they would still find enough water during the long trek southeast to the Niokolo-Koba National Park. However delayed departure from the Ferlo imposes strong pressures on the sylvo-pastoral ecosystems and along the transhumance corridors. This also leads to conflicts with sedentary farmers in the villages located along the transhumance corridors, whose resources are taken away as a result of the large numbers of livestock that exceed rangeland carrying capacity. Such conflicts are frequently the cause of numerous arson fires set either by sedentary populations to save their water supply or by transhumants as a reaction to the opposition manifested by the sedentary farmers.

On the contrary, less rainfall in the rainy season induces an early departure from the Ferlo region to ensure the herds will still find water in the ponds along the transhumance pathways. The early transhumance movements reduce degradation of rangelands in the Ferlo and along the transhumance corridors, but they transfer the pressures to the Niokolo-Koba National Park where large transhumant herds reside over a longer period of time, with negative consequences on wildlife such as poaching and competition for food and water, including mutual contamination and spreading of disease between domesticated livestock and wildlife due to the use of the same water points.

Another movement of transhumance in the Ferlo poses threats to ecosystem and biodiversity conservation. It concerns the herds from the Niayes and the lateritic Ferlo that move into the sandy Ferlo areas. This erratic transhumance is unorganized and becomes essentially nomadism, where the herds roam haphazardly the land in search of forage and water, selecting the best pastures. Such nomadic movements may even force the larger herds to leave the Ferlo area early in the season, even under good rain conditions. The consequences of this type of transhumance include excessive pruning of certain woody species such as *Pterocarpus lucens* and *Pterocarpus erinaceus*, trampling of the soil and grass cover, and excessive tapping of the acacias (*Acacia senegal*) for Arabic gum which the transhumant herders sell for additional income. In many

areas, the impact of grazing results in favouring the growth of invasive thorny species, that degrade the pasturelands.

New settlements by incoming migrants and their clearing of valley-bottom land for cultivation as well as exploitation of Arabic gum are causing loss of wildlife habitats. Despite that Senegalese Law prohibits new settlements in reserves, people are not abiding by the Law. Also anarchic well permits in the reserves have attracted migrant populations to settle permanently in these away from authorized transhumant corridors, and that is causing more wildlife habitat loss or degradation. In the northern Ferlo, transhumants are coming from everywhere, including Mauritania, and they settle down anywhere regardless of the Law. In the south, new settlements are blocking the paths used by the wildlife migrating from and back to the Niokolo Koba National Park (NKNP). Finally transhumance corridors to the PNNK are subject to poaching on wildlife by transhumant herders to feed themselves and to protect their livestock.

The second major axis for socio-economic activities in the Ferlo is the tapping of Arabic gum from Acacias, especially *Acacia senegal*. At the end of the rainy season, farmers identify plots inside and outside the Ferlo Game Reserves, where they tap Arabic gum from the tree that are ready for exploitation. People pay attention not to have uncontrolled fires that would burn the trees being tapped, hence gum exploitation combats bush fires. It also combats overgrazing, mostly from small ruminants, that may strip out the bark of the Acacias being tapped. Unfortunately, when large herds of transhumant livestock reach an area being tapped for Arabic gum there clashes between transhumants and gum farmers. Also when the herders settle in unfenced gum tree stands, the goats eat the bark, thus reducing gum production, leading to conflicts with the gum tappers. The latter do everything they can to chase the livestock farmers as soon as they see them near their trees; in such cases, the transhumant herders depart but only after setting fire to the disputed plots.

Production systems are now marked by the development of new gathering activities, more particularly those concerning gum arabic, jojoba (*Ziziphus mauritiana*) and sump fruit (*Balanites aegyptiaca*). Gum marketing channels are almost entirely controlled by a group of Wolof and Moor traders. Due to the depletion of gum tree stands in the western Ferlo area, these activities have shifted southwards. Eastern Ferlo holds considerable potential and is one of the main areas for gum production. The stands are so dense that in certain sectors, (in particular around Ranérou), natural gum tree stands do not appear to be entirely exploited. Traditionally, tapping activities were conducted mainly by poor local families or some Moorish groups from outside the area. But for the past few years, they are practised by all social strata and categories. This generalization of gathering activities is the result of two major causes:

- difficulties encountered by the populations within the current climate conditions, which encourage them increasingly to look for additional income that they reinvest in the purchase of various equipment (cultivation and transportation, lighting) or livestock, such as sheep and goats; and
- the drop in gum production during drought years that rekindled interest in that activity, due to a marked increase in producer prices.

Arabic gum tree stands are appropriated like other natural resources. Due to their abundance, family domains are usually quite extensive, which enables certain families to lend part of their holdings to neighbours or parents; the latter frequently attempt to claim ownership based on the National Domain Law which stipulates that the land belongs to those who develop it.

The third and last main axis around which evolves socio-economic activities in the Ferlo is agriculture. Contrary to the nearby Jeery area where precipitation is low and irregular, the Ferlo region enjoys relatively high rainfall. Rainfed agriculture therefore occupies a more important place than irrigated cultivation or on washed terrain by receding floods in the Waalo. Groundnut production is prohibited in the reserves. Short-cycle millet, which does not suffer too much from low rainfall, is the most common crop and constitutes the staple food for the Ferlo populations. Cultivated areas are significant and cereal fields extend over 2 to 3 hectares for each household.

The fields located within sylvo-pastoral reserves, away from the hamlets, are cultivated using a shifting cultivation system. Mixed crops are grown on each parcel, depending on the type of soil and location. Millet is grown in association with beans, groundnuts and/or hibiscus on sandy clay soils. Late sorghum is grown in valley-bottom areas that have clay soils. Soil fertility is maintained using various techniques including:

- extended grazing on a given parcel to fertilize the soil with animal excreta;
- trampling the soil by feeding livestock which facilitates soil improvement after harvesting;
- fallow periods to rest the land; and
- crop rotation.

### III. Niokolo Koba National Park and Surroundings

The second project site is Niokolo-Koba National Park and surroundings made up of 9 RCs containing 304 villages with a total population of approximately 92,000 people in the south-east of Senegal. Economic activity is dominated by the primary agricultural sector, as the vast majority (91%) of the active population in the Tambacounda region is involved in agriculture, either at the subsistence or commercial levels. Despite the low occupation rate of arable land in the region, around 3.9% only, agricultural activities strongly mobilize the population during the entire rainy season and much of the dry season. Food crops consist of cereals (millet, maize, sorghum and rice) for rural and urban household consumption. They extend over 58% of the cultivated areas, of which 72% for millet and sorghum and 25% for maize. Agriculture is barely mechanized and use high labor intensity; crop farming contribute as much as 40% of the GDP in the area.

Peanut production is the major commercial crop, a secondary one being cotton. Peanut occupies over 85% of the areas under cultivation, with strong extension towards the Tambacounda and Bakel Districts. Cotton and peanut have benefited from State policies that require obtaining export receipts in order to secure support for general development in the region of Niokolo-Koba. New settlement (Koumpentoum, Kaffrine and Koussanar) strongly contributed to the sustained eastward expansion of the groundnut basin, while the construction of earth roads reinforced cotton production with SODEFITEX. The migrations encouraged by a new land settlement policy after the soils in the traditional groundnut basin became depleted contributed to massive clearing in the protected areas. In certain places, this led to the rapid desertification of large expanses in the forest habitats near Niokolo-Koba. Such practices, which were based on slash-and-burn cultivation, severely disturbed the natural habitats and pasturelands, which were systematically cleared for these commercial crops.

The livestock sector contributes 30% to GDP of the area, an indication of the importance of this activity in the forest ecosystems where nearly three quarters of the country's livestock find forage and water during the dry season. The area residents increasingly practice livestock

farming, not only cattle but also sheep and goats. Between 1982 and 1996, the livestock grew by 65.56%, i.e. an average 6.6% of annual growth rate. Average annual growth rate was 2.85% for cattle and 6.95% for sheep and goats. This positive trend was attributable to the implementation of livestock farming extension programmes such as PDESO initially, then PICOGERNA. Competition between livestock and crop farming forced livestock to marginal areas, and which in turn made the herders lead livestock to use the forest and community reserves and even strict protected areas such as Niokolo-Koba National Park, where feeding and watering conditions were better. Frequent preying on the livestock by wild carnivores has brought about intense poaching by the villagers to protect their herds. In addition, in many cases, at the edge of the PAs where the forest cover is dense, transhumant herders prefer to set fires to eliminate parasitic insects, which are feared to decimate their herds. Even though these fires help regenerate some pastures located within the PAs, this action appear to shift the forces where livestock seem to win the competition over wildlife.

Timber harvesting is almost entirely carried out in this Niokolo-Koba area, and it contributes to meeting the needs for household energy in the major cities of western Senegal, whose population is rapidly increasing. Forestry operations generate approximately 6% of the GDP. It should be noted that 95% of the revenues come from logging. A total of 55% of the country's domestic energy needs are met with wood and charcoal (UNDP, 1999:204), almost all of which is extracted and produced in the Niokolo-Koba project site. Carbonization of trees for charcoal is carried inefficiently in traditional open ovens, which are prone to setting bush fires. In addition, the poorer population groups surviving mainly on PA resources also use fire for clearing. Due to the lack of income generating alternatives, villagers increasing in numbers practice logging and produce charcoal during the dry season and sell their products by the roadside. Other socio-economic survival strategies include, beside poaching, Arabic gum tapping or gathering, honey production in south-eastern Senegal; these operations using fire in the production of honey also contribute to starting bush fires. Such rudimentary methods lead to the ecosystem degradation and sometimes destruction.

Trophy hunting is significant in the region and it generates consistent revenues. To ensure wildlife population control at the national park periphery, some forest reserves have been leased out with a view to ensuring rational use of surplus fauna and limiting the damage caused by wildlife in the VTs. However, the distribution of these areas around the PAs gives rise to problems regarding coordination and harmonization of the game cropping activities. The management of these leased areas, some of which are adjacent to the national park, is not necessarily entrusted to professionals, so that some lessees are unable to manage rationally the leased areas due to lack of capacities. In addition to the attraction of quick profits, this impotency leads to abuses. Also lack of demarcation of national park boundaries, trophy hunters cross into the parkland to kill wildlife. Poaching is also carried out by transhumant and sedentary livestock farmers to protect their herds from predators, as well as by agriculturalists to protect their crops. Their pretext is that there are no State provisions to compensate for damages caused by wildlife. Poaching has claimed loss of certain species, such as the giraffe and the topi and for the decrease in elephant and antelope numbers. The lack of human and physical resources in the PAs, the rigidity of the legal status of the Pas and the low interest in conservation by the population exacerbate the situation.

Mining operations could become the most important economic activity in years to come near Niokolo-Koba National Park. Over the past five years, south-east Senegal's mining potential has been attracting exploration and exploitation. Few multinational mining companies have begun work under licenses granted by the State; they are now a major source of jobs in the area, which is reducing unemployment around NKNP. In 1988, the labor force in the area numbered 142,605



people, of whom 135,052 were employed (94.7%) and 7,552 unemployed (5.3%). The labor force accounted for 38% of the total population; 73.8% were males and 88.7% rural. The unemployment rate in the area is an estimated 3.5%, which is relatively low compared to the 15% national rate. However, in south-eastern Senegal there still is one area, the Kédougou District, where 80% of the households and 89% of the individuals live under the poverty line. If this situation develops further, it may have to be taken into consideration in eco-regional planning and developing strategies to conserve biodiversity, as it is likely that mining industries will attract more people in this region, and who would exert more pressures on the NKNP biodiversity. Guidance from the IUCN/World Commission on Protected Areas, policy on Mining and Protected Areas, and the IUCN Resolution on Mining and Protected Areas (Amman Oct 2000) may be relevant.

Overall, the viability of the PNNK is in jeopardy due to the extent of the pressures exerted by the population within and around the park. The main cause for this situation is the non-participation of the population in the management and conservation of animal and plant resources, despite new attempts at relaxing PNNK regulations. There is a dire need to seek ways to involve the neighbouring populations in PA management

#### **IV. Saloum Delta**

The third project site is the Saloum Delta and Basse Casamance National Parks. This project site covers 2 national parks, and 3 community reserves (CRs) that contain a total of 99 villages with 45,800 people. In 1997, the Saloum Delta area was home to an estimated 610,000 people, with an annual population growth rate of 2.8%. The population is characterized by its extreme youth: 55% of the total population is under 30 years of age. Population density ranges from 21 to 61 inhabitants per square kilometre, according to the District commissioner. The two major ethnic groups are the Serer and the Mandingo. Family “squares” consist of large homesteads under the authority of the older male. Within these family units, social organization varies from one group to the other and responsibilities for control of the resources are distributed according to gender.

Economic activities comprise fishing, salt extraction, agriculture, livestock farming, and a putative tourism industry. Fishing and trade are the main economic activities in the Saloum Delta. Local people belong mostly to the Niominka, who have a high sense of collective property, which is the key factor in their successful economic sector. Women are in charge of gathering activities and processing of fish products for sale. The Niominka have no cast system and observe perfect equality between the individuals, the only differentiation being based on know-how and knowledge of the sea. Horizontal and vertical solidarity, i.e. between the villages and the islands, is very strong and deeply rooted in attitudes.

Fishing activities concern all species of fish, molluscs, crustaceans and cetacea present in the area. They take place in the Saloum Delta sea arms (Saloum, Diomboss and Bandiala). Fishing resources hold considerable potential and have enabled the riparian populations to develop important fishing operations. Fishing in the bolongs (along the sea front between the mangroves) is of the traditional type. People in the Saloum Delta are now reporting a drop in fisheries production due to over fishing and lower rainfall. Also there difficulties linked to the fisheries operations, such as under-development, under-equipment, and insufficient means of conservation and marketing for women in charge of these activities. In addition, the use of beach seines with small mesh size gravely compromises resource replenishment. The fishing center of Missirah at the border of the SDNP (Saloum Delta National Park) has regularly recorded annual landings of 12,000tons from community fishing ever since its creation in 1979. However, this sustained production dropped to 2,000 tons only in 2000. This situation caused considerable hardship for all

actors in the fishing sector, from fishermen to fishmongers and to women in charge of processing (drying, smoking), storing and marketing the catch. In order to be successful, the GEF alternative will need to build on these lessons from experience to achieve sustainable development and conservation of the marine, coastal and littoral biodiversity.

Gathering of molluscs, oysters and shells, another feminine activity, is made in the bolongs, mangrove and mudflats, and it contributes to the large consumption wood resources for fish smoking. Both oyster gathering, performed by cutting off the roots of mangroves, and processing of molluscs, oysters and shells involve the consumption of significant quantities of fuel wood.

Salt extraction is another significant activity, carried out in village lands at the periphery of the reserve, in the Fimela district in particular. This age-old activity is generally managed by women, although men are becoming more and more involved since the drought years, more specifically since the decrease in incomes from fishing and commercial agriculture.

Among the Mandingo, agriculture is the dominant activity, with the older male generally in charge of managing production. Men generally cultivate on the plateau cash crops, while women work in the valley bottoms by growing rice for household consumption and vegetables as a supplemental source of income. Major food crops are pearl millet, sorghum, rice and maize. Commercial crops include groundnuts, cotton, cashew nuts and, to a lesser extent, soybean. During the dry season, valleys and the lowlands are used to grow vegetables.

Extensive livestock farming is also well developed in the area, despite the presence of the tsetse fly. Cattle is of the trypano-tolerant N'dama breed in the south, with zebu and gobra breeds in the north. Sheep and goats are also here. The main constraints on livestock farming include lack of water, risks of botulism, endo-parasitic diseases and lack of rangelands.

Despite the high tourism potential, with at least 25 islands in the Saloum Delta and the high demand from the younger population, tourism industry remains practically non-existent to this day, except for three private enterprises tapping only a minimal percentage of the ecotourism potential.

Generally, the relationship between PA authorities at the selected sites and peripheral population groups is of a conflictual nature. One of the main sources of these conflicts is the absence of a buffer zone. The fields cultivated by the population are adjacent to the PAs. As a result, predation on livestock and damage to crops due to wildlife (hyenas, warthogs, monkeys and ground squirrels) pose problems, especially as forestry legislation does not explicitly provide for compensation for damages caused by wildlife. Human populations are sometimes confronted with difficulties in accessing certain commodities that are rare in the village lands and abundant in the PAs (fuel wood, straw, medicinal plants, fruit). The benefits accruing to the population from conservation in the PAs are not sufficient to encourage greater popular involvement in management. The lack of operational consultation mechanisms between the various PA actors and lack of consistency of legal and regulatory provisions in effect in neighbouring countries adjacent to the selected sites such as Guinea and the Gambia also hinder conservation efforts. In addition, the close proximity to the parks of the areas under lease and the relatively high cost of customary hunting permits encourage poaching. Within the current socio-economic context, the parks' tourism potential, which could benefit both the parks and the riparian population, remains insufficiently developed.

Mangroves constitute the main habitat in the Saloum Delta, but they are subject to massive destruction from fuel wood gatherings and cutting off the roots to harvest oysters. Furthermore,

excessive salinity due to repeated droughts causes high fish mortality in the mangroves. Also changes in ocean currents between Toubacouta and Niodior unearth large numbers of tree roots. The fresh water resurgences in the mangroves make the waters brackish, allowing them to support dolphins, dugongs and manatees, which are severely threatened from socio-economic pressures. This mangrove is a unique environment with rich biodiversity and fertile soils, without which many of the villages and the Saloum islands and vast expanses of coastline forests would be submerged.

## **V. The Niayes Coastal Habitats**

The fourth project site is the Niayes coastal habitats that comprise 8 community reserves (RCs) along few core forest reserves. This project site covers 449 villages with a total population of approximately 200,500 people. The intensity and diversity of the pressures clearly explain the increasing speed of biodiversity erosion in the Niayes area. This area once very rich in natural resources has suffered substantial loss of biodiversity. It is both an ecologically fragile environment and a horticultural production area. The Niayes are an important source of vegetable products for Dakar and all of Senegal, providing 2/3rds of Dakar's consumption and 89% of the national production of vegetables. This production supports more than 150,000 people, who earn much of their income from it. The area has great potential, but freshwater is a scarce resources and the production systems remain archaic. The main produces are tomatoes, maize, lettuce, onions, carrots, beets, sweet potatoes, cabbages, strawberries, beans and to a lesser extent rice. Average agricultural plot size is approximately 0.5 ha; and because of droughts and urban extension cultivated areas in the Niayes are reduced from year to year. Beside off-season crops, the depressions of sand dunes and surrounding areas are under constant exploitation, producing vegetables crops and fruits.

The Niayes are also used for extensive cattle and sheep and goat farming. There are an estimated 90,000 heads of cattle in the Dakar region alone. Most of the time, the cattle out of the Niayes is forced to move, partly during the rainy season when most of the land is flooded and also during the dry season because of the lack of forage and to avoid conflicts with vegetable growers. Niayes' livestock migrate to the neighbouring sylvo-pastoral area, where it takes the form of nomadic grazing, with no fixed home base in a village, but rather following randomly the best pastures. This in turn pushes the large Ferlo herds towards the NKNP. Industrial and semi-industrial poultry farming is sharply on the increase in the Niayes area, relying mainly on imports of chicks and hatching eggs.

Fish population has generally decreased in the Niayes ponds and lakes. Some formerly abundant species, such as *Protopterus*, have become very rare. Purse seining used at sea has strong negative impacts on the aquatic fauna. Due to the very small mesh size, many juveniles are captured. The boats illegally plying the coastal area constitute a threat on biodiversity and community fisheries. Turtle nesting grounds on the coast, mainly in the central and northern Niayes, are severely disturbed. Pollution from chemical industry appears to affect the aquatic fauna. As advocated by the local populations, it would be wise to consider creating marine protected areas to allow a reconstitution of the stocks undergoing strong regression as evidenced by increasingly smaller catches in spite of an improvement in traditional fishing equipment. Likewise, strengthening the Fisheries Monitoring Project (Projet de Surveillance des Pêches - PSP) is needed in order to limit illegal fishing by boats and to save jobs in the communities.

In addition, organization, training and diffusion of adapted techniques benefiting all actors in the fishing sector (i.e. fishermen, fishmongers and women in charge of marketing and processing the fish at the Kayar fishing centre) are needed to ensure the sustainability of the activities

envisioned under the GEF alternative for the conservation of biodiversity in traditional fisheries. The sustainability of the GEF alternative in the area will depend to a large extent on the durability of the **filaos** strip, established on 150 kilometres several decades ago and showing signs of ageing. This ageing causes serious regeneration problems due to the considerable thickness of the accumulated litter preventing the seeds from reaching the soil.

Overall, the socio-economic situation in the Niayes area is characterized by: (1) water balance deficit linked to drought and resulting in a drop of the water table due to excessive withdrawal; (2) poor management of vegetable cultivation with bad drainage and soil salinization; (3) strong migrations of human populations into the area, leading to land clearing and erosion within an already fragile ecosystem; and (4) overfishing due to the lack of control and poor management of fisheries.

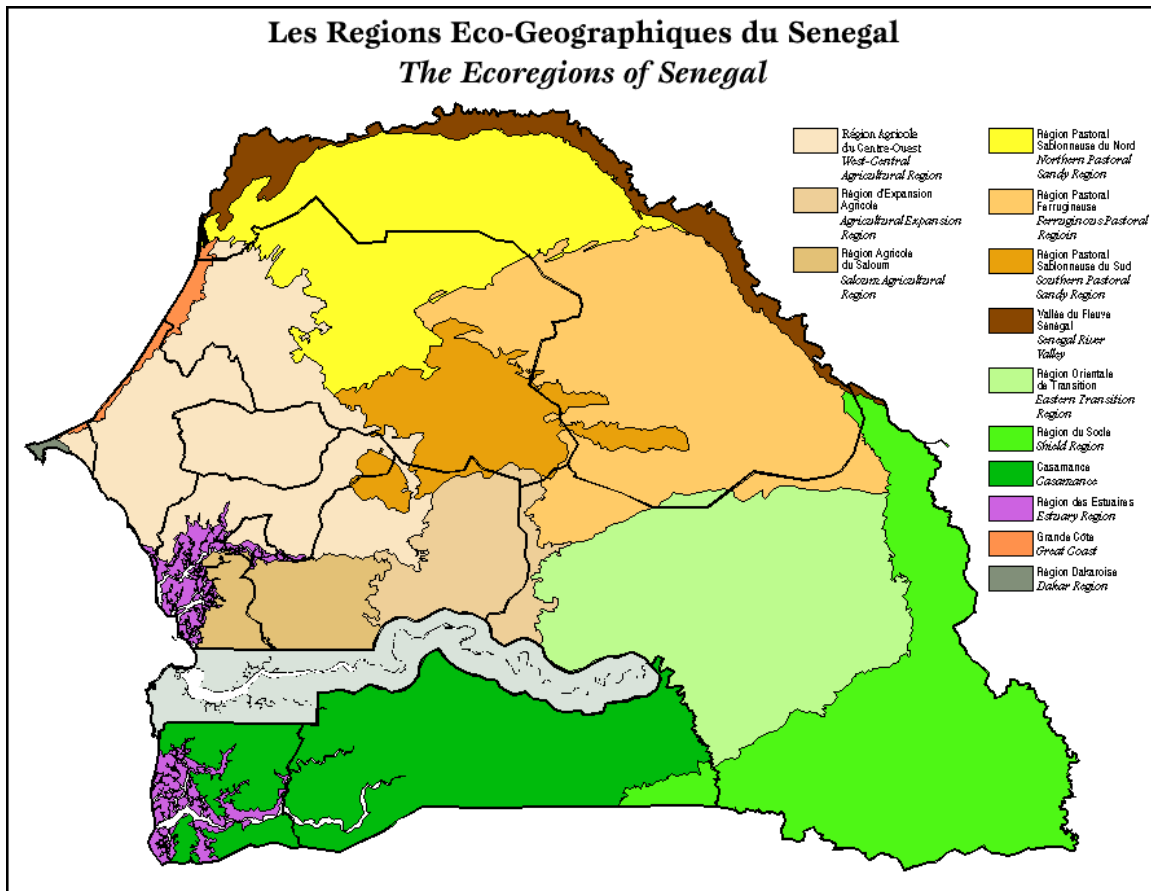
## **VI. Concluding Remarks**

Despite the creation of an extensive (more than 40% of the country's land mass) PA system extending over more than 12 million hectares, the negative consequences of the socio-economic situation on biodiversity conservation have prompted Senegal to consolidating its approaches and reviewing its policy and institutional context with a view to introducing changes to adapt them to sustainable development and adopting participatory biodiversity conservation strategies. Senegal expect from the international community and GEF, assistance to achieve its goal of biodiversity conservation of its unique, endemic, specific and eco-systemic assemblages that have worldwide bearings and recognition.

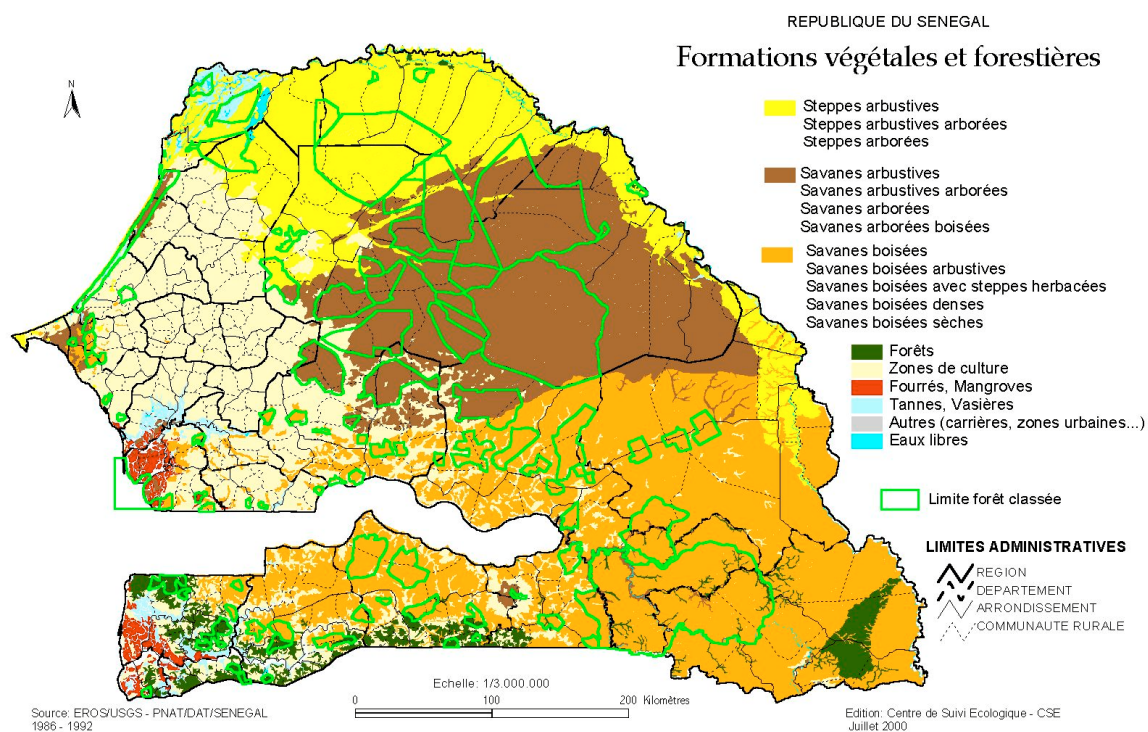
Increasing pressures and competition over resources in the Ferlo reserves pose threats to the survival of the wild flora and fauna. In view of these threats, the government of Senegal has come to the conclusion that the preservation of the Ferlo will have to go through its classification as a Biosphere Reserve. This would make it possible to organize interventions around majors objectives, namely: (1) to conserve biodiversity and the natural environment; (2) ongoing monitoring of the condition and evolution of the resource; (3) actions targeting the population in the form of information and training; (4) development initiatives likely to have lasting influence on the standard of living of the local populations; and (4) sustainable management of hydraulic installations and waterholes, an essential condition to the survival of livestock farming and the sylvo-pastoral ecosystem of the Ferlo. The GEF alternative will thus need to capitalize on the lessons from experience to ensure favourable conditions for long term conservation and sustainable development. The positive impacts of the GEF alternative will be felt in the forest ecosystems of eastern Senegal, containing the NKNP, a complex with which the Ferlo area maintains systemic relationships, involving transhumance, animal migration and bush fire management. The northern sylvo-pastoral ecosystems of Ferlo and the eastern forest ecosystems of Niokolo-Koba are two different ecological entities, still united by their complementarity through the transhumance and shifting use during different times of the year. Such complementarity must be taken into consideration in the management of these two biodiversity rich areas of Senegal, and it is important to favor optimal rotation of the use of forage and water resources, which neither entity could achieve in isolation year round. Without the traditional rotation system hinged upon agriculture, tapping and gathering activities and transhumance, the large demand by humans and livestock as waged against rangeland low carrying capacities especially during the dry season, semi-sedentary livestock farming cannot be sustainable in the Ferlo nor the Niokolo-Koba area alone.



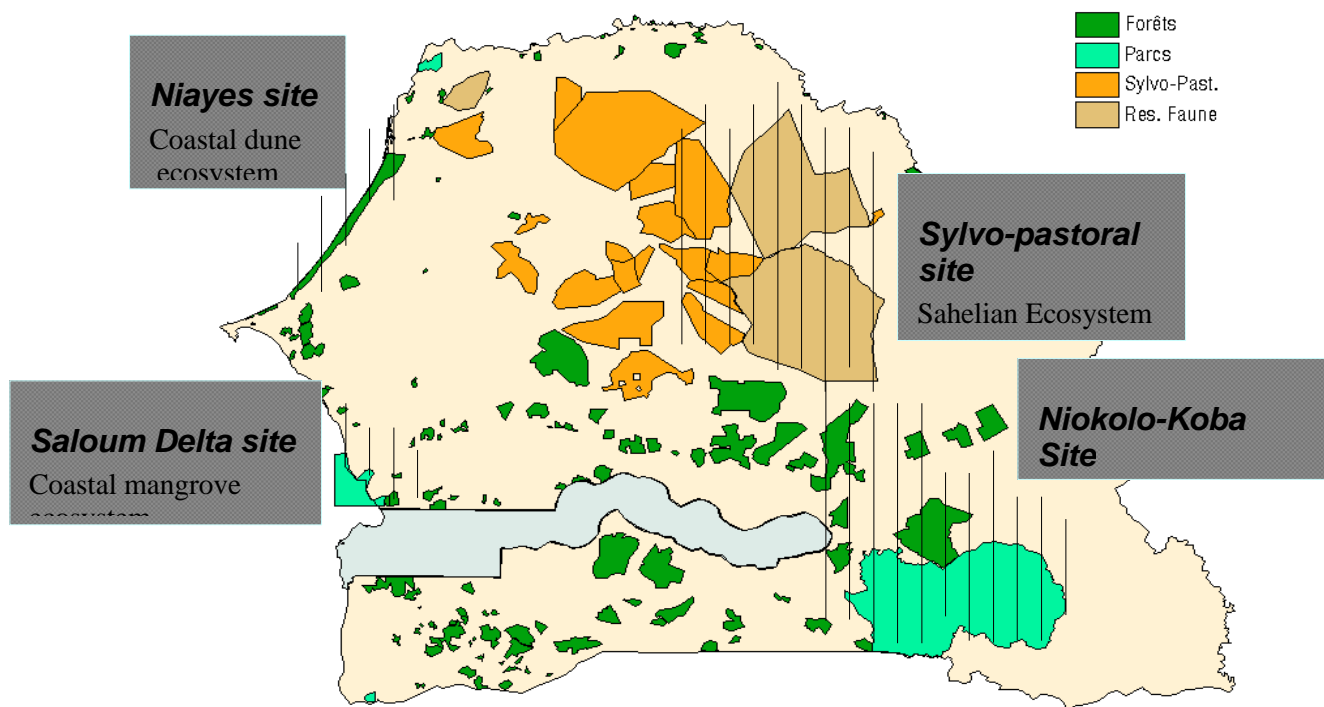
## ANNEX IXa. ECOREGIONS OF SENEGAL



## ANNEX IXb. MAJOR ECOSYSTEMS AND CLASSIFIED FORESTS OF SENEGAL



**ANNEX IXc : Map of Senegal's protected area system and location of four project sites**





## ANNEX X. THREATS AND ROOT CAUSES ANALYSIS

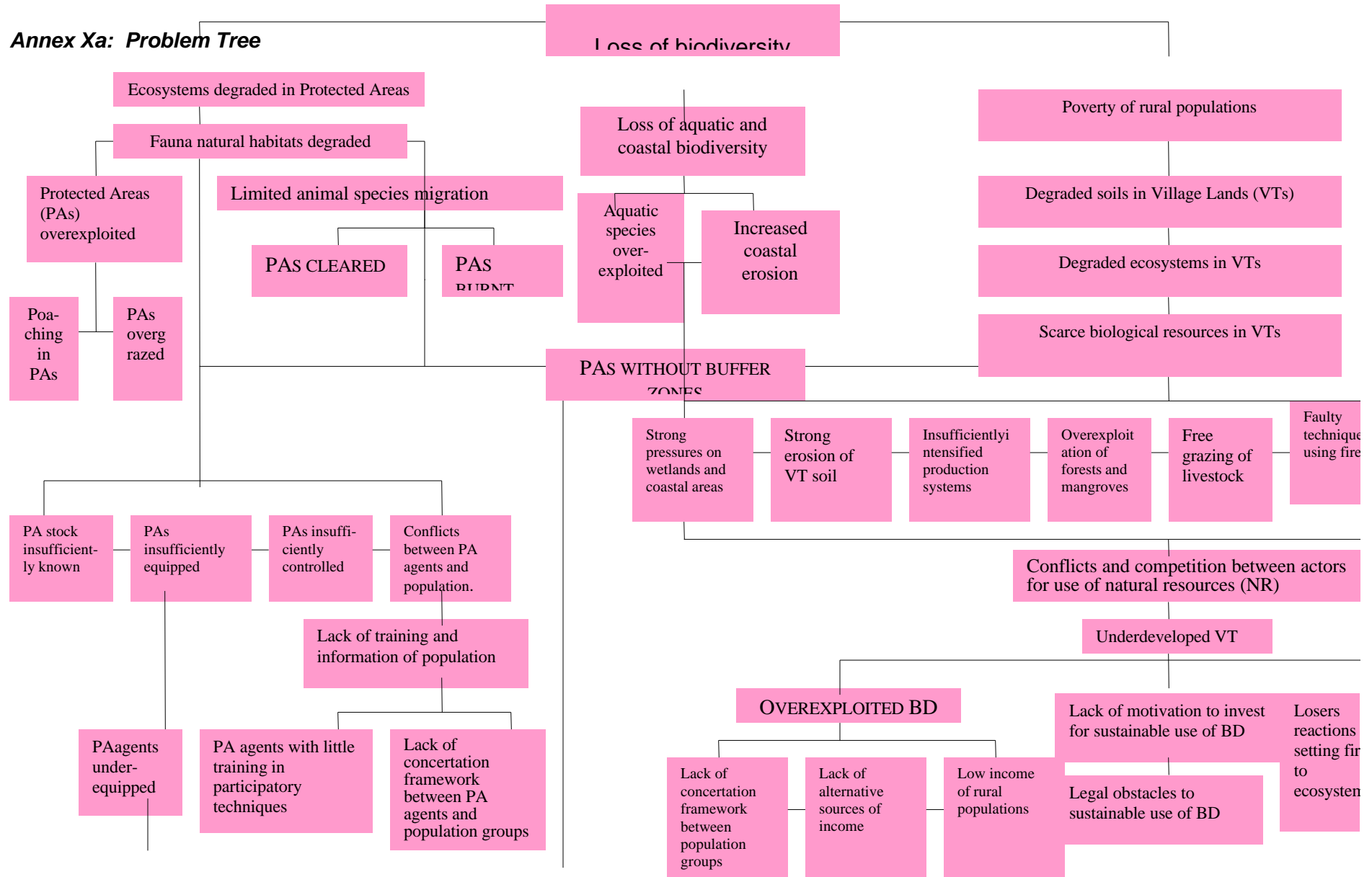
<b>PROBLEM</b>	<b>THREATS</b>	<b>ROOT CAUSES</b>	<b>ALTERNATIVE STRATEGY</b>
<p><i>Loss of globally significant biodiversity in protected areas</i></p> <p>Fragmentation of protected area System</p> <p>Land degradation in and around protected areas</p> <p>Decreased rates of natural regeneration of endemic fish and tree species.</p>	<p><i>Cultivation encroaching onto protected areas</i></p>	<p>§ Population increase (local and Due to immigration)</p> <p>§ Lack of environmentally and economically appropriate techniques for agricultural intensification</p> <p>§ Unclear procedural rules and uncertain tenure for land use planning</p> <p>§ Lack of alternatives for income generation</p>	<p>ü Legal and policy framework strengthened to better devolve land use planning and enforcement; to reconcile sectoral inconsistencies; and create incentives for sustainable agriculture (Output1).</p> <p>ü Appropriate techniques for agricultural intensification tested, demonstrated and replicated (Output 2)</p> <p>ü Local land use planning capacities strengthened (Output 2)</p> <p>ü Capacity and institutions for eco-regional planning enhanced (Outputs 2,3,4)</p> <p>ü Alternative incomes generated through credit system in support of intensification (Output 2).</p> <p>ü Capacity of local authorities enhanced for participatory M&amp;E and adaptive management (Output 5).</p>

<p><i>Excessive fuelwood harvesting in and around protected areas</i></p>	<p>§ <i>Conversion of woodland to crops</i>  § Population increase and high demand for fuelwood  § Destructive harvesting practices (woodland and mangrove)  § Lack of participation and incentives for protected area management  § Lack of legislation for co-management  § Lack of consistency in tax law</p>	<p>ü <i>Appropriate fuelwood harvesting techniques demonstrated and replicated (Output 2,3,4)</i>  ü Community and private woodlots demonstrated and replicated (Output 2)  ü Sustainable harvesting regime established, implemented and monitored in CNR and PAs (Outputs 3,4)  ü Legislation clarified for co-management of PA (Output 1,4)  ü Inconsistencies in tax laws reconciled (Output 1)</p>
<p><i>Excessive hunting of predators and other wildlife</i></p>	<p>§ <i>High demand from poachers for customary leases</i>  § Mismanagement of public concessions  § No compensation for damage to crops or livestock  § Lack of participation and incentives for protected area management</p>	<p>ü <i>Co-management of PA and benefit sharing instituted as incentive for protection of wildlife (Output 4)</i>  ü Sustainable harvesting regimes and benefit sharing systems established for wildlife in CNRs  ü Eco-guards established (Output 3,4)  ü PA management and infrastructure strengthened (Output 4)</p>

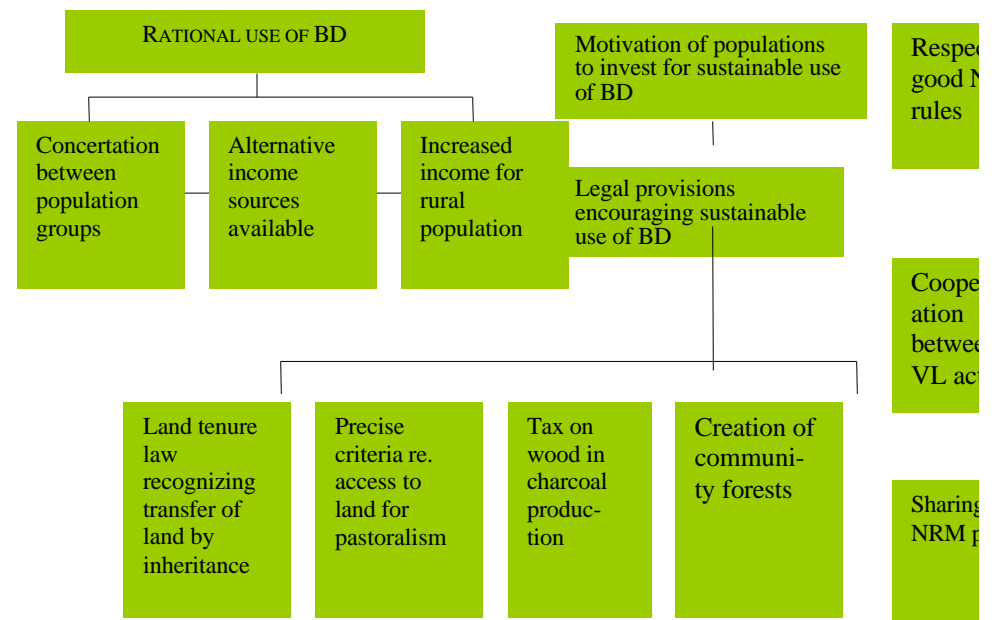
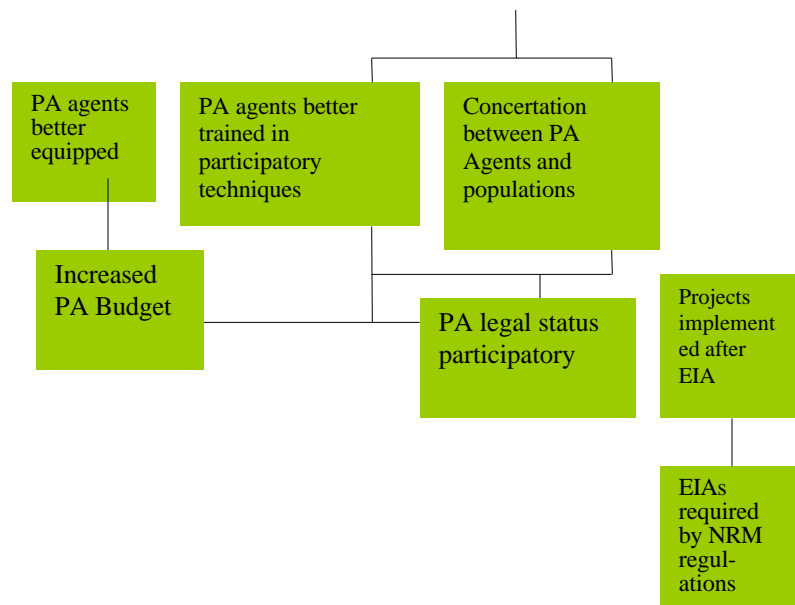
<p><i>Overgrazing by domestic animals in and around protected areas</i></p>	<p>§ <i>Conversion of pasture to crops</i>  § Badly managed water resources  § Lack of appropriate intensification techniques  § Unregulated transhumance and conflicts on land access and land use  § Lack of participation and incentives for protected area management</p>	<p>ü <i>Needs of pastoralists and transhumants enshrined in local and eco-regional planning (Output 2,3)</i>  ü Selective and targeted investments in pastoral infrastructure (Output 2,3)  ü Appropriate techniques for intensification demonstrated around boreholes (Output 2,3)  ü Grazing and water fees instituted in improved pastures, and contributing to VT revolving funds (Output 2)  ü Eco-guards established (Output 3,4)  ü Participatory M&amp;E established for adaptive management (Output 5)  ü Local knowledge incorporated in all planning and M&amp;E (Output 5)</p>
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<p><i>Excessive and uncontrolled</i> bush fires damage ecosystems and biological resources</p>	<p>§ <i>Traditional use of fire (clearing, pasture regeneration, honey harvesting, charcoal production) is not efficient.</i></p> <p>§ With population increase, traditional use is of scale beyond that required for healthy system</p> <p>§ Lack of traditional, or modern, means to combat fire at these scales, without coordination.</p> <p>§ Lack of participation and incentives for protected area management; and lack of effective management of VT and CNR.</p>	<p>ü <i>Fire-less technologies promoted for charcoal, beekeeping, etc. (Output 2)</i></p> <p>ü <i>Firebreaks created, and maintained through controlled grazing and selective biomass harvesting (Output 2,3,4)</i></p> <p>ü <i>Appropriate techniques for fire management tested, demonstrated and replicated in VT, CNR, and PA (Outputs 2,3,4)</i></p> <p>ü Local community and PA staff , including eco-guards, capacities strengthened (training, equipment) for fire management (Output 3,4)</p> <p>ü Traditional village “vigilance” committees re-established, coordinated, and operational for early warning systems (output 3,4).</p>
<p><i>Excessive and unsustainable</i> Harvesting of marine and non-timber resources</p>	<p>§ <i>Inefficient and destructive harvesting technologies</i></p> <p>§ Habitat conversion in mangroves</p> <p>§ Lack of alternative income generation</p>	<p>ü <i>Sustainable harvesting regimes tested, demonstrated and replicated for selected resources (Output 2,3)</i></p> <p>ü Alternative incomes generated through credit system in support of intensification (Output 2).</p>

## Annex Xa: Problem Tree







## ANNEX XI: Project Technical Specifications and Strategies

The activities to be conducted within the GEF alternative at the legal, policy and institutional levels in the VTs, the CNRs and the PAs are aimed at applying sustainable solutions to the biodiversity degradation problems that were identified. Those proposed activities will help to remove the obstacles to sustainable development which are not addressed in the baseline and ensure the sustainability of the measures implemented and their success into the post-project phase. The technical specifications and strategies are based on a review of lessons learnt in Senegal and elsewhere. They were also reviewed by all stakeholders in the PDF B process. Many of the techniques below have been tested elsewhere, some also in Senegal. However, they have often not been replicated spontaneously. This is either because the technology still needs improvement, or there are policy, technological, financial or other barriers to their widespread adoption. In the case of the former, the project will endeavour to show innovative improvements, and in the case of the latter, the project will assist in lifting these barriers.

### **1. Legal, policy and institutional issues**

Promoting pilot activities for PA joint management will require amending the present legal status of the PAs and adapting it to allow effective popular participation. In addition, once present obstacles to participation have been removed, the legal provisions will need to be revised in order to guarantee access to and ownership of community biological resources and equitable sharing in the profits achieved in the PAs. In this regard, the criteria for development, which is the basis for land attribution or retirement will also need to include livestock farming, whether individual or collective as confirmed by one or several of the local pastoral management committees both at the Ferlo site and at other project sites. Furthermore, it will be necessary to legalize the CNRs by means of a real transfer of authority and responsibility and by instituting them by a decision of the RC or RCs concerned.

At policy level, development policies will have to be made equitable for all categories of actors and stakeholders in the area of natural resource management. In particular, the current bias against pastoralists in policies and laws has to be lifted. This is crucial to the success of the cooperation and concertation mechanisms. In addition, a review of the current development policies in the agricultural, pastoral, forestry and hunting sectors, will be conducted in order to identify and remove the obstacles to encouragement of individual and community initiatives for the sustainable management of biological resources. Experience elsewhere in Africa shows that lifting these legal and policy barriers is a pre-requisite for sustainable natural resource management.

In order to ensure synergistic effects between project activities and the expected outputs of other projects to be implemented at project sites, the GEF alternative provides for mandatory Environmental Impact Assessments (EIAs) for all future projects so as to limit their adverse effects and to preserve and reinforce the results achieved as regards sustainable biodiversity conservation.

### **2. Micro-credit and savings schemes**

Lessons learnt have shown that activities that generate alternative incomes often need initial capitalization to take off and become financially sustainable. Micro-credit projects have been tested in Senegal. Experience shows that revolving community systems are sustainable only when : (a) potential users contribute to their capitalization; (b) funds are tightly managed by competent and trust worthy local people (including businessmen); (c) checks and balances are established through communal oversight to avoid abuse ensure timely repayment of loans; (d) micro-projects are vetted stringently according to business



principles, to ensure adequate rates of return, before acceptance; (e) links to local development banks are established so as to encourage borrowers to graduate to the commercial sector.

### **3. Eco-regional planning**

Classical regional planning (including economic stratification; regional land use planning; population and infrastructure nodes and links; etc.) has been part of the baseline for many years. Recent policies on decentralization have mandated the regional governments and Rural Councils to conduct regional planning, within the framework of a national plan. However, current regional planning approaches do not incorporate biological and ecosystemic factors. On the one hand, there is a need to incorporate bio-regional approaches (including corridors and connectivity between protected areas), and on the other, to incorporate IEM principles. This will ensure that population pressure and movements (migration, transhumance) between one landscape and the next are adequately planned and managed in order to allow all development and conservation needs to be effectively integrated and addressed. In the context of this project, the two neighboring landscapes of Ferlo and Niokolo offer a golden opportunity to test and demonstrate these principles, because of their proximity, the presence of a system of classified forests in the corridors, and relatively lower population pressure (compared to the linkages between Niaye and Ferlo landscapes, for example). The project will build capacity for eco-regional planning at all relevant local, regional and national levels.

### **4. Intensification of production systems**

These activities will target crop production, livestock production and fish production. They will be aimed at encouraging the stakeholders, to increase soil productivity so as to reduce the pressures on natural ecosystems, and reduce excessive land clearing.

Tree planting through spreading organic manure in the fields: In the Ferlo and Forest areas, forestry research has demonstrated that 30 to 40 individuals of *Acacia albida* in a field can increase millet production by 40 to 50%. This is due to the following facts: (1) this tree is a legume, therefore capable of fixing nitrogen in the soil with its root nodules; (2) litter mineralization is considerably faster than for many other species; (3) the tree is native to the southern hemisphere and one of the few trees in the Sahel to keep its foliage during the dry season, thus providing shade which attracts livestock, also drawn by its fruit which it finds very palatable; (4) this species is among the few that drop their foliage during the rainy season, thus providing humidity to activate the mineralization process while providing water for crops under the canopy. *Acacia albida*, a companion of agrarian societies, generally germinates only after the seeds have transited through ruminants' digestive tract, because of its very tough tegument. By feeding the seeds of these species to animals and spreading the manure over the fields, one promotes the regeneration of these species in the fields. This is an innovative idea that requires field testing before dissemination.

Agro-forestry: This consists in integrating trees in agricultural production systems. The best option with this technique is to use legume species that are capable of fixating nitrogen, as are most of the species of the *Acacia* genus. The trees are placed in a row to allow passage for mechanized implements whether drawn by animal or by tractors. The optimal density is 100 trees per hectare on the average, i.e. one tree every 10 meters. Generally, the species used in this field plantation technique are multi-purpose species which, beside increasing crop yields, also produce fruit, forage and gum, while serving as windbreaks and stabilizing the soil. Among the species used in this manner are *Acacia albida*, *Cordia pinnata*, and *Parkia biglobosa* which are all local species in Senegal, as well as cashew trees (*Anacardium occidentale*), strongly adopted by farmers in the Saloum Delta. The main constraint to widespread adoption has been the lack of land security.

Windbreaks and live hedges: These consist in planting two or three rows of trees or shrubs in offset position orientated perpendicularly to prevailing wind direction. They may be located at the periphery or within the fields, delimiting sections of crops. They provide the advantage of reducing wind speed and water runoff speed, increasing water infiltration, mineralizing the litter or fixing nitrogen, and protecting crops against free-grazing animals if the windbreak is sufficiently dense. Windbreaks and live hedges also lend themselves to multiple uses depending on the species and can produce fruit, gum, oil, forage and sustainable income. In order to avoid whirlwind effects on crops, the windbreak must be permeable to the wind. Current obstacles to the use of these techniques are the difficulties linked to land transfer, as these land improvement activities are medium- to long-term investments. Also, knowledge on seedling production of native species is limited and needs assistance.

Ecological farming: This consists in integrating crops, animal breeding and forestry (agro-sylvo-pastoralism) using conservation farming and organic farming techniques. A plot where livestock was kept pasturing in the post-harvest phase during the dry season becomes enriched with manure. Seeds from the desired plant species which were fed to the livestock are collected and sown on the same plot which will be cultivated over a three-year period while fertilizing it with manure from the animals that are kept in pens. During the next season, the animals are pastured on another plot for three consecutive years to enhance tree regeneration. The first plot may then be used for pasturing after the harvest while the second or third plots, depending on land availability (sylvo-pastoral ecosystems and forest ecosystems) is temporarily off-limits to animals. This rotation is complemented by two-year forest fallows. Under this land management regime, the plots are fertilized, used for crops, then for trees in alternation over different periods. Combined with crop rotation, this method produces the highest reported yields per space unit. The major constraint for this innovation is the lack of land security, and some technical know-how.

Compost pit techniques: In agricultural areas where organic fertilization with livestock manure is a limiting factor, the project will undertake pilot activities demonstrating the use of compost pits using agricultural by-products and biological household waste. These products are buried and placed in a cement compost pit which is covered while allowing some ventilation. Regular watering activates the mineralization process. Compost pits are located either in the fields or next to the dwellings. After complete mineralization, compost is retrieved from the pits and spread on the fields. This is a very common technique in Senegal's Peanut Basin which has the highest rural density on the poorest soils, where it is being adopted by the populations with good results. The main constraint is the information/extension services to be provided and the cost of construction of the pit which can be used for over five years. Applying a reduced (almost halved) quantity of compost by surface area produce better results than chemical fertilizer while preserving soil texture and fertility sustainably. In addition, these positive effects are cumulative over time. These techniques may be advocated for farmers in the Delta and Niaye.

Rock bund technique for soil and water conservation: It consists in constructing small dikes (rock bunds) placing a line of stones on hills in a perpendicular orientation to the slope, in order to reduce the speed of surface runoff during the rainy season. The technique can be applied to one or several fields in the same catchment area, at village level for instance. This is where the technique is most efficient as it reinforces individual actions undertaken in each field. This technique enhances water infiltration and organic matter and silt retention. It is a proven technique to rehabilitate degraded soil and increase land potential in the VTs. The major constraint is that it requires hard work to collect the stones and great care to construct the dikes. Such initiatives can be supported and encouraged. In addition, it should be noted that maintenance work is far less demanding and that once they are constructed, the farmers see their profits, which ensures sustainability. The constraint lies at the initial stage in convincing the stakeholders of the benefits of the technique. The project will do so with awareness raising techniques, including organising cultural events, shows, competitions, etc. Farmers will also be encouraged to take micro-loans to hire labourers for the work.

Livestock pasturing: Efforts will be made, in the Ferlo area in particular, to encourage the pasturing of livestock in the fields after the harvest. Both livestock owners and less wealthy households will be encouraged to avail themselves of this option. The latter will thus exchange agricultural by-products in their fields against livestock pasturing for a duration to be negotiated. Such pasturing adds value to agricultural by-products by fertilizing the fields with organic manure, an ecologically sound and valuable operation. It has been established that this technique more than double the yields, for cereal crops and commercial crops alike. The only constraint regarding this natural fertilization technique is that the livestock must be allowed in some fields, while the owners of other surrounding fields need their agricultural by-products to feed their own pen livestock such as sheep or goats. Concertation mechanisms may provide a solution, as will encouragement of widespread use of live hedges using impenetrable euphorbias and acacias.

Sheep and cattle fattening: This is a type of pastoral intensification which consists in taking forage to the animal instead of the traditional, opposite approach. As it causes less energy loss for the animals, the methods increases weight gain considerably over a short period of time, particular when couple with close phytosanitary control. This is a very profitable technique, one adopted by several livestock farmers and even crop farmers. The most popular form is sheep fattening for the annual Tabaski feast, but cattle fattening is also practised. The animals may be bought during the “junction” period, when prices reach their lowest level, and are then fattened for resale, realizing upwards of 100% profit per head. The main constraints are providing information and making the initial investment.

Aquaculture: Aquaculture refers to techniques aimed at using aquatic biological resources (shrimp, oyster or fish) while reducing pressures on PA resources. One type of aquaculture consists in delimiting an area in a body of water where animal raising activities are conducted according to sustainable resource management principles. For fish farming, for instance, in a marigot or cut-off meander or a seasonal stream fed by rainwater, the outlet is blocked to retain water as long as possible; the fish are fed appropriately and captured selectively by size, either medium or large, according to market objectives. Ultimately, after a while, as the reservoir is drying out, all fish needs to be removed gradually in order to avoid asphyxia. This technique can provide considerable amounts of animal protein with very little recurring expenses, but has rarely been tried in Senegal. The fish may be sold fresh or processed before marketing. This type of operation is profitable both at the individual and community levels. The main requirement is training; few other means are required. The technique can be used in areas with favourable rainfall regime and preferably near fisheries so as to benefit as much as possible from initial transfers when the rains begin.

Pisciculture: This refers to fish farming in artificial ponds where juvenile individuals are introduced and fed appropriately. This technique provides animal protein while limiting pressures on the natural environment. The activities extend over a relatively longer period of time as the bottom is less permeable than in natural bodies of water as used for aquaculture, and the expenses far greater. These operations have shown profits depending on the species and demand. The main constraint here is the high start-up cost. The most widely used species in pisciculture in Senegal is *Tilapia nilotica*.

Processing and marketing of plant, animal and fish products: Micro-projects aimed at income diversification will encourage to a large extent activities related to the processing of products from market gardening and fruit-trees, as well as animal products such as curdled milk, butter and cheese, and fishery products, with dried, smoked and salted shrimp, fish and oysters and their packaging. Processing of gathering products such as palm oil and cashew nuts and production of jams and fruit juices will also be encouraged in order to alleviate pressures on the natural environment. In addition, storage and marketing operations carried out by women groups will also be encouraged, to benefit the most disadvantaged groups. The current constraint to such operations are financial, as well as lack of information on markets.

## 5. Extensive production and sustainable harvesting

Pasture improvement: This is an income-generating activity which also produces environmental benefits as it conserves biodiversity and regenerated the ecosystems. It consists in developing the pastures and enriching them on a rotational basis. A number of pasture units are placed off-limits to grazing and enriched both with palatable species such as *styloxantes* and with shrub or tree forage species such as *Acacia senegal*. After a pre-determined period of time, the enriched sections are opened to grazing and other blocs previous used are enriched and placed off-limits. In this regard, over the 10-year duration of the project, it will be possible to assess the results of such rotation as regards both sustainable development and conservation. This rotation system provides quality forage at all times while protecting the natural habitat of wild fauna species, which incidentally also benefit from this quality forage. In addition to this benefit for the wild fauna, pastureland management is also favourable to environmental balance and provides income from the sale of gum arabic. In view of the high international demand for this product from breweries, the pharmaceutical sector and confectionery, sustainability is insured as a result of the high price of gum, in excess of US\$2.00 per kilogram. The obstacle to the realization of these pastureland improvements is the fact that pastoralism is not explicitly included in legal provisions as a land-development criterion and therefore is not considered as such by land-use planners, who allocate land according to such criteria. Therefore no land has ever been allocated either individually or collectively for pastoral use by the RCs. Pastureland access is open and free of charge to anyone and, as a consequently, no pastoralist is inclined to investing or become involved in the management of such land. As a result, pasturelands are not only increasingly degraded, leading to transhumance over longer distances with the attendant conflicts, but they are also subjected to clearing for cultivation thus relegating the livestock on mediocre soils. This technique also includes grazing and water fees on improved pastures, which should generate revenues which are put back into communal management of the system.

Plantation of green firebreaks: These are plantations of two or three rows separated with alleys along a firebreak either at the perimeter of an area or within an area to form compartments, with evergreen forest species with low flammability. One such species is *Anacardium occidentale*. These green firebreaks are also multi-purpose as the fruit of the tree is eaten raw or dried and its seed, the cashew nut is roasted and consumed as snack food. There are outlets for these products and the high national and international demand far exceeds supply. The income derived from this tree is durable, as one tree can yield up to 300 kg of cashew nuts and for a minimum of 20 years. In the Saloum Delta area where the species was introduced with GTZ support, 10 years after project completion, the villagers continue to plant it using their own money because of the substantial income it provides. According to the villages income per hectare is higher for *Anacardium* than for groundnut or cotton. Due to its rapid growth, the species covers the soil quickly and serves as an effective windbreak for crops while improving the environment. The constraint regarding replication is the initial investment due to the high price of seeds for farmers and their lack of knowledge regarding its culture. In this regard, the national forestry seed project has already been a good experience, but it does not assume the costs of planting of this species.

Reforestation and forest regeneration: The baseline situation in Senegal shows strong preferences for exotic species because of their faster growth rate compared to local species. However, local species are better suited to regenerate the ecosystems, of which they are natural components providing habitat and food for the fauna. These often multiple-use local species are competitive over the long term and are drought resistant. While eucalyptus can be harvested much sooner, and 2 or 3 times for the same tree owing to stump regeneration, local species begin to yield products between 18 to 20 years of age. Although in the long term local species generate greater economic and financial gains due to their multiple uses, this waiting period alone is enough to discourage investment. In this context, in order to remove the obstacles to reforestation with local species, there is a need for supportive research activities on local species sylviculture, the creation of private and community tree nurseries for endemics, sustainable management

technologies for these species as well as dissemination and diffusion of lessons learned in this area. In addition, another obstacle to be removed is that of transfer of land ownership by inheritance.

Streamlining charcoal production and consumption: Charcoal has become the most widely used source of household energy in Senegal, both in rural and urban areas. Its production using still rudimentary processes restricts supply and conversely increase the weight of demand. As few Senegal's forest have a management plan, logging for carbonization purpose is conducted according to the needs, without taking into consideration actual forest production capacity. There is thus a need to streamline charcoal production and consumption. Current production methods are of the open kiln type, often starting forest fires, requiring 5 kg of wood to produce 1 kg of charcoal. There does exist improved carbonization techniques which were successfully tested in Senegal by USAID in the 80's, but despite the 30% savings in wood consumption obtained using improved kilns with a metal chimney for the same amount of charcoal produced plus pyroigneous by-products, the local charcoalers failed to adopt these techniques. This is due to the fact that taxes are levied on the finished product instead of the raw material (wood) which should be taxed in order to promote the use of these improved techniques. Support is also needed for the initial investment required to purchase a chimney. On the consumption side, the Malagasy stoves currently used are being replace by improved stoves burning both charcoal and fuel wood, with a 40% gain in efficiency. The initial investment is, again, the obstacle preventing widespread adoption of these stoves, although this additional investment is rapidly recouped thanks to the lower fuel consumption.

Rangeland Management: Based on the experience from previous projects implemented in the sylvo-pastoral area, both sedentary and transhumant pastoralists who have traditional access rights must together invest and become involved in stewardship of activities to improve range management, and create and manage ponds and boreholes in rangelands. This willingness on the part of both categories of pastoralists was noted during the PDF-B consultation process and resulted in acceptance of grazing fees on parcels developed by the project at a rate of CFAF 50 per head of cattle/per month and watering fees at a rate of CFAF 100 per head of cattle/per month. According to the statistics of the Directorate of Livestock for 1999, the figures for the livestock population in the Ferlo area during the dry season is given in the Table below.

In view of these numbers, the fees paid for grazing and watering during the 9 months of the dry season are expected to generate a total of US\$3,756,000, demonstrating the potential financial sustainability of this option, providing resources beyond pasture regeneration and water supply point management requirements which will cover expenses for animal health and salaries for the elected members of the pastoral unit local management committees.

Livestock	Number	Costs of watering and grazing for 9 months (@CFAF150/head/month) In US\$ millions
Bovines	676,000	1.303
Sheep	1,096,000	2.113
Horses	96,000	0.185
Asses	78,000	0.150
Camels	2,750	0.005
Total		3.756

It should be noted that this figure is a minimum, as: (1) Fees currently paid in the PRODAM pastoral units are for pastures that were not improved with valuable fodder plants capable of increasing growth and milk

production, and (2) The herds are supposed to remain in the area even during the rainy season when Ferlo pastures are of better quality, which brings the total time to 12 months, i.e. US\$5,008,000 per year if all Ferlo area livestock benefited from the creation of pastoral units and organization of pastoral management committees. Therefore, economic durability is ensured since the recurring costs both for the management of water points such as ponds and boreholes and for animal health services can be assumed entirely by user fees. One remaining requirement is to strengthen the organizational structure, including enhancing the cooperation between stakeholders, and the dissemination of the pasture enrichment techniques which will result in better milk production and therefore ability to pay fees.

Leasing of community hunting zones: These leasing activities will concern the hunting zones located in the territories devolved to RCs for management. Formerly a State responsibility, as a result of the transfer of authority in NRM, these activities are now within the purview of the local communities. The RCs will thus have to collect culling fees on a number of prolific animals, during the hunting season. In addition to those high fees paid by hunting tourists, private promoters are leasing hunting lodges to house the tourists in these areas. In the PNNK area and in the Saloum Delta alike, this is an emerging sector. During the hunting season, one single lodge can accommodate up to 20 hunters per week, collecting receipts in excess of US\$7,300 per week. Data for the past five years provided by the lessees show that the number of hunters is on the rise at a rate of more than 10% per year. This sector is organized by clubs planning the tourists' stay entirely from their departure to their return to their homeland. In view of the sustainable profits generated by this activity, it is expected that the villagers will be able to protect biodiversity in the PAs as it is the excess game animals from the PAs that spill over into the leased community areas. The creation of Community Nature Reserves at the level of the villages bordering the PAs will allow those villages to participate in the development of ecotourism, where they will find promising outlets for other types of products such as artefacts, thus diversifying income sources. At the same time, these Community Nature Reserves will provide connections between the various PAs, contributing to environmental balance between the ecosystems.

## **6. Protected Area management and sustainability**

Co-management: This will be an innovation in Senegal, where the current legal status of the National Parks left little room for such an approach. The GEF alternative, by removing the legal, policy and institutional obstacles (Output 1), will lay the foundation for genuine stakeholders' participation and co-management of the National Parks. In Senegal, co-management responsibilities could be shared between a Steering Committee, an Implementation Committee, and a Management Committee.

The Steering Committee will be the entity in charge of guiding the programme, making decisions and validating the recommendations issued by the other committees. It will consist of representatives of DPN, DEFCCS, administrative authorities for the region or regions concerned, traditional and religious leaders of the RC adjacent to the Park, and individuals in charge of specialized institutions dealing with the conservation of biological resources. It will be convened at least once a year.

The Implementation Committee will be responsible for defining the general method to be applied to implement the programme, reviewing the various work plans and outputs, and supervising the monitoring and evaluation of the activities. Its membership will include the Rural Councillors of the RCs concerned and experts in the appropriate areas pertaining to the conservation of biological resources. This committee may be chaired by the presidents of the adjacent RCs on a bi-annual or annual rotation basis.

The Management Committee will provide its support for the execution of the programmes by coordinating in the field the activities of the sub-committees in charge of plant and animal resources. These sub-committees will consist of the various actors intervening on the ground, including women's groups, socio-professional organizations, transhumant livestock farmers, sedentary livestock farmers, areas lessees, hotel

managers, forest farmers, bee keepers, fishermen, crop farmers and processors of biological resource by-products.

Co-management will thus enable the actors and stakeholders to carry out all conservation activities in the PAs according to a specific work plan based on compromise decisions. In this regard, bee keeping, ecotourism, straw harvesting, consumption of forage by resident or transhumant livestock, harvest of various fruit in the multiple use firebreaks and supervision of the lessees activities will be carried out in conformity with rules adopted by all. In addition, as regards the distribution of profits from conservation, the populations will receive from the PAs an income representing equitable sharing of these profits. With variations depending on the sites and efforts put into conservation by the parties, a percentage of the receipts to be returned to the communities will be determined by the stakeholders themselves on a negotiated basis. Such profits will thus provide support for sustainable development in the VTs and the CNRs while serving to ensure the durability of the activities. Eventually, with the concertation framework, the SFIECE programme and the support of the eco-guards, the NPs are expected to achieve self-sufficiency as a result of the co-management regime. In addition, VT artistic and cultural products will be developed and promoted within the PA ecotourism activities.

Ecotourism: The GEF alternative will place particular emphasis on the development of ecotourism recognizing the fact that it is one of the very few options generating income from conservation without extracting resources from nature. The selected sites afford innumerable ecotourism potentialities. Visits to the PNNK exceed 2,000 per year and to the Saloum Delta no fewer than 1,000 visits per year. Policy options will endeavour to integrate ecotourism and NP management in order to remove the obstacles to self-sufficient management of the parks. With all hotel receipts, park entry fees, fines and confiscation of property, the revenues from the biodiversity conservation would amount to a minimum of US\$2,488,000 over the 7 year period. This figure is computed on the basis of a constant projection of the current visits, in a statu quo scenario.

Rents from eco-tourism, referring to sharing park entrance and other fees between PA and peripheral VTs, are expected to accrue to local communities. Although most ecotourism is a package deal gathered in home country of the traveler, there is significant scope for income generation at the local level through : sale of crafts; offering touristic attractions, such as fêtes, dances and theatrical shows; and offering accommodation and other services. Other sources of revenue will be from granting controlled hunting licences (both for CNR and PAs), and from fines and confiscations.

The GEF alternative is expected to make the parks, World Heritage sites and Biosphere reserves more attractive which would result in a significant increase in the number of visitors. According to this scenario, total receipts beyond baseline contributions are likely to exceed \$2.5 million with the total cost for the component for PA management improvement reaching US\$7,485,000. In other words, the durability of PA management will be assured, eventually, by the PAs' self-sufficiency once the legal obstacle to self-management has been removed (Output 1). The joint management initiative involving the local communities will help to enhance PA tourism potentialities, which will translate into improved biodiversity conservation and increased durability of the joint management activities, in particular as a result of the sharing of the profits from PA conservation. In this regard, an annual percentage of the profits to be determined in consultation with the stakeholders will be allocated to neighbouring VTs as a return and reinvested in the sustainable management of VT and CNR resources, feeding back into PA conservation (Outputs 2 and 3). To ensure a positive effect of this return, it would be advisable to conduct a study involving all of the actors so as to factor in, on an inversely proportional basis, the number of recorded infractions to the rules constituting illegal use of the PAs. Such a system would encourage the VT populations to cooperate and abide by the PA management rules and to denounce any individual, whether local or foreign, about to breach the regulations established and adopted by all stakeholders.

Bee keeping: Honey production will simultaneously generate sustainable income and protect the PAs where this activity is conducted. Conservation in this context is due to the fact that in the event of a forest fire, the bee keepers will be the first ones to want to extinguish it because of the threat to their production. Honey production while improving the local diet will also generate sustainable income through sales. The only obstacles to bee keeping is the lack of access to initial micro-credit for the populations of the isolated villages located at the PA periphery. The durability of this activity resides in its economic and financial profitability. For bee keeping, the initial funds required are for the purchase of a protective suit and chemicals to put the bees to sleep for 35 minutes. All told, this fireless bee keeping technique requires an initial investment of US\$100, plus the honeycombs. As one hive can yield at least 25 kg of honey and the price of honey is US\$11 per kg, profit for one hive is US\$175. For one season, a bee keeper can tend a minimum of 5 hives, with two harvest per season, making a net profit of US\$1,750 per season. The honey production season goes from March to July, which is also the latest period for forest fires, when they are most threatening. Bee keepers therefore take basic precautions to minimize the risks of fires which would destroy their hives using firebreaks.

Hay harvesting: As a consequence of village land degradation, straw to build or repair huts in the villages has become a scarce therefore expensive, commodity and its harvesting in the PAs, the only place where it is still available, is a lucrative activity. As a result, despite explicit prohibition on straw harvesting in the NPs and the dangers of confronting parks agents, the populations indulge in this activity either for their own personal use or to sell the straw which is in high demand as the hut roofs have to be redone every other year to remain water tight. The GEF alternative, while eliminating the obstacles to a conservative management of biological resources, will test the option of involving the riparian populations in the cleaning of peripheral firebreaks and of amending NP legal status so that they may use the straw collected in this manner to use or sell as they please. Such an activity will protect the ecosystems against bush fires and generate substantial sustainable income. The only obstacle is the current legal status of the NPs and nature reserves which prohibits the use of resources in these areas under any form whatsoever.



## ANNEX XII: PUBLIC INVOLVEMENT

### 1. Brief preparation and PDF B process:

The Senegal Protected Areas (SPA) project is a country driven initiative taken during the national biodiversity strategy formulation process. The SPA project received a GEF pdf B grant and co-financing from the Government of Senegal (GoS) as well as UNDP. The pdf B process was undertaken for 18 months between 1999 and 2000. The project preparatory activities included: (1) a series of consultations among country's biodiversity stakeholders regarding the selection of project sites and the significance of biodiversity for sustainable development; (2) participatory rural appraisal (PRA) exercises, that involved 150 villages and over 2,000 residents of four selected project sites, to gather biophysical and socio-economic data; (3) an objective oriented planning (ZOPP) exercise at each of the four project sites with the grassroots to determine the problems, solutions, results and actions required to conserve biodiversity at each site; and (4) a ZOPP synthesis workshop that lasted 5 days with 41 delegates, who were representing their constituent stakeholders from the four project sites.

Among the stakeholders that participated in the ZOPP exercises were representatives from public services and the LCs involved, village leaders, rural animators, transhumant and resident livestock farmers, tree farmers, fishermen, women's groups concerned with vegetable gardening and processing of sea products, lessees of hunting areas, vegetable producers, hotel managers, hunting camp managers, NGOs, staff of ongoing baseline projects, researchers, national consultants and the pdf B project technical staff. The ZOPP exercises resulted in a consensus on the problems of biodiversity and their root causes, solutions tree, expected outputs to meet the stated objectives, and activities to produce the expected outputs (see Logical Framework in Annex IV). Also indicators, their source of verification and risks were assessed during these workshops. The project site workshops were conducted in the national languages, but the national workshop was held in French, and they made it possible to quantify and budget the activities and to complete the project logical framework with full participation of the stakeholders. Baseline and incremental costs were assessed by national consultants with support from the project staff and finalization by UNDP-GEF headquarters; (6) resource mobilization efforts were lead by the ME for co-financing among the country's bilateral and multilateral donors; and (7) the project team drafted a brief (see references in Annex XIX) and made its translation from French into English. A letter of endorsement of the project by the Operational Focal Point (see Annex I) was then obtained. The draft brief was distributed to the donor community and members of the project steering committee. The discussions that followed with these institutions in addition to those held with ME and the country designated GEF Focal Point led to the finalization of the project brief.

The project covers four sites which were selected because of the presence of unique ecosystems relatively well conserved, their interconnectedness and the wealth and diversity of biological resources therein. The four sites correspond to ecological and socio-economic complexes that extend over a total 5.7 million ha of Protected Areas including 989,000 ha of National Parks, 266,250 ha of Classified Forests and 995,988 ha of Reserves. As one of its output, the project will be creating an additional 100 Community Reserves (CRs) as identified with the stakeholders during the PDF-B activities. Adjacent to these areas is a total of 24 Rural Communities including 1,014 villages with a total population of over 425,000 people to be involved in the project. The population includes various socio-professional categories that make out their living upon PA products. Some clear protected areas land for agriculture or grazing grounds, other collect fuel wood, undertake commercial logging, gather forest fruits, hunting for food or trophy, and many more work as hunting guides, tour guides or staff at the hotels located on park land or its periphery.

In supporting this PA biodiversity project, the GoS' objective is to provide sustainable benefits to a maximum number of people over the long term, while fostering development options for future generations. This will require a sustainable use of biological resources as recommended in the PNAE, the SNCB and the PNACB on which the present project is based. For this purpose, stakeholders will be full involved in the planning, development and management of both VTs and PAs to implement community-based biodiversity conservation and sustainable use. Participatory sustainable development of the VTs adjacent to the PAs is assumed here to serve as a socio-economic shield against the activities of poachers and illegal users of the PAs, while ensuring stakeholders' cooperation in the definition, adoption and respect of rules for the sustainable use of natural resources.

Participatory sustainable use will be based on four principles. First it will entail (1) encouragement of individuals and community initiatives by strengthening the stakeholders' capacities; (2) identification and implementation of incentives for conservation by reinforcing capacities through an SFIECE programme aimed at promoting the value of conservation in productive activities; (3) generation of income thanks to a credit programme for micro-projects about sustainable use of biological resources at all stages of production, transformation, conservation and commercialization, also integrating ecotourism activities; (4) promotion of the local know-how and artistic diversity in key selected activities, such as wood carving; and (5) promotion of improved control of the local institutions by the stakeholders and end-users by ensuring their training in planning, community-based co-management, monitoring, and evaluation of measures for the sustainable use of biological resources.

## **2. Project beneficiaries**

The project beneficiaries are the users of the goods and services pertaining to biological resources. They include mainly the poor rural dwellers, who depend on PA biological resources for their survival, as well as several socio-professional categories around the protected areas. Overall, project will involve and reach out a total of 24 RCs, 1,014 villages and 425,517 people. The benefits will consist of training, capacity building, co-management, conflict resolution, and equitable redistribution of wealth and services that accrue from sustainable use/management of biodiversity resources. The primary target population consists of the riparian groups (local communities) that live at the edge of the PAs, but at large there are five groups to benefit from the project. These include: (a) the poor rural dwellers; (b) the professional biodiversity resource users; (c) the civil servants and the civil society; (d) the private sector; and (d) future generations.

The first group of communities living around PAs contain the poorest segment of the rural population in Senegal. They often are landless, without much to invest or to purchase agricultural equipment and inputs. They daily see PAs as the main cause of their misgivings. Most of these live below poverty levels (<US \$1 per day) especially the women and the youth, who are the most vulnerable segment of the society. For this group, the project will first try to bring about their sympathy from their participation in PA co-management. Then the project will foster their food security by promoting better living conditions that are necessary for them to participate in generating global conservation benefits and sustainable development. The project will build on the baseline pertaining to poverty alleviation in identifying the obstacles to development and bringing appropriate solutions.

The second group of beneficiaries will be the professional resource users comprising forest operators, hunting zone lessees, agro-pastoralists, beekeepers, various women groups (vegetable gardening and fruit farming), fishermen, and actors in the processing, packaging and marketing channels of gathering, agricultural, fishing and dairy products. The project will bring to them the input they need to perform well in their sector of society by initiating catalytic initiatives, such as

micro-credit schemes and alternative source of income that are compatible with biodiversity conservation.

The project will also benefit a third group of public servants and the staff of the civil society made essentially of the PA agents, the eco-guards, CERP technical agents, NGOs, and other baseline projects. These would be provided training, extension services, demonstration of techniques for the sustainable use of biological resources, income diversification, alternative income sources, and sharing in the benefits derived from conservation.

The fourth group of beneficiaries, the private sector will also benefit from the positive effects of the project, in particular from eco-tourism and the distribution of cultural and artistic products from the villages benefiting hotels keepers, restaurant owners and village groups engaged in marketing of such artefacts as woven materials, baskets, sculptures and dyed fabrics.

Finally by safeguarding the ecological processes and the contemplative value of landscape and biodiversity conservation is assumed to provide development options for the last and fifth group, the future generations. The project will also ensure that benefits are redistributed in the VLs by establishing social infrastructures such as boreholes, hillside reservoirs, anti-salinization dykes and other hydraulic installations, and by assuming the recurrent operating costs. This redistribution will ensure the durability of the activities undertaken in the VLs, providing benefits to a great number of people over the long term, thus integrating future generations. The benefits will improve social cohesion and economic, cultural, biological and physical conditions, at the village, VT, CNR, RC, regional, national and even international levels when there are global environmental benefits

### **3. Strategies for Community and Public Involvement During Project Implementation**

Strategic approaches to community and public participation during project implementation were identified, detailed, adopted, and validated by the stakeholders during the PDF-B consultation processes, and they are described below. First of all, for each of the RCs adjacent to PAs, a plan for biological resource management will be made on the basis of the existing watershed plans in order to improve the management of natural resources without conflict and duplication of efforts. This will entail the participation of the RC leadership, especially its president, and the rural councillors of the village when it encompasses a whole RC and its watershed. For those watersheds involving several RCs, concertation will be sought among villages, and an inter-RC management committee will be created. All RCs adjacent to PAs will be represented on a Local Natural Resource Management Council (LNRMC); one representative for each RC will be elected by the rural councillors to sit on the board governing the PA in their vicinities; members of the governing board will assume chairmanship on a rotational basis. Secondly, at each RC level, plans for the management of natural resources of the PAs and VTs will be elaborated in a participatory manner to ensure integrated development.

In each village, a Village Group for the Community-Based Conservation of Natural Resources and Environmental Protection will be created. Each village group will include at least one representative of the Rural Councillors and will form several committees, particularly a Management Committee, Bush Fires Control Committee and a Vigilance Committee to monitor infractions to the rules elaborated for the VT planning and management. In connection with these local organizations and institutions, project activities will include the following set of strategies for public involvement:

- a) The formulation of a SFIECE programme and its implementation in cooperation with agents of the CERPs and technical services involved in natural resource management. The purposes of the SPIECE programme are: (1) to provide to villagers needed explanations on the project objectives, expected outputs, activities and role for each category of stakeholders; (2) to raise awareness of stakeholders about financial and environmental benefits and their bearings on the project expected outputs; (3) to define the roles and responsibilities of each category of stakeholders; (4) to define clearly the role of the concertation committees that would reinforce solidarity of the stakeholders to ensure synergy of their activities for the sustainable improvement of living conditions and to mitigate conflicts; (5) to seek consensus in decision making for the management and sustainable use of biological resources; (6) to implement community-based monitoring and evaluation of project activities and their adaptation to the evolving biophysical conditions as well as socio-economic values that would be integrating local knowledge and know-how; (7) to ensure transparency of the decision-making processes to obtain popular approval of project activities; (8) to adopt and disseminate successful pilot activities in areas not directly involved in the project.
- b) Prospective village trainers will be identified, to receive training in management, communication and dissemination of new techniques and technologies for the sustainable management of biological resources. Once trained, these village trainers will become members of the local NRM Councils and of the Village Groups for Community-Based NR Conservation; they will play a key role within the village committees according to their areas of competence;
- c) Each of these Village Groups will be represented on the Local NRM Council by one elected member to represent the interest of the villages in generating win-win solutions, while also promoting conservation concerns during RC meetings/deliberations;
- d) Regular meetings will be held for collective discussion on activities regarding the planning, development and management of natural resources both at RC and VT levels, in order to take into account everybody's concerns;
- e) Project implementation agreements will be negotiated and signed between the RCs and villagers' leadership and other villagers' organizations;
- f) A map depicting the limits of village lands will be established and for each VT, a land use plan as well as a plan for the management of natural resources will be elaborated with the rules and provisions for implementation of those plans through own financing from villagers' savings and credit schemes out of conservation oriented micro-projects;
- g) A map of the PAs will be established and their limits will be materialized on the ground; for every PAs, a Governing Council involving the adjacent RCs will be instituted, with RC representatives assuming chairmanship on a rotation basis;
- h) A Project Steering Committee will be established for each of the four project sites with one representative of each adjacent RC to PAs;
- i) Study tours will be organized for rural stakeholders to visit project sites in other VTs to promote exchanges of experience and expertise regarding sustainable use of biological resources;
- j) Community Nature Reserves will be delimited and their sustainable management will

be instituted through promotion of eco-tourism and leasing of hunting areas under the control of eco-guards and tour guides recruited from the villages;

- k) All these actions will also involve both the staff of the public domain especially those of the NPs, the agents of the Water and Forestry Service and, at the grassroots community levels, the agents of the CERP multidisciplinary teams and locals NGOs. These agents will establish the SFIECE programme and provide technical and methodological guidance to implement the activities; they will also participate in inter-group visits. This structural organization will contribute to ensure the success of post-project activities in view to sustain the entities involved at the grassroots levels;
- l) Under the project implementation agreements, the RCs will guarantee access to land to people living around the PAs in order to benefit from eco-development without opposing conservation of biodiversity;
- m) Both at RC and VT levels, monitoring and evaluation committees will be instituted to assess the nature of the products and benefits obtained from alternative income-generating activities linked to conservation, to identify the weaknesses to remedy them, and to identify existing potentials to promote them and disseminate lessons learned;
- n) In each VT, project disengagement will be effective after three years and the monitoring and evaluation committees will work in close collaboration with the project team to capitalize on lessons learned, in order to increase the chances of success of VT activities during the project maturity phase;
- o) At each RC level, annual discussions will be held on the results obtained from socio-economic development and sustainable conservation of natural resources to disseminate lessons learned;
- p) The VTs, where project disengagement has been successfully completed, will contribute advice and conduct information exchanges to other VTs where activities are underway so that they may benefit from their experience;
- q) Information garnered throughout the project will be recorded in socio-economic and biophysical databases to serve other projects, NGOs and village groups outside the 4 project sites to ensure dissemination of learned lessons; and
- r) The project will also report regularly on its achievements to ME and UNDP for consideration within the Country Cooperation Framework and programmes implemented with other development partners.

#### **4. Stages to Ensure Community Participation**

In order to ensure the durability of the expected outputs, the activities identified with the stakeholders during the formulation of the logical framework will necessitate: (1) legal backing of initiatives in connection with the sustainable management of biological resources; (2) strengthening stakeholders' capacities through the project's Environmental, Training, Information, Education and Communication programme together with planning, development and management activities; (3) integration of local knowledge and know-how during the project implementation, and evaluation and monitoring stages. For this purpose, the project will build respectively on the needs, capacities, knowledge of the grassroots actors in seven stages.

The seven stages of the process required to achieve the objectives of community-based biodiversity conservation will be as follows:

## **PHASE ONE**

Stage 1: Preparation stage. It consists of all preliminary activities required for the implementation of a good project, including in particular:

- § Selection of public entities and NGOs which need to be involved in animation, organization and training of the grassroots actors;
- § Organization of the Rural Councils of the various concerned RCs at each site into Local NRM Councils;
- § Organization of the populations of VTs adjacent to PAs in structured groups with specific committees;
- § Identification and selection of rural trainers to be trained by the project;
- § Elaboration of the SFIECE programme;

Stage 2: RC and VT recruitment stage. This stage will gradually involve the RCs and VTs adjacent to PAs and will include the following activities:

- § Implementation of SFIECE programme to clarify the expected benefits and eligibility criteria of RCs, Villages and Groups to the savings and credit programmes for the implementation of alternative options designed to generating income from conservation.
- § Elaboration and signature of implementation agreements with RCs;
- § Elaboration and signature of protocols with VTs concerned, with counter-signature of the RC or RCs involved;
- § Realization of VT and PA maps;
- § Materialization of VT and PA limits;

Stage 3: Planning stage. It involves community activities to elaborate the plans for development and sound management of natural resources and their validation. This includes:

- § Survey of traditional knowledge, local knowledge and know-how in the area of community-based conservation of natural resources;
- § Elaboration of VT development plan including establishment of Community Nature Reserves;
- § Elaboration of the VT and PA resource management plan;
- § Elaboration of community rules for natural resource management;
- § Evaluation of the VT and PA plans as formulated, through public discussions;
- § Validation of each VT and PA development and management plans by the village(s) and RC(s) involved;
- § Taking stock of VT and PA natural resources to establish the pre-project baseline;
- § Elaboration of a community-base natural resource conservation programme including a participation plan specifying in detail the roles and responsibilities of the stakeholders;
- § Establishment of a local entity in charge of the project involving RCs and VTs, with elaboration of the Local project organization chart;

## **PHASE TWO**

Stage 4 : Implementation of the community-based programme for the conservation of natural resources. This stage will include the following activities:

- § Continued implementation of the SFIECE programme;

- § Establishment of the savings and credit scheme with definition of eligibility criteria;
- § Dissemination of eligibility criteria for micro-project credits to be entrusted to a local bank in order to avoid negative reactions on the part of the grassroots partners toward the project in case credit is denied;
- § Instauration of the various decision-making, supervisory and control entities both at RC and VT levels;
- § Participatory monitoring and evaluation and capitalization of lessons learned;
- § Dissemination of lessons learned through inter-group visits, discussions and publications on acquired knowledge and monitoring of biodiversity;
- § Equitable sharing in the profits derived from conservation activities; and
- § Strengthening cooperation by fostering solidarity among stakeholders;

Stage 5: Leveraging stage. This will consist of actions to leverage the results obtained in order to ensure the continuation of conservation activities into the post-project stage. Activities of the fifth stage will include:

- § Strengthening the role of Village Groups and Committees in local decision-making regarding the planning, development and sustainable management of natural resources;
- § Convening periodic meetings between stakeholders, with RC involvement; and
- § Strengthening the vigilance committees for sustainable natural resource management.

### **PHASE THREE**

Stage 6: Project disengagement stage. Activities included in this sixth stage are those required prior to project disengagement. They will vary according to the findings of the monitoring and evaluation and the capitalization of lessons learned.

Stage 7: Disengagement stage. This will mark the total pull-out of the project and termination of financial support and guidance activities. After project disengagement in given RCs and VTs, the allowed actions there will be those to extract lessons learned in order to enhance chances of success for the next VTs to benefit project support.

## ANNEX XIII: IMPLEMENTATION ARRANGEMENTS

The project will be executed under the National Execution modality by the Ministry of Environment (ME) with the assistance of UNDP. Ministry of Economy and Finance (MEF) will provide financial supervision and will open a bank account for the project. GoS will undertake to transfer a total of US\$1.519 million in budgetary allocations to this bank account, in three equal instalments to coincide with the beginning of each project phase.

The project will be implemented by a streamlined Project Coordination Unit (PCU) based in Dakar and placed under the direct technical oversight of the Ministry of Environment (DPN), and under the supervision of UNDP-GEF, UNDP-Senegal, and the MEF. The PCU will be responsible for the design, planning, monitoring, evaluation and adaptation of the project to the new visions of the stakeholders and for the timely production of the expected outputs. Four streamlined Field Units will also be established in each project zone. The Field Units will work directly through PA, CERP and other Ministry agencies, as well as local NGOs.

Under DPN supervision, the NP Curators concerned, together with the Regional Inspectors of Water and Forestry Agriculture, Livestock and Fisheries together with their staff will be the linchpins for project implementation on the ground in their areas of competence. PA agents will focus on the NPs and surrounding areas including the CNRs. The Water and Forestry agents will focus on the Classified Forests and CNRs in synergy with the NP agents and the Livestock Service agents. Finally, the agents in charge of agriculture and fisheries, with support of the Livestock and Water and Forestry Services, will focus their activities on the VTs to ensure the environmentally sound intensification of the production systems. At VT level the CERP and NGO team will ensure the implementation of the project, acting in connection with the parks' curators, and the eco-guards. In this regard, a series of capacity-building activities will be conducted in particular for the benefit of DPN and DEFFCS so that by project completion, the capacities required to ensure appropriate sustainability of the activities will be in place.

The Project Steering Committee (PSC) is formed by CONSERE which is an entity in charge of coordinating government actions as regards the management of the interfaces between development and environmental protection. CONSERE is presided over by the Prime Minister and its Secretariat is provided by the Ministry of Environment. This body also includes the Ministry of the Interior overseeing NGOs and CERPs in order to ensure consistency and integration of grass root actions. UNDP/GEF and/or UNDP-Senegal will also be part of the Project Steering Committee.

A Scientific and Technical Committee will be established to include prominent members of the academic and research establishment in Senegal. The role of this Committee will be to evaluate project impact and provide guidance on technical specifications, in particular bringing to the attention of the project staff pertinent innovations that could be tested or replicated in the project site during its 10 years.

The following two organigrams provide a description of (a) existing public structures; and (b) the project's organizational chart.

### **Cooperation and Co-financing arrangements**

GoS has agreed to commit US\$ 1.050 million from its national budget for the project. Other co-financing is considered in-kind and will entail : staff salaries, premises, equipment, etc. Given the participatory nature of the project, it is expected that local communities will also contribute in-kind resources (labour, minor equipment, land), but these have not been quantified. UNDP has committed US\$ 1.650 from the core resources of its 2002-2004 CCF to the project. Assuming that the project will show successful results during



its first phase, it is likely that such cash co-financing will continue in the next two CCF cycles. UNDP co-financing is expected to gradually diminish towards the third phase so as to ensure an orderly phase-out. Cooperation and synergies will be built with the soon to be prepared GEF/WB project for Coastal Zone Management. These modalities will be discussed and fine-tuned during the feasibility stage of this project, but can include for example : coordination through CONSERE at the national level; joint project meetings in Niaye and Saloum at regular intervals; and common choice of local implementing agencies, such as IUCN in Saloum.

In addition, the co-financing arrangements with three projects have already been negotiated. Other coordination arrangements will be determined during the Feasibility Study. These projects are the AGIR (Transboundary project for Niokolo-Koba National Park and Badiar National Park in Guinea); the Coastal Zone Afforestation Project for Niaye (JICA); and the Dutch/IUCN project support to PNDS. Other co-financing is expected to be negotiated during the feasibility stage of the project with USAID, GTZ and CIDA.

The AGIR project will start March 2001 and run for four years. Based on an agreement reached with the AGIR project in February 2001, that project will use its co-financing for zoning of the PNNK, construction of a ferry, rehabilitation of dirt roads, and construction of eco-tourism camps. It will also support the Dalaba Training Center (equipment, training of trainers); and conduct awareness raising actions in surrounding villages.

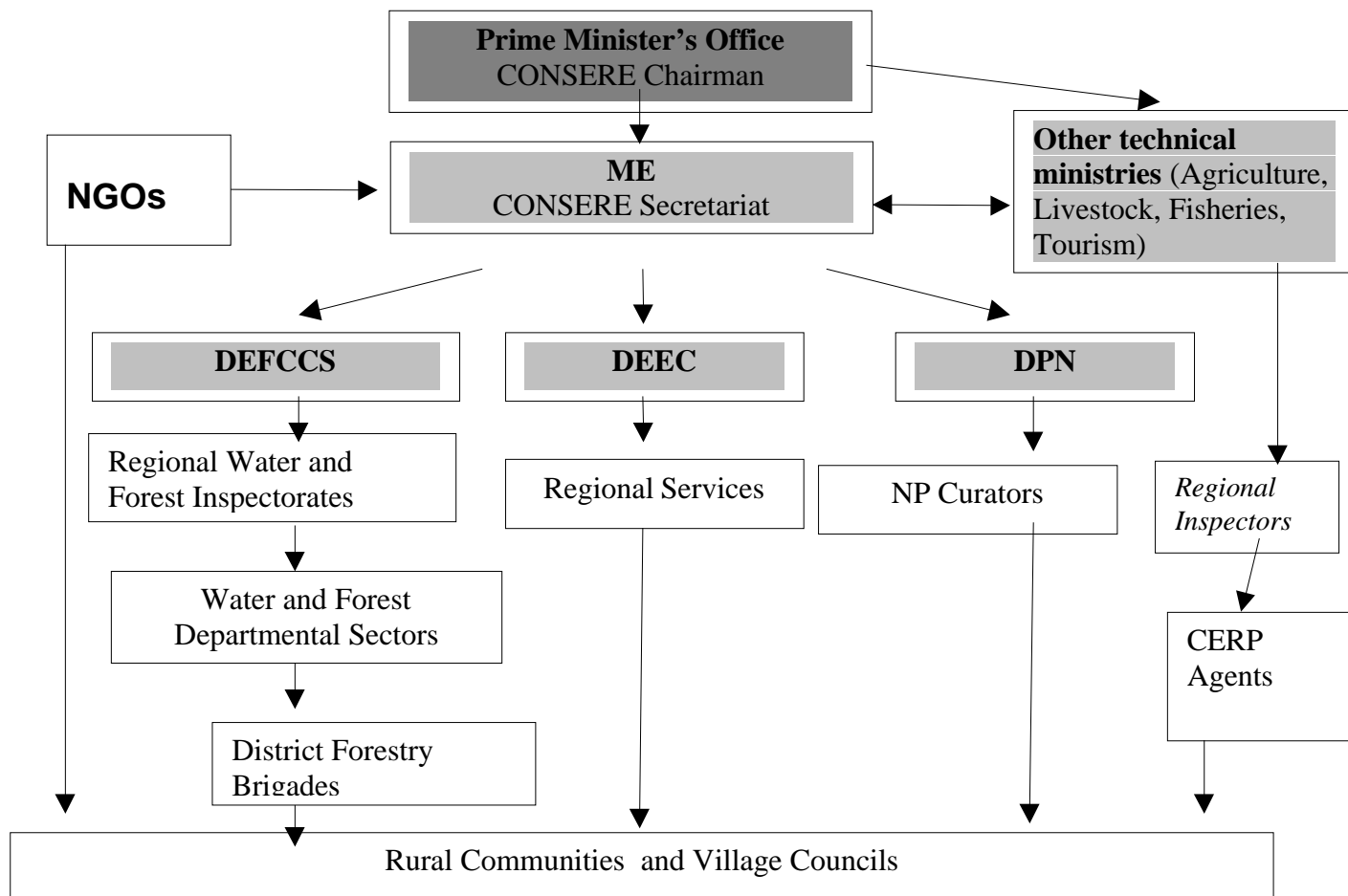
Based on agreement reached with the Niayes Coastal Afforestation Project, the co-financing from this project will bear the cost of large-scale sand dune fixation in the coastal region of Thies and Louga (through a subcontract with the private sector). The GEF project will bear the cost of community based windbreaks around inter-dunal vegetable gardens, which will help to extend the impact of the large scale afforestation closer to the communities. The JICA project will start in 2001 and will run for 10 years, for a total cost of US\$13.192 million. It is expected to result in 2037 hectares of fixed sand dunes or 101.850 km wide by 200 m strip of tree plantations. Only one fourth of this plantation is expected to directly cover the GEF project site, therefore co-financing is estimated at US\$3.298 million.

In the PNDS, the Netherlands funded project (through IUCN) will start in 2002 and run until 2004, for a total of US\$ 2 million. Negotiations have been held to re-align this support so as to constitute co-financing for the UNDP-GEF project. The IUCN/Dutch project will cover activities related to some of Component 2 and Component 3, and all Component 4 activities only in the Saloum Delta. The two projects will arrange yearly coordination meetings between the project field units, and further coordination will be ensured at the national level through CONSERE and the Project Steering Committees. Wherever possible, joint monitoring and evaluation activities will be conducted.

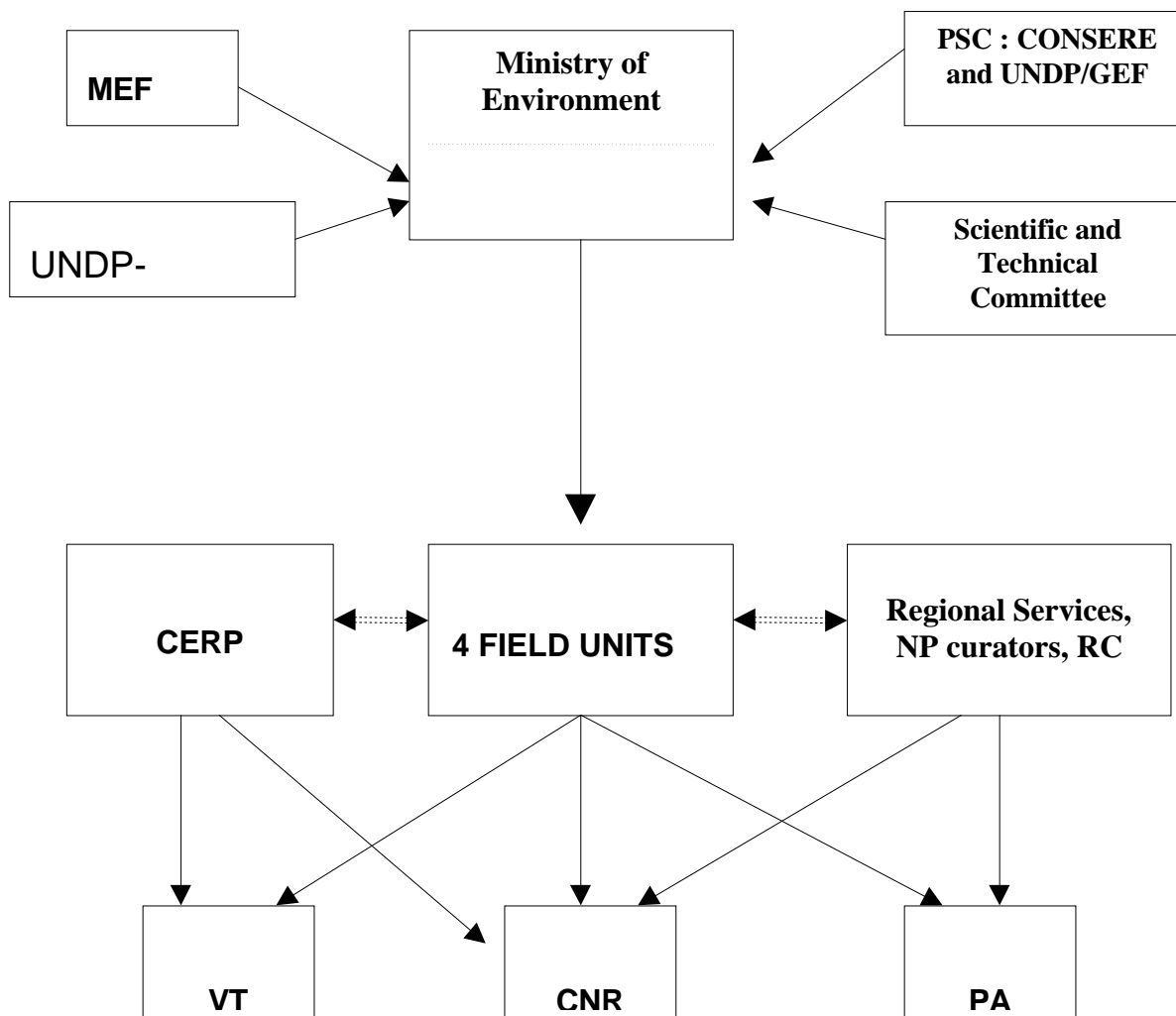
The FFEM and FAC are financing a project for support to PNNK for \$608,000. The project started in 1997 and will terminate soon. It has helped PNNK in some preliminary infrastructure development (e.g. sign posts, gate, etc.) ; initiated discussion on co-management planning with PNNK staff; and conducted preventive awareness campaigns in a few selected villages in the northern and western borders of the Park where threats to biodiversity are not very strong. By the time the GEF project comes on line, it is expected that the FFEM project will have been completed. However, if the FFEM project is re-financed for a second phase, then cooperative arrangements will be established in order to avoid duplication and build synergies.

The project will be closely with the 11 projects listed as Associated Projects, by having yearly coordination meetings, and in closely designing interventions so as not to duplicate efforts.

**Annex XIII a. Environmental Management Institutions in Senegal**



**ANNEX XVIII: Project Organizational Chart and Implementation**



## ANNEX XIV: Thematic Areas and Types of Project Activities

Thematic Areas						
Biodiversity		Climate Change		International Waters		Ozone Protection
Conservation 4		Energy conservation (prod./distribution) 4		Transboundary Analysis		Monitoring:
in situ 4	Ex situ		ESCO's	Efficient Designs 4	Strat. Action Plan Development	ODS phase out (Production)
Sustainable Use 4		Solar:		Freshwater Basin		ODS Phase Out (Consumption)
Benefit-sharing 4		Biomass: 4		Marine Ecosystem 4		Other:
Agrobiodiversity		Wind:		Wetland Habitat 4		
Trust fund		Hydro:		Ship-based		
Ecotourism 4		Geothermal:		Toxic Contaminants		
Biosafety		Fuel cells:		Demonstration 4		
Policy & Legislation 4		Methane recovery:		Fisheries Protection 4		
Buffer Zone Dev. 4		Other: Carbon sequestration 4		Global Support:		
b. Categories of General Interest						
Investment 4		Technical Assistance 4		Targeted Research 4		Land Degrad. 4
Technology Transf. 4		Small Islands		Info/Awareness 4		Private Sector 4

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## ANNEX II: INCREMENTAL COST ANALYSIS

### DEVELOPMENT OBJECTIVE

*Economic Policy:* The Senegalese Government's (GoS), economic targets for 2001 include raising GDP to 6%, while keeping inflation below 3%, reducing their external current account deficit to 6% of GDP, maintaining a budget surplus of 2% or more, and sustainable improvement of social indicators. Public investment is being targeted at education, health and basic infrastructure while the GoS is liberalizing and promoting the private sector in other economic sectors.

***Agricultural Policy:* The Agricultural sector generates only 20% of the country's GDP, but employs over 60% of the workforce, particularly in rural poor. Policies have focused on improving access to credit and supporting producer organizations while removing subsidies, price support and more direct intervention in the sector.**

***Environmental Policy:* the GoS has set aside 5.15 % of its land to total protection, and a further 35 % for multi-use including biodiversity conservation. In the second half of the last decade the GoS created the Higher Council for Environment and Natural Resources (CONSERE) to coordinate environmental policy between government Ministries. The Ministry of Environment is responsible for the management of National Parks and Classified Areas. However in recognizing the increasing strain on PA resources from local populations the GoS now wishes to make legal provisions for co-management of PAs in order to provide incentives for community involvement in biodiversity conservation and natural resource management.**

### GLOBAL ENVIRONMENT OBJECTIVE

The four areas selected for project intervention contain the largest remaining pristine and contiguous mangrove in West Africa; a RAMSAR site of international importance for wintering migratory and palearctic birds; and two World Heritage sites. The sites are representative of Senegal's 4 main relatively untouched ecoregions, and contain endangered and charismatic species such as the elephant, Jaguar, and the African Wolf. These sites are under pressure from a number of principal threats, defined during PDF B preparations as: land conversion; deforestation; poaching; overgrazing; over-extraction of marine and non-timber resources; and bush fires. Over USD 231 million in baseline funding is being invested through projects, mainly in village lands to intensify natural resource management and to make approaches more sustainable. PA staff do not have sufficient capacity and resources to enforce PA legal provisions against illegal resource use. Recognizing this, the objective of the project is to promote integrated ecosystem management of globally significant biodiversity in and around Protected Areas

through co-managed conservation, sustainable use and equitable redistribution of benefits from natural resources between local stakeholders, introduce eco-regional planning and buffer zone management principals in areas between Pas, and promote inter-sectoral integrated means to intensify crop production systems and enhance traditional pastoralism. Global benefits are expected to be generated from protection of globally significant biodiversity as well as increased carbon sequestration and enhancement of carbon sinks.

#### ***BASELINE***

Those activities expected to occur during the life of the project are described below (Annex V provides a more detailed description of the baseline).

**Policy and legal framework : In the recent past, GoS has out into effect legislation concerning decentralization, EIAs, community based forestry, and environmental codes such as fisheries and hunting. Currently and in the near future, no activities are expected under the baseline that would have and impact on this output.**

Natural Resource Management: There are seven projects with a combined investment of around USD 40 million from UNDP, UNCDF,, USAID, IFAD, GTZ, Germany, WB, BOAD, the GoS and local beneficiaries to help local stakeholders generate environmentally sustainable income opportunities on village lands. Interventions are focused at: assisting communities to organize themselves into advocacy, collective and other productive groups; assist private sector and collectives to develop investment plans, and assist Rural Councils to prepare area development and natural resource management plans; improve credit access to rural populations; and increase the profitability of local community economic activities.

Poverty Alleviation, Agricultural and Pastoral management: ten projects with combined investments of over USD 136 million, funded from IFAD, WB, BOAD, CFD, RFA, GTZ, AfDB, CIDA, IDA, the GoS and local beneficiaries, aim to combat poverty and improve the management of agriculture and pastoralism. Interventions focus on agricultural intensification; assisting agricultural start-ups; improve access to water; restructure the Ministry of Agriculture and improve the agricultural support services they provide to rural communities.

Forestry and fuel wood management: two projects with an investment of over USD 13 million, funded by Japan and Dutch aid, focus on sustainable forestry management and the sustainable management of traditional forms of energy.

Fisheries Management: two projects for over USD 13 million funded by JICA and EDF, one to build/ improve a fishing complex, the other to provide support to artisanal fishermen.

Vegetation rehabilitation: one project is a USD 9.9 million proposal to be funded by JICA and the GoS to fix sand dunes by afforestation and protect inland pastures along the entire Niayes coast, and to put in place a regime for the sustainable collection of firewood from the plantations. This project will be implemented in the context of Article 12 of the Kyoto Protocol, and is confined to plantation work. It will not address the need for sustainable management systems by local communities.

Conservation : Three projects for USD 8.4 million will contribute to this output. The first funded by the GoS is for the purchase of fire-fighting equipment; the second project funded by FFEM and FDS (which will likely terminate before the project starts) will contribute somewhat to the



improved management of Niokolo-koba National Park; and the third funded by the EU will support Natural Resource Management in the Niger and Gambia River Basins (AGIR) and will cover PNNK to some degree.

Monitoring & Evaluation, and Environmental Education: There is one project for just under USD 7 million funded by JICA, to monitor fish stock levels off the coast of Senegal. In addition, in the past, NASA has increased the capacity of CSE to establish training facilities for monitoring carbon sequestration in West Africa (USD 1 million). Japan is currently financing a national environmental education program for a total cost of USD 2.8 million.

In summary, the baseline situation is such that pressure on biological and natural resources will continue to grow, while ongoing action will focus primarily on increasing living standards and devising short term solutions for natural resource problems. Concrete actions have been carried out with the participation of several development partners, NGOs, various economic associations (GIE) and Village Associations, as well as numerous youth and women groups. However, in most cases, these measures have failed to meet expectations. There has been a lack of sectoral integration, resulting in technological packages/systems that are non-replicable outside of laboratories or demo plots. There has been limited adoption by the population due to distortions in economic and policy incentives. And there has been limited involvement of the stakeholders in planning, monitoring and evaluation processes

#### *ALTERNATIVE*

The Alternative GEF scenario will build on the baseline by testing and applying an ICD model at each site, promoting integrated eco-regional planning, promoting C sequestration and avoidance of C emissions, and removing the legal, policy, and technical barriers to IEM. In the VTs, production systems will be intensified, land use will be rationalized and food and energy self-sufficiency will be promoted in order to enhance natural resource management and reduce pressure on protected areas. In the CNRs, participatory, integrated, management plans for sustainable use and conflict resolution will be promoted in order to create buffer zones, and alternative techniques for income diversification through sustainable harvesting of biological resources will be demonstrated. In the PAs, a co-management model will be tested for the first time in the Sahel including mechanisms for the equitable sharing of benefits accruing from conservation. Furthermore, the project will build institutional and technical capacities, will demonstrate innovative incentives for conservation, and will monitor impacts on biodiversity and carbon balances over the ten year period.

#### *GEF INCREMENT*

The rational for GEF intervention in the Alternative is to :

- § To retain connectivity between, and promote suitable land uses around PAs by building the capacity of Rural Councils and VTs to plan and implement the principals of local land use planning, and eco-regional planning in village lands;
- § to demonstrate, remove barriers, and create the opportunity for co-management of PA resources in order to provide incentives for local community involvement in biodiversity conservation and CBNRM, and foster custodianship of PA resources by local communities through the equitable distribution of PA resources,

- § to encourage sustainable harvesting (not already covered by baseline activities) to improve rural incomes in village lands;
- § to encourage complementary land uses, and to augment a buffer between commercially oriented land uses in village lands, and conservation in PAs, by promoting planning, designation and management of Community Nature Reserves;
- § to improve the enabling environment for sustainability of project results.

In keeping with the GEF's incremental cost rational the following broad principals of separation between co-financed and GEF funded activities have been adopted. The GEF will finance all project activities to:

- § review and draft legislation
- § augment the capacity of PA authorities, and local communities to co-manage the project's target PAs for biodiversity conservation and maintenance of carbon sinks;
- § create the institutional structures, legal means and procedures for equitable distribution of benefits from PA resources;
- § enable Rural Councils to adopt and implement IEM and eco-regional planning principals in development and NRM plans;
- § encourage local communities to designate, plan and manage Community Nature Reserves using IEM principles; and
- § remove barriers and demonstrate techniques and approaches for intensification of production systems and make the use of the natural resources more sustainable and profitable.

Co-financing will cover:

- § all recurrent costs to enforce legislative changes introduced by project activities;
- § all recurrent costs of PA planning and management in keeping with the GEF's financial sustainability principals;
- § all recurrent costs of local level land use planning (VT);
- § all capital, labour and material inputs of the sustainable use activities the project is removing barriers for; and
- § all costs to replicate throughout the project area those activities the GEF is financing the costs of demonstration for.

## LOCAL VS. GLOBAL BENEFITS AND COSTS

The following matrix provides a summary of the expected costs and benefits accruing from the project.

**Table IIa. Expected costs and benefits to local and global levels**

Component	Cost (USD)	Intervention summary	Local Benefits	Global Benefits
<i>Output 1:</i> Policy and legal framework adapted to IEM	Baseline		Legislation is distorting incentives promoting optimal land use, encouraging unsustainable resource usufruct practices	Continued degradation of ecosystems due to overexploitation of biological resources resulting in extinction of species and loss of globally significant habitat

Component	Cost (USD)	Intervention summary	Local Benefits	Global Benefits
	Alternative	Draft, enact and enforce legislation enabling co-management of PA's, amend land tenure law, harmonize sectoral policies and make EIA compulsory	Incentives promoting sustainable use of biological resources, and a steady income stream from these resources	Legal enabling environment created to sustain contiguity of wildlife corridors between PA's and PA co-management, and pressure on PA resources reduced, thereby enabling conservation of important habitats endangered and endemic species within them.
<i>Output 2: Sustainable development and NRM in VTs</i>	Baseline	Short term measures to increase livelihoods and solve more pressing sectoral problems.	High income streams generated from natural resource usufruct, over the short term, but deteriorating over the long term, as soils, and ecosystem functions degraded	Accelerated deterioration of ecosystems in village lands, their ability to trap carbon, increasing pressure on juxtaposed PA's, and leading to the extinction of globally significant species.
	Alternative	Intensification of agricultural production, NRM, eco-regional planning, demonstration for new sustainable harvesting regimes to adding value to NRM products, and scaling up activities demonstrated.	IEM and eco-regional planning to make best use of ecosystem functions, and generate sustained incomes	Contiguity of wildlife corridors, and reduced pressure on PA resources, thereby conserving important habitats and conserving endangered and endemic species within them; and leveraging the capacity of the productive environment to sequester and retain carbon.
<i>Output 3: Conservation and sustainable management of CNRs</i>	Baseline	Limited amount of vegetation rehabilitation.	Incompatible land uses around PAs, poor use of harvesting, hunting and eco-tourism potential in PA buffer zones, leading to a loss of potential income from the natural resource base and land degradation.	Pressure on PA resources leading to loss of globally significant habitat, extinction of endangered and endemic species, and loss of carbon sink potential.
	Alternative	Community Nature Reserve planning, designation; and barrier removal and demonstration of new sustainable use activities including vegetation rehab.	Bio-compatible and sustainable income generated in buffers zones, and avoiding wasteful conflict between different interest groups for effective NRM	Buffer generated around PAs reducing pressure, conserving PA habitats and endangered species inside and outside PAs, and enhancing carbon sequestration in buffer zones
<i>Output 4: Sustainable conservation and co-management of natural resources in PAs</i>	Baseline	Some activities in two national parks (PNNK and PNDS) for improving infrastructure, management plans, and eco-tourism.	Continued degradation of plant cover in PAs, exposing village lands to sand storms, soil erosion, fires and risks of floods with attendant disasters.	Continued degradation of ecosystems in World Heritage sites, Biosphere reserves and Ramsar sites, and of globally significant species living in these ecosystems, together with a reduced capacity of PA habitats to sequester and hold carbon sinks.

Component	Cost (USD)	Intervention summary	Local Benefits	Global Benefits
	Alternative	Training, institutional strengthening, capacity building, and installation of infrastructure for improved enforcement and co-management of PA's	Co-management of PA resources creating win-win situations with local benefits from equitable distribution of benefits from PA use, and protection of watersheds and village lands.	Conservation of ecosystems and global biodiversity in World Heritage sites, Biosphere reserves and Ramsar sites, and of globally significant species they contain, together with increased mitigation of greenhouse gas emissions and enhanced carbon sequestration.
<i>Output 5: Participatory monitoring &amp; evaluation of the ecosystems</i>	Baseline	Some monitoring of fisheries and wildlife resources.	Poor understanding of the anthropogenic impact on biodiversity, and the potential from IEM to local uses	Rapid loss of endemic and globally threatened species due to lack of knowledge.
	Alternative	Participatory M&E for adaptive management; creating data base on biodiversity and carbon balance.	Improved knowledge of local benefits from biodiversity conservation and sustainable use, and better use of project resources.	Improved protection and sustainable conservation of endemic and globally threatened species; improved knowledge and capacity to monitor carbon sequestration in arid lands.

#### PRINCIPLES GUIDING INCREMENTALITY

The distinction between the GEF increment and co-financing during implementation is given in more detail below, by project output, and is summarized in Annex IIIb.

*Output 1:* The GEF will fund the review and recommendation phase of output 1, while the GoS will fund all enactment, adoption, and enforcement of the new legislation.

*Output 2:* Under output 2 the GEF will fund all start-up costs to develop IEM and eco-regional planning overlays for village and coastal development and natural resource management plans. This will include generating broad based consensus on usufruct rules; capacity building and assistance to Rural Councils, VTs, Fisheries Management Committees and local populations in eco-regional planning; and developing institutional and procedural means and capacity for conflict resolution. Co-financing will cover the operational costs of implementing and replicating those plans. The GEF will fund barrier removal and demonstration for; conflict resolution mechanisms; developing fuel wood alternatives; introduction of sustainable soil and water conservation techniques in arable and pastoral land uses; intensifying and diversifying rural production systems; training and community mobilization in effective bush fire control; sustainable oyster collection techniques; aqua-culture and fish processing. Co-financing will cover all recurrent costs of these activities. The demonstration and barrier removal rationale is explained in more detail below.

*Output 3:* Similarly the GEF will fund all start-up costs of developing participatory management plans for Community Nature Reserves in buffer zones of the park; including survey and consultation work for the plans; capacity building and institutional strengthening of Rural Councils and VTs to monitor, enforce and implement the management plans; creating the institutional structure for a micro-credit scheme and equitable sharing of hunting and eco-tourism profits. Co-financing will cover future operational and running costs of implementing the plans. The GEF will fund the demonstration and barrier removal costs of all sustainable use activities in

the output; including bush fire control; bee-keeping; eco-tourism; and marine and non-timber forest product harvesting, processing and marketing. The rationale for funding these activities are detailed below. Co-financing will cover the cost of all material investments and running costs of these sustainable use activities.

*Output 4:* the GEF will fund all new infrastructural development to strengthen PA management not covered by the AGIR project; including physical delimitation of boundaries; construction of guard and observation posts and encampments; bridges and fords; transport and communications and upgrading park training centers. Already planned co-financing will contribute to some of this infrastructure and bear the full cost of maintenance for all infrastructure. The GEF will fund the costs of all capacity building, training, institutional strengthening of PA authorities and civil co-management teams, and the development of participatory PA management plans to facilitate more effective enforcement of PA resources; co-management; cost recovery and equitable distribution of funds gathered from utilization of PA resources. GEF and co-financing will share the cost of legal modifications and bio-surveys. Co-financing will cover all salaries of PA staff, including recruitment of eco-guardians. As with the other outputs the GEF will fund demonstration and barrier removal costs of all sustainable activities; including bee-keeping, straw mowing, and controlled grazing.

*Output 5:* the GEF will fund all costs of collecting additional baseline data, to monitor the impacts of the project, and training a team in biodiversity and carbon sequestration survey techniques, as well as participatory M&E. Co-financing will cover the salaries of staff during and after the close of the project to facilitate long term monitoring of the project's impacts.

#### *Barrier Removal and Demonstration Rationale for Sustainable Use Activities.*

A number of techniques have been developed and tested successfully in rural areas of developing countries, which would increase the sustainability and productivity of farming systems in village lands, and reduce pressure on PA resources. However they are not currently normal practice among farmers in the project's target area. Other techniques are either innovative or need incremental innovations to adapt them to the Senegalese context. The GEF will fund all the costs for promoting these techniques, training and providing technical advice to farmers in the adoption of these techniques, while all material inputs, and recurrent costs will be covered through co-financing. Where investment costs are prohibitive the GEF will provide access to loans through the project's micro-credit scheme. The techniques being promoted under the project are described briefly below (and in more detail in Annex XI).

- § *Sustainable sedentary farming models:* this includes techniques that have been tested elsewhere in Africa, such as : encouraging mixed livestock and arable farming to enable farmers to maintain soil fertility with manure and feed livestock with fodder; field rotation and composting to maintain soil fertility and fix nitrogen; promote agro-forestry to boost organic soil content from leaf litter; reduce wind and water erosion of soils, provide shade for crops, and utilize space more efficiently through fodder and NTFP production, from tree canopies. The GEF will fund all the costs for testing and fine-tuning these techniques in the project sites, and training and providing technical advice to farmers in the adoption of these techniques, while all material inputs, and recurrent costs will be covered through co-financing.
- § *Livestock Fattening:* Consistent with the mixed farming model above, the GEF will fund costs of training farmers in sedentary intensive small ruminant fattening techniques, including livestock nutrition and phyto-sanitary regimes and provide access to loans for small start-up investments through the project's micro-credit facility.

- § *Pasture management:* Traditional transhumance strategies are being hindered as pastoralists lose access to pasture as exclusionary rights are allocated to the cultivators to convert pasture. The project will modify land tenure laws to accept pastoralism as a legal land use, and provide training in rest and rotation strategies, and planning of pastoral investments and corridors, to enable sustainable pastoralism to co-exist with emerging agricultural land use patterns. Co-financing will finance all pasture improvement and rehabilitation.
- § *Windbreaks and green fire breaks:* planting field and pasture hedges reduces soil erosion by wind and water, and depending on the species, protects crops and pasture resources against fire, provides non-timber forest products, and fodder for livestock. As above, the GEF will fund all the costs for promoting these techniques using endemic species, training and providing technical advice to farmers in the adoption of these techniques, while all material inputs, and recurrent costs will be covered through co-financing.
- § *Reforestation and regeneration:* Some native species have better investment returns than fast growing exotics, because they yield a number of timber and non-timber forest products, such as nuts and fodder. However they take longer to return a yield on the initial investment, because they are slower growing. Because this activity can take up to 8 years to demonstrate, the GEF will provide matching funds for farmers to invest in native species, through the project's micro-credit scheme, to encourage the uptake of this practice and demonstrate its effectiveness over the longer term. Also, the GEF will demonstrate appropriate techniques for reclamation of saline affected lands, for improved biodiversity conservation and C-sequestration.
- § *Aqua-culture:* Aqua-cultural models ranging from the simple to the more intensive will be demonstrated. For example ox-bow lakes and hand-dug ponds filled during the rains can hold rain and flood water long enough to fatten and harvest some species of fish, such as *Tilapia nilotica*. The GEF will fund the costs to provide assistance and training to local entrepreneurs in bio-friendly aqua-cultural techniques, and provide loans through the project's micro-credit scheme to buy fish and other inputs.
- § *Charcoal production:* The project will promote a green tax on wood inputs to charcoal production to encourage efficiency gains in the conversion process. The GEF will fund loans through its micro-credit scheme enabling producers to purchase low cost equipment to improve the efficiency of charcoal production by up to 30%. The equipment will also reduce the risk of accidental bush-fire caused by the conversion process.
- § *Beekeeping:* New techniques in honey production are now available that do not require "smoking" the Bees from the hive. Instead a chemical compound can be used. The compound is cheap and avoids the risk of accidental bush-fires. The GEF will finance demonstrations, and training in the use of this technique to encourage its use, and make micro-credit available for the purchase of equipment. Although more costly than using fire, if collectively undertaken this technique will reduce the risk of losing pollinating flowers the bees depend upon to make honey.
- § *Eco-tourism and hunting:* these are strategically important activities to the project, since they are compatible with IEM objectives, and can be practiced in PA's and surrounding buffer zones, and raise revenue for conservation management. While there is potential in Senegal for eco-tourism and hunting they have not as yet taken off. The GEF will finance activities to promote tourism in Senegal, develop, introduce and enforce eco-tourism codes of conduct for operators PA's and buffer zones, and Community Nature Reserves. Tourist operators will cover all capital and operating costs of practicing tourism and hunting.
- § *Processing, packaging, storing and marketing natural resource based products:* As with the above, if regulated, collecting non-timber forest, rangeland and marine products can be compatible with conservation, and generate revenues for conservation management. The GEF will finance the cost of developing, introducing and enforcing, sustainable NTFP and fish collection techniques and levels. The GEF will also provide training in new or modified

techniques to process and package NTFP, rangeland and marine products to increase value and, and provide micro-credit for the purchase of equipment.

## SCOPE OF ANALYSIS

The scope of analysis includes the geographic, institutional, market, policy and legislative factors impacting the projects target areas, as well as the costs and benefits generated from the project activities. This includes: (a) all 4 project sites, there buffer zones, and connecting corridors; (b) all stakeholders in the area; (c) local businesses in the four project areas utilising natural resources on (d) local and national government; (e) governments policy, legislation and plans; (f) NGO's; and (g) other donors active in the four project areas. The temporal scope covers a 10 year period, although most of the baseline can only be predicted up to about 6 years. Table IIa summarizes the national and global benefits and costs.

## COSTS

The total project costs are USD 31.613 million. Project co-financing amounts to 68% of this total. About 85% of the co-financing has already been allocated to specific outputs. The remainder will be determined during the feasibility study. Together with the baseline activities, the total alternative scenario will cost USD 263.500 million, of which the total project costs amount to 12%. This is an IEM project building on a substantial baseline complemented by significant co-financing. The GoS is fully committed to sustaining the impacts of the project in the long term, and has shown that commitment through various policy changes, as well as committing cash (equivalent about 10% of GEF contribution).

## ANNEX III: Project Logical Framework Analysis

Objectives/Outputs	Objectively Verifiable Indicators	Verification Sources	Critical Conditions
<b>Overall Objective:</b>  Conserve and sustainably use globally significant biodiversity and enhance carbon sequestration in four representative ecosystems of Senegal to generate both global benefits and national benefits from sustainable use and equitable sharing of benefits.	Presence of globally significant animal and plant species increased by 50% at each site by Y10  Amount of carbon sequestered increased by 30% in all sites by Y10.  At least 50% of local stakeholders accruing significant benefits from sustainable use by end of Y7	Independent evaluations.	Current institutional and political stability continues to hold in the country.  Current pattern of rainfall continues to hold or improves.  Unforeseen externalities do not occur, such as civil strife in Casamance or in neighbouring countries (forcing transhumants and other refugees into cross border areas).
<b>Component 1: Policy and legal framework adapted to participatory IEM</b>			
1.1. Legal obstacles to IEM and sustainable use of biological resources removed	Land tenure laws to allow transfer of private land title, by Y3. CNRs legalized by Y3. Co-management text for PAs drafted and approved by end of Y3.	Official Journal of Senegal	Government political situation continues to be amenable to policy reform.
1.2. Sectoral development policies encourage IEM	Agricultural, pastoral, forestry, hunting and coastal development policies encourage conservation initiatives that are equitable to all actors by end of Y2. Pastoralism is recognised as a criterion for land development in RC and VT procedures by Y3. Wood tax to be instituted by Y3.	Direct observation, reports from Project, DEFCCS, DPN, eco-guards and CERPs.	
1.3 Community ownership of biological resources in CNR legally recognised.	Effective transfer of authority responsibilities for community reserves by end of Y2. Land tenure regime modified to allow effective devolution of ownership by Y3.	RC deliberations on woodland use planning	



Objectives/Outputs	Objectively Verifiable Indicators	Verification Sources	Critical Conditions
1.4 Effective environmental impact assessments in project sites	EIA Unit of ME trained in EIA monitoring by Y3. EIA guidelines improved to incorporate biodiversity issues by Y3. Environmental impact studies conducted for each future project in the project sites as early as end of Y2.	Official Journal of Senegal	
<b>Component 2: Sustainable development and Community Based Natural Resource Management in Village Territories</b>			
2.1. Stakeholders more aware, better trained and informed of techniques, tools and strategies for sustainable management of biological resources	Environmental awareness-raising, training, information and communication programme elaborated and implemented in 100 villages by Y2, and replicated in Phase 2 and 3. 100 Village Trainers identified and trained regularly each year beginning in Y1, replicated to new villages in Phase 2 and 3.	Direct observation, reports from Project, DEFCCS, DPN, eco-guards and CERPs.	No major changes in global trading patterns and international prices for commodities such as gum arabic, meat, cereals.  No major structural changes in decentralized institutions of Senegal (RC, VT, etc.).
2.2. VTs delimited and appropriate plans for local level land use planning, and eco-regional planning developed for IEM ("Management Plans")	100 VTs mapped by end of Y3. 100 VT Management Plans are produced and adopted by consensus, by Y3; replicated in Phase 2 and 3.	Direct observation, reports from Project, CSE, DEFCCS, DPN et CERPs, and RC minutes	
2.3 Effective cooperation between various stakeholders to apply rules of good IEM	100 Local Management Committees created and adopted by all stakeholders by end of Y2 4-5 RC committees established for eco-regional planning by Y2 VT and RC leadership trained in eco-regional and land use planning by Y3 RC development plans modified to reflect eco-regional concepts, by Y5.	Direct observation, reports from Project, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	

Objectives/Outputs	Objectively Verifiable Indicators	Verification Sources	Critical Conditions
2.4. Local management plans integrate appropriate pastoral issues and investments	<p>All VTs in the Ferlo region and at destination point of transhumant livestock have a pastoral management plan adopted and respected by all by the end of Phase 2.</p> <p>3 transhumant corridors are established between Ferlo and Niokolo areas and adopted by residents and transhumants, by Y5.</p> <p>Uncontrolled clearing of rangelands stopped in all VT by Y3.</p> <p>10 ponds and 5 boreholes created and managed by local pastoral management committees by Y6.</p> <p>Minimum grazing fee (estimated CFAF 50 /head/month) and water fee (estimated CFAF 100/head/month) instituted in all improved pastoral units by Y5.</p> <p>Semi-intensive enrichment and rotation system around ponds and boreholes demonstrated in Ferlo pasturelands, by Y4, and replicated through co-financing by Y7.</p>	Projects, DEFCCS, eco-guards CERP, and RC minutes	
2.5. Supply-demand balance in domestic wood energy controlled in VTs and CNRs	<p>100 VTs have a positive balance between supply and demand of wood energy by Y10.</p> <p>At least one village nursery created in each 100 VT by Y4, and replicated in Phases 2 and 3.</p> <p>Individual and collective woodlots created in 100 VT by Y5, and replicated in Phases 2 and 3</p> <p>Windbreaks and live hedges planted at a rate of 100km/year in all project from Y4 onwards.</p> <p>10,000 improved stoves manufactured and used by local communities, of which 1000 demonstrated in Phase 1, and rest replicated in Phases 2 and 3.</p> <p>50 groups of local communities trained and using improved techniques for wood cutting and carbonization, of which 10 in Phase 1, and 40 in Phase 2.</p>	Direct observation, reports from Project, DEFCCS, and CERPs.	

Objectives/Outputs	Objectively Verifiable Indicators	Verification Sources	Critical Conditions
2.6. Land and marine coastal ecosystems development and management plan elaborated and implemented	<p>55 VT local management plans for coastal ecosystems conservation elaborated and under implementation, by Y3.</p> <p>800 ha of saline soils reclaimed and managed along the estuaries and in deltas, of which 100 in Phase 1, 500 in Phase 2 and 200 in phase 3.</p> <p>3000 ha of mangrove regenerated through direct seeding and with temporary restricted access, of which 500 demonstrated in Phase 1, 1500 in Phase 2 and 1000 in Phase 3.</p> <p>Sustainable techniques for oyster collection, without damaging mangroves demonstrated and adopted by 45 villages in Y3.</p> <p>55 VTs protecting fresh water resurgence sites in Saloum Delta to protect manatee habitat, of which 5 sites demonstrated in Phase 1, and extended to 45 in Phase 2.</p>	Projects, DEFCCS, eco-guards CERPs, and RC minutes	
2.7. Human pressures on fishing resources reduced in coastal VTs	<p>All management plans for coastal VTs include good management rules respected by all by the end of Phase 2.</p> <p>At least 50 fishermen converted to eco-guards for alternative income, trained and operational by Y3.</p> <p>At least 10 aquaculture sites functional by Y4.</p> <p>Techniques for improved fish processing and marketing (dried, smoked, salted shrimp, fish and oysters) demonstrated in 55 VTs through micro-projects by end of Phase 1, and replicated to 100 more villages by phase 3.</p>	Projects, DEFCCS, eco-guards CERPs, Fisheries Service, and RC minutes	
2.8. Bush fires managed in VTs, and integrated with PA and CNR fire management plans.	<p>50% reduction of uncontrolled fires in VTs in Y5; 80% reduction in Y7; 95% reduction in Y10.</p> <p>An Information and Rapid Warning System for eco-guards established in all VTs by Y3.</p> <p>All eco-guards equipped with communication systems by Y2.</p> <p>All 100 VTs have operational fire “vigilance” committees by Y3.</p>	Projects, DEFCCS, eco-guards CERPs, and RC minutes	

Objectives/Outputs	Objectively Verifiable Indicators	Verification Sources	Critical Conditions
2.9. Rural production systems intensified and diversified	<p>Productivity of production systems doubled through use of sustainable production techniques by Y10.</p> <p>1000 ha of arable land fertilised with improved composting, of which 250 ha demonstrated in Phase 1, and 750 replicated in Phase 2.</p> <p>7000 ha of land under intensified integrated agro-sylvo-pastoral systems, of which 2500 in Phase 1, and 4500 in Phase 2, and replicated in Phase 3.</p> <p>10,000 micro-projects for income diversification (processing, intensification, marketing, etc.) implemented through local credit system, of which 1000 in Phase 1, 6000 in Phase 2 and 3000 in Phase 3.</p> <p>1000 horticultural units in Niaye are protected from active dunes through windbreaks, hedges and other techniques, by Y10.</p> <p>A mechanism to monitor and share information on market dynamics is established between VTs, RCs and wholesalers, by Y5.</p> <p>100 VTs encouraged to promote cultural and artistic diversity (carving, weaving) to benefit tourist trade, by Y5, and replicated to 200 more villages by Phase 3.?</p> <p>Women account for at least 50% of the micro-projects in all years.</p>		
2.10 Appropriate credit and savings schemes developed and implemented in VTs.	<p>100 credit and saving schemes operational by Y4, and replicated in Phase 2 and 3.</p> <p>Each VT establishes a committee for M&amp;E on operation of credit schemes, including auditing, and evaluation of impact on biodiversity and sustainable livelihoods.</p>	Projects, DEFCCS, eco-guards CERPs, Fisheries, Agriculture and Livestock Services, and RC minutes	
2.11. Appropriate soil and water conservation techniques applied in VTs	<p>400 km of erosion control and revegetation, of which 40 demonstrated in Phase 1, 200 in Phase 2, and 160 in Phase 3.</p> <p>800 ha of wetlands protected and restored of which 80 in Phase 1, 400 in Phase 2, and 300 in Phase 3.</p>	Direct observation, reports from Project, DEFCCS, and DA	
2.12. Conflicts between crop farmers and livestock breeders managed	<p>Reduce conflicts by 40% in Y6, and 70% by Y10.</p> <p>Leaders of 100 VTs, 4 RCs and associated Pastoral Management Committees trained in conflict management by Y3.</p> <p>At least one Adjudication Court set up in each VT to handle conflicts by Y3.</p>	Direct observation, reports from Project, DEFCCS, and DA	

Component 3: Conservation and sustainable management of Community Natural Reserves			
3.1. CNRs established around PAs to serve as buffer zones	100 CNRs are delineated, and legally recognised (including protocols) by RCs, of which 20 in Phase 1, 60 in Phase 2 and 40 in Phase 3.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	Rate of population increase in Senegal remains at predictable rates.
3.2. CNRs have a participatory plan for management of biological resources, implemented with cooperation of all parties concerned	100 CNRs have adopted plans for participatory management of biological resources and implementation of plans has begun, of which 20 in Phase 1, 60 in Phase 2 and 40 in Phase 3. Each CNR regularly conducts participatory M&E. Eco-guards entirely financed through user fees and collection of fines, by Y7.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	
3.3. Sustainable use regimes demonstrated and implemented for selected resources	Identified and proven alternative techniques for sustainable harvesting and processing (charcoal, honey, wild fruits, gum arabic, hay harvesting, medicinal plants) are demonstrated in and around 20 CNR by end of Phase 1 and systematically used in all CNRs by Phase 2. A manual containing rational techniques for the management of biological resources is produced by the end of Y3. Fuelwood exploitation in CNRs is sustainable by Y6. Regeneration of vegetation with local species (and temporary restricted access) in CNR at a rate of 400 ha/year starting in Y3. 100 km of dune fixation completed, of which 20 in Phase 1, 60 in Phase 2, and 20 in Phase 3.	Direct observation, reports from Project, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	
3.4. Management plans for control of fire elaborated and implemented, and integrated with VT and PA fire management plans.	1000 km of firebreaks opened, maintained, and bordered with plantations of non-deciduous fruit trees, of which 400 in Phase 1 and 600 in Phase 2. Yearly hay collection from firebreaks by local communities in all CNRs. 100 fireless bee keeping micro-projects demonstrated and implemented in all sites by Y6.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	
3.5. Local credit and savings schemes (from Component 2) adapted to sustainable use actions	At least 1000 micro-projects financed related to sustainable use, by Y10. 100 VT and 20 CNR management committees institute a system of incentives for resource users and penalties for offenders	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	

<b>Component 4: Sustainable co-management for conservation of biodiversity in PAs</b>			
4.1. PAs delimited and marked.	19 PAs are delimited by boundary markers by actors by end of Phase 1	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	Turnover of staff in PA system and DPN kept at a reasonable minimum.  No major changes in boundaries of formal PA system during life of project.
4.2. Infrastructures and equipment improved in PAs	All equipment for PA agents and eco-guards in each of the 19 sites (communications, GPS, transportation) are in place by end of Y2 All PA operation and management infrastructures (guard camps, pontoons, vehicles, water trucks, observation towers) are completed by end of Y3. All infrastructure aimed at increasing biodiversity values (ponds, salt stations) are in place by end of Phase 1. All infrastructure for ecotourism enhanced by Y3. 2 training centers at Dalaba and Thies restored, equipped and operational by Y2.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	
4.3. Village eco-guards serving as intermediaries in the integrated management of VTs, CNRs and PAs trained and operational.	50 village eco-guards are provided each year with appropriate training in community-based biodiversity conservation techniques and approaches.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	
4.4. PA natural resources managed jointly with riparian populations	Local management committees are involved in the adoption and implementation of co-management plans at each of the 19 project sample sites by Y3. 19 PAs have new or improved co-management plans by Y2. 4 Inter-RC management committees established and functional by end of Y1. Village committees to combat poaching around PAs and in CNRs created and supported by eco-guards. Former poachers encouraged to switch to sustainable use micro-projects. Controlled grazing operations demonstrated and organised on selected land units inside PA and during appropriate periods, to reduce biomass in firebreaks and assist in germination of certain forest species by end of Phase 1.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	

4.5. Enhanced knowledge of PA biodiversity, co-management and IEM used for management planning.	Data on biodiversity and participatory M&E of co-management taken into account in adaptive management of PAs. Capacity built for eco-regional planning and IEM among all PA staff in 19 PAs.	Direct observation, reports from Project, CSE, DEFCCS, DPN, CERPs, and RC minutes	
4.6. Bush fires managed in PAs and integrated with VT and CNR plans	6000 km of firebreaks opened/maintained by Y10. 40 village groups and all PA staff trained to apply appropriate techniques in using fire as management tools by Y3. Fire early warning and prevention system (with local communities) put into place by en of Y2 in all PAs.	Projects, DEFCCS, DPN, eco-guards, CERPs, and RC minutes	
4.7. PAs have the required resources to assume operating costs and be self-supporting	Each PA effectively reaches self-reliance by Phase 3. Entrance fees increased gradually until Phase 2. Government contribution to 19 PA budgets increased by at least 100% by Y7.	Direct observation, reports from Project, CSE, DEFCCS, DPN, CERPs, and RC minutes	

## Component 5: Participatory monitoring and evaluation of the ecosystems

5.1. M&E of biodiversity and natural resources in PAs and peripheral areas	Regular inventories of plants and animals, as well as animal migration and biodiversity status, and land use, conducted every other year until Y10.	Direct observation, reports from Project, CSE, DEFCCS, DPN, CERPs, and RC minutes	Local knowledge is still viable and conducive to documentation.
5.2 M&E of carbon sequestration in all project sites	Regular carbon inventories in all project sites , on a yearly basis until Y10.		
5.3. Local knowledge taken into consideration in biodiversity monitoring and evaluation, and adaptive management.	Studies on local knowledge of biodiversity, land use, fire, pastoralism, etc., conducted and results being applied in VTs, CNRs and PAs starting in Y2.	Direct observation, reports from Project, CSE, DEFCCS, DPN, CERPs, and RC minutes	

5.4. Participatory mechanisms to monitor and evaluate project activities elaborated and implemented	Capacity built for participatory M&E in both VT and PA communities, and applied each year.	Direct observation, reports from Project, CSE, DEFCCS, DPN, CERPs, and RC minutes	
5.5 Dissemination of lessons learnt	Networking and exchange visits maintained regularly between 4 project sites until Y10. Dissemination workshops established including other Associated Projects; once every 2 years. Regular information fed to mass media at national scale, and locally through rural radio, schools, local theatres, and other cultural events.	Direct observation, reports from Project, CSE, DEFCCS, DPN, CERPs, and RC minutes	



### Annex IIIb. Project Activities and co-financing arrangements

The following table describes the list of indicative activities for the project during its entire 10 year duration; and the relative share of GEF to co-financing. Annex VI provides a breakdown of the phasing by output.

	<b>Components and Activities</b>	<b>GEF and co-financing</b>
<b>1.</b>	<b>Policy and legal framework adapted to participatory IEM</b>	<b>GEF &gt; Co-finance</b>
<i>1.1</i>	<i>Legal obstacles to IEM and sustainable use of biological resources removed</i>	
1.1.1	Identify legal constraints on natural resource conservation	GEF
1.1.2	Integrate amendments proposed in legal study to encourage private and community initiatives for conservation	GEF
1.1.3	Adapt land tenure system so as to provide incentive for agricultural intensification	GEF
1.1.4	Integrate pastoralism as eligible criterion for land tenure security	GEF
1.1.5	Develop co-management text	GEF
1.1.6	Legally acknowledge co-management text	Co-finance
1.1.7	Enact, adopt and enforce proposed legislation	Co-finance
<i>1.2.</i>	<i>Development policies encourage biodiversity conservation</i>	
1.2.1	Identify and propose policy amendments to remove constraints for agricultural, pastoral, forest, hunting and coastal fishing and encourage collective and private initiatives	GEF
1.2.2.	Adapt development policies to protect forest, rangeland, and coastal land and marine areas by establishing effective buffer zones to reduce erosion.	GEF
1.2.3	Adopt and implement above recommended policies	Co-finance
<i>1.3</i>	<b>Community ownership of biological resources legally recognized in forests and CNR</b>	
1.3.1.	Develop and disseminate idea of private and community initiatives through recognition of community ownership of CNRs	GEF
1.3.2	Transfer authority and responsibilities on CNRs	Co-finance

1.4.	<i>Effective environmental impact assessments/ studies</i>	
1.4.1	Develop/improve EIA guidelines for Biodiversity	GEF
1.4.2	Increase capacity in ME to monitor EIA on Biodiversity issues	GEF
1.4.3	Enact, adopt and implement EIA guidelines proposed by project	Co-finance
<b>2.</b>	<b>Sustainable development and Community Based Natural Resource Management in Village Territories</b>	<b>Co-finance &gt; GEF</b>
2.1	<i>Stakeholders more aware, better trained and informed on techniques, tools and strategies for sustainable management of biological resources</i>	
2.1.1	Elaborate an awareness, training, information and communication programme for sustainable use and conservation of biological resources	GEF > co-financing
2.1.2	Train trainers in awareness, training and communication for sustainable use and conservation of biological resources	GEF > co-financing
2.1.3	Implement the awareness, training, information and communication programme for sustainable conservation of biological resources in all 100 villages	GEF > co-financing
2.1.4	Identify, elaborate and disseminate lessons from experience and promote ongoing training of agents and stakeholders in biodiversity conservation techniques and strategies	GEF > co-financing
2.2	<i>VTs delimited and appropriate plans for local level land use planning, and eco-regional planning developed ("Management Plans")</i>	
2.2.1	Map 100 VT and mark boundaries of resources, including pastures	GEF > co-financing
2.2.2	Elaborate participatory development and management plans for 100 VTs to include farmland pasture, and coastal resources	GEF
2.2.3	Build Capacity for eco-regional planning in RC and VT	GEF
2.2.4	Develop eco-regional planning co-operative framework between all 4 sites	GEF
2.2.5	Adopt and implement eco-regional plans and planning principals	Co-finance
2.3	<i>Effective co-operation between various stakeholders to apply rules of sustainable biological resource management</i>	
2.3.1	Put into place an appropriate mechanism for concentration and co-operation between the stakeholders at VT level.	GEF

2.3.2	Put into place a system of fines in case of non compliance with good management rules established in VT management plans	GEF
2.3.3	Organize community discussions on management of 100 VT development plans in order to ensure flexibility and introduction of remedial measures as the need arises	GEF
2.3.4	Adopt, apply, and enforce good biological resource management rules	Co-finance
2.4	<i>Local management plans integrate appropriate pastoral issues and investments</i>	
2.4.1	Inform stakeholders of changes in development legislation and policies	GEF
2.4.2	Establish a dialogue between host farmers/transhumants and outsiders/immigrants	GEF
2.4.3	Create pastoral units outside of CNRs, and establish Pasture Management Committees as intermediates structures between VTs + RC (to include both residents and outsiders)	GEF
2.4.4	Participatory management plans for Pasture Units (both residents and outsiders), prepared and implemented	Co-finance > GEF
2.4.5	Demonstrate effective vegetation enrichment techniques for improvement of extensive pastures	GEF
2.4.6	Replicate enrichment techniques in pastoral units with high quality endemic and non-exotic forage species	Co-finance
2.4.7	Create/equip ponds and boreholes for pastoral units based on rangeland management plans	Co-finance
2.4.8	Demonstrate, and replicate rotation systems both within and between pastoral units	Co-finance > GEF
2.4.9	Create, and enforce transhumance corridors through participatory eco-oregional planning	Co-finance > GEF
2.4.10	Establish, adopt and enforce a system of payment of grazing and watering fees in improved pastoral units to ensure financial sustainability including system of fines for infractions	Co-finance > GEF
2.4.11	Put into place and implement a participatory rangeland monitoring system for adaptive management by pastoral units	GEF > Co-finance
2.4.12	Prohibit clearing of rangeland and pastures through VT management plans	Co-finance
2.5	<i>Supply-demand balance in domestic wood energy controlled in vats and CNRs</i>	
2.5.1	Demonstrate at least one village nurseries in x VT using endemic species, and replicate in X VT's	Co-finance > GEF
2.5.2	Train VT volunteers in nursery management techniques for endemic species	GEF
2.5.3	Encourage the creation, and replicate successful techniques to establish and sustainably manage village woodlots.	Co-finance > GEF
2.5.4	Demonstrate techniques to establish and manage windbreaks and live hedges in and around the fields and villages, and replicate successful techniques	Co-finance > GEF
2.5.5	Promote manufacture and massive use of improved stoves	Co-finance
2.5.6	Demonstrate and replicate the use of rational techniques for charcoal production and wood	Co-finance > GEF

	cutting	
2.6	<i>Land and marine coastal ecosystems development and management plan elaborated and implemented</i>	
2.6.1	Identify coastal sensitive sites and establish maps of mangroves and saline soils	GEF
2.6.2	Elaborate, and implement a specific plan for coastal land and marine management in each VT	GEF > Co-finance
2.6.3	Demonstrate techniques to reclaim saline soils along estuaries and in deltas	Co-finance > GEF
2.6.4	Demonstrate and invest in mangrove restoration by planting, direct seeding restricted access	Co-finance > GEF
2.6.5	Demonstrate, replicate sustainable techniques for oyster harvesting to conserve mangrove tree roots	GEF > co-finance
2.6.6	Conduct regular monitoring of plant and animal stock species in mangroves	GEF > Co-finance
2.7	<i>Human pressures on fishing resources reduced in coastal VTs</i>	
2.7.1	Put into place, and implement a programme for monitoring and evaluation of stocks, landings of coastal fisheries, and pollution by VTs	GEF > Co-finance
2.7.2	Carry out studies on species' behaviour in mangrove areas and their interrelations with marine life	GEF
2.7.3	Establish, and convene Local fishery management committee	Co-finance > GEF
2.7.4	Establish, adopt and enforce local rules for management of biological rest periods for mangrove and coastal areas	Co-finance > GEF
2.7.5	Demonstrate and adopt alternative income options for fishermen	Co-finance > GEF
2.7.6	Demonstrate, and adopt appropriate aquaculture techniques	GEF > co-finance
2.7.7	Demonstrate, and adopt improved fish processing techniques	Co-finance > GEF
2.8	<i>Bush fires managed in VTs, and integrated with PA and CNR fire management plans</i>	
2.8.1	Train trainers and eco-guards from VTs in preventive and active techniques to combat bush fires	GEF
2.8.2	Organize, and implement an information and rapid warning system with the eco-guards	GEF > Co-finance
2.8.3	Revitalize and equip village committees to combat bush fires in VT, CNR and PA	Co-finance > GEF
2.8.4	Part of the fees collected as fines, confiscation and seizure in CNRs and PA's, put back into revolving fund for financing of eco-guards and other community services	Co-finance
2.8.5	Develop, train and adopt appropriate techniques, and use fire as management tool in VTs	Co-finance > GEF
2.9	<i>Rural Production systems intensified and diversified</i>	

2.9.1	Demonstrate, promote and replicate composting systems to restore soil fertility	Co-finance > GEF
2.9.2	Promote, and replicate agro-sylvo-pastoral techniques in VTs	Co-finance > GEF
2.9.3	Demonstrate and replicate alternative options for income diversification	Co-finance > GEF
2.9.4	Provide technical assistance in and adopt cattle, sheep, goats and poultry fattening techniques	Co-finance > GEF
2.9.5	Provide technical assistance in, and adopt techniques to intensify vegetable garden crop production	Co-finance > GEF
2.9.6	Provide technical assistance in, and adopt appropriate processing techniques for dairy, vegetable and fruit products	Co-finance > GEF
2.9.7	Integrate gender approach alternatives income generation of biodiversity in PAs , CNRs and VTs	Co-finance > GEF
2.9.8	Identify and implement improved marketing channels for rural products	Co-finance > GEF
2.9.9	Encourage the replication of artistic and cultural products for ecotourism in VTs.	Co-finance > GEF
2.9.10	Establish livestock health monitoring and emergency curative programmes	Co-finance
2.9.11	Demonstrate and replicate semi-intensive fodder production and rotation system around boreholes	Co-finance > GEF
2.10	<i>Appropriate credit and savings schemes developed and implemented</i>	
2.10.1	Conduct a study to determine most suitable credit and savings schemes to ensure sustainability of activities	GEF
2.10.2	Build capacity of VTs to determine most profitable and most durable sustainable use activities for micro-projects	Co-finance > GEF
2.10.3	Capitalise and operationalise credit and saving system	Co-finance
2.10.4	Conduct a participatory assessment of micro-projects on impact on the standard of living and biodiversity evolution	GEF > Co-finance
2.11	<i>Appropriate soil and water conservation techniques applied</i>	
2.11.1	Conduct topographic surveys and develop, demonstrate, and replicate appropriate S&W conservation techniques	Co-finance > GEF
2.11.2	Demonstrate, and replicate construction of anti-erosion devices	Co-finance > GEF
2.11.3	Demonstrate, build capacity, and replicate in community protection and restoration of wetlands in VTs	GEF < Co-finance
2.12	<i>Conflicts between crop farmers and livestock breeders managed</i>	
2.12.1	Create and enforce corridors for livestock passage in VTs	Co-finance > GEF

2.12.2	Delimit grazing areas and agree and enforce access rights by all users in management plans	Co-finance > GEF
2.12.3	Demonstrate and replicate techniques for establishing and managing live fences and windbreaks around fields	Co-finance > GEF
<b>3.</b>	<b>Conservation and sustainable management of Community Natural Reserves</b>	<b>Co-finance &gt; GEF</b>
3.1	<i>CNRs established around PAs to serve as buffer zones</i>	
3.1.1	Local communities ratify adoption of CNRs identified in PDF B	Co-finance
3.1.2	CNRs legally recognized and boundaries materialized	Co-finance > GEF
3.1.3	Conclude agreements between RC and VT for management of CNR	Co-finance > GEF
3.2	<i>CNRs have a participatory plan for management of biological resources, implemented with co-operation of all parties concerned</i>	
3.2.1	Elaborate, and implement CNR sustainable use and management plans integrated with VT and PA plans	GEF > Co-finance
3.2.2	Establish and adopt rules of good management of biological resources in CNRs, including fines for infractions.	GEF > Co-finance
3.2.3	Establish and manage mechanisms for self-financing of CNR management through user fees and hunting licenses	GEF > Co-finance
3.2.4	Deleted – covered under 3.2.1	Co-finance
3.3	<i>Sustainable use regimes demonstrated and implemented for selected resources</i>	
3.3.1	Plan and manage fuel wood exploitation in CNRs	GEF > Co-finance
3.3.2	Demonstrate, and replicate ecosystem regeneration by direct seeding in CNRs according to management plans	GEF > Co-financing
3.3.3	Promote, and replicate plantation of multiple-use windbreaks and green firebreaks in and around CNRs as boundary markers	Co-finance > GEF
3.3.4	Replicate wood cutting and charcoal production techniques tested in 2.5.6 to CNR	Co-finance > GEF
3.3.5	Implement options for dune fixation using non-exotic species	Co-finance
3.3.6	Encourage development of ecotourism in community nature reserves adjacent to National Parks	Co-finance > GEF
3.4	<i>Management plans for control of fire elaborated and implemented, and integrated with VT and PA fire management plans</i>	

3.4.1	Demonstrate, and replicate fire-less bee keeping techniques	GEF > Co-finance
3.4.2	Open and maintain firebreaks in CNRs integrated with VT + PA systems	Co-finance > GEF
3.4.3	Practice hay making in firebreaks of CNRs and VTs.	Co-finance > GEF
3.5	<i>Local credit and savings schemes (from Component 2) adapted to sustainable use actions</i>	
3.5.1	Promote and replicate techniques for new value-adding processing techniques for Non-timber forest products such as leaves, gums, oils and waxes	Co-finance > GEF
3.5.2	Identify and implement appropriate techniques to lease hunting zones in CNRs with the assistance of eco-guards	Co-finance > GEF
<b>4.</b>	<b>Sustainable conservation and co-management of natural resources in PAs</b>	<b>GEF &gt; Co-finance</b>
4.1	<i>PAs delimited and boundaries marked.</i>	
4.1.1	Map PAs	GEF
4.1.2	Clearly mark PA limits on the ground	GEF
4.2	<i>Infrastructures and equipment improved in PAs</i>	
4.2.1	Create and maintain permanent ponds	GEF
4.2.2	Create and recondition PA guard camps	Co-finance
4.2.3	Rehabilitate fords, bridges and pontoons	Co-finance
4.2.4	Rehabilitate PA observation towers	GEF
4.2.5	Establish salt stations in parks	GEF
4.2.6	Improve transportation equipment for PA agents	GEF
4.2.7	Restore and upgrade communication systems for PA agents for early warning systems	GEF
4.2.8	Provide PA agents with GPS equipment	GEF
4.2.9	Recondition and equip training/retraining centres at Dalaba and Thiès	Co-finance > GEF
4.2.10	Develop ecotourism infrastructure installations in each national park and reserve to provide funding for recurring costs	Co-finance
4.2.11	Maintain all PA infrastructure	Co-finance

4.3	<i>Village eco-guards serving as intermediaries in the joint management of VTs, CNRs and PAs trained and operational</i>	
4.3.1	Identify village volunteers, and hire to serve as eco-guards using participatory approach	GEF > co-finance
4.3.2	Train trainers and animators for joint management	GEF
4.3.3	Train village eco-guards in rural animation and natural resource conservation techniques	GEF
4.3.4	Train village eco-guards in tourism and cultural guides' approaches and strategies	GEF
4.3.5	Retrain eco-guards and PA agents every six months in sustainable conservation techniques and strategies for PAs and peripheral areas	GEF
4.4	<i>PA natural resources managed jointly with riparian populations</i>	
4.4.1	Build the capacity of Council Members and RC's to make co-management decisions with PA authorities	Co-finance > GEF
4.4.2	Put into place and convene regularly in each RC a functional steering committee for PA management involving PA agents, eco-guards, CERP agents and rural producers	Co-finance > GEF
4.4.3	Develop and implement agreements with RCs involved in management of peripheral zones and community nature reserves	Co-finance > GEF
4.4.4	Demonstrate and replicate diverse community activities income generation from conservation in PAs (such as straw mowing, bee keeping, grazing, cultural rites) where allowed (see output 3)	Co-finance > GEF
4.4.5	Put into place and convene for each site an inter-RC concertation committee to ensure actors' cooperation for sustainable management of PAs' ecosystems and eco-regional planning	Co-finance > GEF
4.4.6	Establish and implement an appropriate mechanism to share profits from conservation	GEF > co-finance
4.4.7	Build capacity of village committees and eco-guards to combat poaching in PAs and in CNRs, and enforce poaching laws	GEF
4.4.8	Establish, and implement a rapid alert system to report presence of poachers, including regulations and fines.	Co-finance > GEF
4.4.9	Develop and implement a system of compensation for crop and LS damage using revenues from sustainable use and user fees.	Co-finance > GEF
4.4.10	Build capacity of sedentary and transhumant livestock farmers in elaboration and implementation of pastoral use plans in Pas	GEF
4.4.11	Monitor controlled grazing in appropriate areas in PAs to assist in PA ecosystem maintenance according to management plan	Co-finance > GEF
4.5	<i>Enhanced knowledge of PA biodiversity used for management planning</i>	
4.5.1	Inventory plant and animal species using appropriate methods	GEF
4.5.2	Integrate local knowledge to determine rates of pressure and extinction of plant and animal species.	GEF



4.5.3	Disseminate results of participatory monitoring-evaluation to VT and PA stakeholders on a regular basis to be used in adaptive management of PA	GEF
4.5.4	Conduct a study on fauna migration in the PAs and peripheral areas	GEF
4.6	<i>Bush fires managed in PAs and integrated with VT and CNR plans</i>	
4.6.1	Open and maintain firebreaks in PAs using local community participation	Co-finance > GEF
4.6.2	Develop, and implement and demonstrate appropriate techniques using fire as management tools in PA, CNR, VT	GEF > co-finance
4.6.3	Train PA agents in appropriate use of early fires in PAs	GEF
4.6.4	Equip PAs with water trucks for rapid intervention in PAs, CNRs and VTs	Co-finance > GEF
4.6.5	Put into place, and implement an fire early warning and prevention system for PA integrated with that of CNR and VT.	Co-finance > GEF
4.7	<i>PAs have the required resources to assume operating costs and be self-supporting</i>	
4.7.1	Promote development of ecotourism in PAs in partnership with private sector.	Co-finance > GEF
4.7.2	Institute a system of entrance fees for all in PAs	Co-finance > GEF
4.7.3	Government budgetary allocation increases for PA	Co-finance
<b>5.</b>	<b>Participatory monitoring and evaluation of the ecosystems</b>	<b>GEF &gt; Co-finance</b>
5.1	<i>M&amp;E of natural resources in PAs and peripheral areas</i>	
5.1.1	Conduct inventory of animal species every other year in PAs, CNRs and VTs	GEF
5.1.2	Conduct inventory of plant species every third year in PAs, CNRs and VTs	GEF
5.1.3	Carry out study on animal migration and behaviour of vulnerable species	GEF
5.1.4	Create and use databank on evolution of living resources in the PAs and peripheral areas in management plans	GEF
5.1.5	Gather information on project impacts (dynamics of biodiversity and carbon sequestration, and improvement of standards of living) in PAs, CNRs and VTs and include it in databank	GEF
5.2	<i>M&amp;E of carbon sequestration in all project sites</i>	
5.2.1	Ground based data collection in a sample of representative sites	GEF

5.2.2	Data collection through remote sensing	GEF
5.2.3	Modelling of carbon cycle in all project ecosystems	GEF
5.2.4	Training of PA staff in monitoring of carbon sequestration	GEF
5.3	<i>Local knowledge taken into consideration in biodiversity monitoring and evaluation, and adaptive management</i>	
5.3.1	Investigate local knowledge and integrate in monitoring and evaluation of biodiversity in PAs and peripheral areas	GEF
5.3.2	Integrate traditional healers, traditional hunters and women in monitoring and evaluation of biodiversity	GEF
5.4	<i>Participatory mechanisms to monitor and evaluate project activities elaborated and implemented</i>	
5.4.1	Create village committees for biodiversity monitoring and evaluation under supervision of eco-guards	GEF > Co-finance
5.4.2	Organize local debates on evolution of biodiversity in PAs and peripheral areas	GEF > Co-finance
5.4.3	Ensure regular participatory monitoring of biodiversity evolution to determine project impacts	GEF > Co-finance
5.4.4	Redirect project activities in PAs, CNRs and VTs based on the result of monitoring and evaluation	GEF > Co-finance
5.5	<i>Dissemination of lessons learnt</i>	
5.5.1	Publish results of evaluation of biodiversity taking into consideration local knowledge through debates, reviews cultural events and in the media	GEF
5.5.2	Regular networking and exchange visits between 4 project sites and with associated projects	GEF



## Annex IVa. STAP Roster Review

Project Number: 1148  
Project Title: **Integrated Ecosystem Management in Four Representative Landscapes of Senegal**  
STAP Reviewer: Dr. Kenton Miller, Vice President for International Conservation and Development, WRI, Washington D. C.  
Date: February 24, 2001

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### Key Issues:

1. **Scientific and Technical Soundness of the Project.** Project design draws upon current theory and practice of Conservation Biology and Landscape Ecology. It reflects current scientific guidelines to shift management scale to that of whole ecosystems and landscapes. On the social side, it reflects current guidelines from research and practice in terms of shifting to decentralized approaches to wildland management, including participatory mechanisms with resident communities.
2. **Identification of the Global Environmental Benefits and/or Drawbacks of the Project.** The benefits to the global community from success are clearly identified, namely the long-term protection and maintenance of the wild flora and fauna unique to the greater ecosystems (Ecoregions) found in Senegal. This includes the biota of the coastal, estuarine, and riverine ecosystems targeted by the project. With project success, the global benefits will expand to regions beyond the four project field sites through demonstration and replicability.
3. **Fit of the Project within the Context of the Goals of GEF, Operational Strategies, Program Priorities, and relevant Conventions.** Project fits well within the goals, strategies and priorities of the GEF. It also fits well within the objectives and provisions of the Climate, Biodiversity, and Land Degradation Conventions.
4. **Regional Context and Replicability.** The project represents an important experiment in the design, testing, and application of new models for biodiversity conservation while fostering positive carbon balances, and the reduction of land degradation. It has a clear focus on poverty reduction and achieving more sustainable livelihoods. The selected project sites are reasonably similar to ecosystems found elsewhere in neighboring countries. Thus, the project is of direct interest and potential replicability to the greater region of West Africa.
5. **Sustainability of the Project.** The odds of achieving sustainability are reasonably high for several reasons. First, the project plans to extend over a 10-year period, allowing for meaningful M&E, and adaptive management. Second, plans include mechanisms for the self-finance of the protected areas, the community-managed

buffer zone reserves, and the village-level programs. Third, the project proposes to develop mechanisms to capture rents from the natural resources, and ways to distribute them so as to generate stewardship among local residents. Fourth, the project has the engagement of national, regional, and local government, NGOs, and local communities. And fifth, the sources of support are diverse suggesting broad-based involvement of donors and technical assistance groups.

6. **Contribution to Improved Definition and Implement of GEF's work.** Again, this project is an important experiment in the design, testing and application of current conservation theory and practice. The lessons learned from this project can have major implications for future GEF-supported projects. Unfortunately, while mentioned briefly early on in the project brief, the document does not expand on or explain how the "lessons learned" will be analyzed, synthesized, and then shared within and around Senegal, and beyond. This is an important point that warrants some further elaboration in the document.

### **Secondary Issues:**

7. **Linkages to other Focal Areas.** The project includes clear linkages to carbon management opportunities and the reduction of land degradation. One could imagine some specific reference to watershed management and water conservation.
8. **Stakeholder Involvement.** Efforts during the PDF B appear to have provided adequate involvement of stakeholders, particularly in the selection of the four project sites, in overall project design, and within the project sites. Then, the project brief provides for continuing and expanding stakeholder engagement in resource management, sharing in both the exercise of authority and responsibility.
9. **Capacity Building.** Generally, the proposal covers adequately the steps to be taken for building capacity at local, regional and national levels. I would like to have seen greater clarity on just how capacity will be built in the areas of "ecoregional planning", and management planning. This will be a massive effort requiring hundreds of trained individuals to meet project goals.
10. **Innovativeness of the Project.** As noted above, this project is clearly innovative in seeking to apply current science and practice in the biological, ecological, social, economic, and institutional aspects of wildland management. It is very ambitious and the risks are not negligible; however, by extending the work over 10 years, the odds are high for success.

### **Specific Comments:**

1. **Project Management Capacity.** The project features a very large number of activities in various geographic locations, with many communities. It is not clear to me who will actually work on the ground to work with all these communities, and how will they be trained? Surely, the project will require hundreds of workers trained in all the many fields involved. There must obviously be a sequenced series of training

activities to build the cadres necessary for implementing all the diverse activities. This is a potential bottleneck for project delivery unless well managed. It would be helpful to have a flow chart showing how the project planners envision building this capacity over a schedule consistent with plans for project implementation.

2. **Limited Entry.** In several places, starting on p. 8, para 18, there is reference to the problem of preventing settlement and entry into reserves and parks. In Annex XI. 1, reference is made to the "bias against non-resident transhumants." There is little chance of project success if the capacity to control land use is not established. Why not have a bias against non-resident mobile communities? Otherwise, as with earlier ICDP's and buffer zone projects, people will move into areas where livelihoods hold greater promise than their current situations thereby diluting project gains. This needs clarification.

3. P 9, para 21, has an apparent contradiction. **Poaching** has led to the disappearance of certain wildlife species...due in great part to various causes including "rigidity of the legal status of these areas." What does this mean?

4. P 11, para 30. **Transfer of Authority to local communities.** Later on p 18, point 1.3.2, transfer of authority and responsibility. Surely you mean this later throughout the document; that is, transferring only authority without responsibility lacks the *raison d'être* for decentralization and devolution – to promote stewardship.

5. P 12, para 37. **Perverse Policies.** The first sentence is very significant and warrants some explanation. The government removes subsidies for traditional agriculture and as a result pressures increase on wildlands by expanding extensive land uses. Why reduce the subsidies if they are perverse to biodiversity conservation?

6. P 15, para 51. **Lessons Learned.** Here and elsewhere, reference is made to lessons learned. This is a particularly important aspect of the project. There will be much learning. How will this be captured, analyzed, synthesized, and shared within Senegal and beyond? (see also p 21, para 71; p 24, para 84, etc.)

7. P 16-17, para 56. **Spatial Units.** This is a very sound scheme.

8. Same. **Village Territories.** The vision at the end of this paragraph is extremely optimistic!

9. P 18, para 60. **Eco-regional Planning.** Here and elsewhere reference is made to this approach to planning. Is it widely understood what this means? I doubt that many PA managers are aware of this; more known is the "ecoregion" scheme of WWF and employed by TNC as a useful way to classify units of land for conservation purposes. Perhaps a note is needed to explain the approach. Is it the same as "bioregional planning" as employed in Australia, west coast USA and Canada, etc.?

10. P 21, para 71. **Biodiversity Evolution.** The third sentence is not clear.

11. P 22, para 75. **Good, sustainable NRM.** Sounds rather subjective.

12. P 22, para 76. **Revenues.** How will local people pay for grazing and watering fees? Do they gain sufficient cash income?

13. P 24, para 83. **Feasibility Study.** Are there still more feasibility studies to come?

14. Annex II. Under Global Environment Objective paragraph, "...introduce eco-regional planning and buffer zone management principals in areas between Pas." This sounds like **corridors and connectivity**, which does not show up in the document until p 4 of Table IIa, and in p 3 of the GEF increment. Could use this language here and be more specific and direct. Packaging such an important concept under "eco-regional planning" obfuscates the point which has significant implications for land use planning.

15. P 3 of Annex II, under GEF Increment, second bullet: what are **PA resources** that can be equitably distributed? Good to list a few to avoid the impression that you mean extraction of timber, hunting, etc.

16. P 8 of Annex II, under Barrier Removal, ninth Bullet: suggests that there will be **hunting in PAs**. Would be good to explain which category of PA to avoid the impression that National Parks will be opened to hunting.

17. Annex III. Point 1.3, insert "and **responsibility**" after authority.

18. Annex III, p 10: **Overall Objective**. Correct word "generate".

19. P 25, 4.5.3. Not clear how to use M&E to adapt management, as presented here.

20. P 25, 5.1. **Inventory**. Who and how will all this inventory work be done?

21. P 25, 5.1.5. What does this mean?

22. Annex Via, p 36: The project calls for a very large number of **management plans**. Who will lead these exercises? How will they be trained? Are these local people, expatriates? This could easily become a bottleneck to progress.

23. Phase III. For VTs and CNRs, the language here says "provided with management plans." Surely you mean that they themselves will develop their management plans, no?

24. P 54. **Mining Policy**. You might want to reference the IUCN/World Commission on Protected Areas Policy on Mining and Protected Areas, and the IUCN Resolution on Mining and Protected Areas, Amman, Jordan, October 2000.

25. P 72. **Capturing Rents**. How will local people, the VTs and CNRs capture rents from ecotourism, hunting, and other fees? Especially if, as noted here, ecotourism expenditures are gathered as package deals in the home country of the traveler?

26. P 73. **Profits**. Still not clear from where the "profits" will come?

This is an outstanding project design, and I look forward to following its implementation.

## Annex IV b. Response to STAP Roster Review

The STAP review has recognized the innovativeness and scientific soundness of the project design. In addition, it has highlighted the project's fit with GEF program priorities; contribution to GEF's work; and the potential sustainability and replicability of the project. Several constructive comments were provided on improving the clarity of the proposal, and these have all been addressed in this revised proposal. These are :

- **Lessons learnt (point 6 of Key Issues, and point 6 of Specific Comments):** *How will the lessons learnt be analyzed, synthesized, and then shared within and around Senegal?* Already quite a lot of lessons learnt have been distilled into the innovative design of the project. Annex XI is devoted to summarizing these and showing how the project will build upon these lessons learnt. In addition, lessons learnt during project implementation will be distilled through the M&E processes (para. 84). An entire component (5) is devoted to synthesizing and disseminating these lessons learnt. The project's Scientific and Technical Committee (para. 80) will be instrumental in ensuring high quality analyses and syntheses, and in assisting in dissemination in scientific journals and professional networks (para. 71). The project will engage dedicated personnel for M&E (both project staff and in local communities), the details of which will be presented in the Project Document.
- **Linkages to watershed management and water conservation (point 7 of Secondary Issues):** Throughout the Brief, 'natural resources' refers to land, water and biological resources, and NRM refers to their management. As an integrated ecosystem management project, water resources and watershed management are included whenever there is reference to natural resources. Most of the activities will address watershed management as it is a major factor in drylands (e.g. output 2.4; and Component 3); water conservation will be a major issue in rehabilitation of vegetation (e.g. output 2.11).
- **Specific comments 1, 13, 20 and 22:** Details on operationalizing the project design (e.g. project staffing, sub-contracts, partnership arrangements, training modalities, who will lead what, etc.) will be detailed out in the UNDP Project Document (PRODOC). STAP review comments on scheduling of training are very constructive and will be taken into account in the PRODOC. This will be developed during a "feasibility" stage during approximately one month after Council approval of the project. These are not research or scientific studies, but standard consultations on operationalizing a project design.
- **Clearer definition of 'eco-regional planning' (point 9 of Secondary Issues; point 9 and 14 of Specific Comments):** This is a very good point as it highlights the different definitions that exist for this term. In the context of this project, the term is used to combine two different scientific streams : (a) classical regional planning (including economic stratification; regional land use planning; population and infrastructure nodes and links; etc.) and (b) bio-regional planning, (including corridors and connectivity between protected areas). The first aspect is currently part of government planning processes, however it does not incorporate biological and ecosystemic factors. Therefore, the project will incorporate these additional concepts into classical regional planning. This will indeed require considerable capacity building, which has been envisaged in components 2,3, and 4, but the focus in Phases 1 and 2 will be on demonstrating the eco-regional linkages only between two landscapes : Ferlo and Niokolo, where the highest linkages exist. In Phase 3, capacity building will continue as



needed and it is expected that the Government will continue to incorporate the approach in other landscapes. Annex XI now includes a section describing this approach, and para. 45, 56, 59, and 67 have been revised accordingly.

- **Concerns about capacity building:** Any project that intends to promote an innovative approach has to involve considerable capacity building. As the project is spread over 10 years, ample time is available to not only build the capacity in crucial areas (eco-regional planning; management plans for VTs, CNRs and PAs; innovative technologies; participatory M&E; etc.), but also to monitor the effectiveness of the exercise, and take remedial action where necessary. Most of the initial capacity building (Phases 1 and 2) will focus on building expertise within national ministries, regional authorities, Rural Councillors, protected area staff, and VT Councillors. This will be carried out first by international experts as trainers of trainers, and then by national and local experts for wider dissemination. Hands-on experience in developing land use and management plans will be crucial in internalizing this capacity at all levels. The project will provide long term technical advisors for this (national and where necessary international). Other beneficiaries in these early phases are local communities in the selected sites, and their capacity will be built through environmental awareness campaigns and hands-on experiences. These operational details will be finalized in the Project Document.
- **Greater clarification (Specific comments points 3,4,5,10,11, 17,18, 19, 21, 23,24):** All of these points are well taken and the relevant paragraphs and texts have been clarified and/or modified.
- **Limited Entry (point 2 of Specific Comments):** The reference to not having a bias against non-residents is based on experience in pastoral natural resource management projects elsewhere in the Sahel (e.g. northern Burkina) and in Morocco, where it has been shown that non-residents who traditionally have access rights must not be excluded. This does not mean that they are accorded the same status as residents, but that their rights and responsibilities should be clearly defined. Land users who have no traditional rights can only have access pursuant to negotiation with residents. The project will work to establish fair and equitable rights and responsibilities of stewardship.
- **Revenues (point 12 of Specific Comments):** The calculation of revenues from grazing and water fees in the Ferlo (para.76 and Annex XI) are based on estimated fees that stakeholders have agreed to pay, during the PDF B. This should be seen as a “willingness to pay” exercise, and final fee levels will be determined in a participatory fashion during project implementation. Livestock sales in the Ferlo are considerable, and the local economy is sufficiently based on a cash system to allow payment of these fees. A parallel GTZ project has had some initial success in ensuring collection and management of fees, and the GEF project will build on this important breakthrough.
- **PA resources (points 15 and 16 of Specific Comments):** The PA resources refer to all sustainable harvesting resources, such as fuelwood, non-timber products, medicinal plants, thatch, as well as hunting. The range and degree of utilization of these resources depends on the type of protected area (NP, SPR, WR, FR) and rules and regulations to be established in the management plans of these areas. This ranges from strict protection in core areas of NPs, to some form of sustainable harvesting of natural resources in the other categories.

- **Management Plans (point 22 of Specific Comments):** There will be different kinds of management plans covering Village Territories (mostly land use planning and zoning, access rights and responsibilities); CNRs in corridors and buffer zones (mostly boundary demarcation, access rights and responsibilities); and PA management plans (ranging from strict conservation to sustainable use regimes). These will be developed by relevant stakeholders : in VTs by village leaders in consultation with CERP and RCs; in CNRs by the latter and also in consultation with PA staff; and in PAs by PA staff and peripheral village leaders. Capacity will be built through national and some international expertise over the first 5 years. Details on how these will be done will be contained in the PRODOC.
- **Capturing rents and making profits (points 25 and 26 of Specific Comments):** Rents from eco-tourism refer to sharing park entrance and other fees between PA and peripheral VTs. Although most ecotourism is a package deal gathered in home country of the traveler, there is significant scope for income generation at the local level through : sale of crafts; offering touristic attractions, such as fêtes, dances and theatrical shows; and offering accommodation and other services. Other sources of revenue will be from granting controlled hunting licences (both for CNR and PAs), and from fines and confiscations. This has been clarified in Annex XI.

## ANNEX V: Details on Baseline funding for ongoing activities at project sites

Project Outputs Contribution to	Baseline Projects	Total Funding	Starting Year	Duration Year	Activities	GOS ( US\$ million)	Beneficiaries (US\$ million)	Development Partners ( US\$ million)	
		(US\$ million)						Costs	Institution
<b>Output 1: Policy and legal frame- work adapted to participatory IEM</b>					Planned				
<b>Subtotal O1</b>									
<b>Output 2: Sustainable development systems and community based natural resource management in Village Territories</b>	Promotion of Agricultural Intensification	7.100	On 1998	On 2003	Promotion of private and collective initiatives for agricultural intensification and transformation.	0.398	1.181	5.521	IDA
	Village Management and Organization	1.754			Restoration of the productive capacities of farmlands, and institutional strengthening of VT in Peanut Basin.	0.022		1.732	IFAD
	Agricultural Development in Matam (PRODAM)	3.771	03/93	7	PRODAM works in the northern Ferlo on the Senegal River to promote 1] food security and increase of income; 2]insertion of returning expatriates; 3] improved irrigation on small plots; 4] promotion of animal traction and diversification of agriculture; 5]livestock improvement and rangeland management; 6] strengthening Village organizations and capacities through a participative approach; 7] infrastructure development.	0.044		2.892	IFAD
								0.834	BOAD
	Improvement of Agricultural Services	84.141	On 2000	6	Reorganization of the Ministry of Agriculture and Livestock, improving the National Agricultural Researches Fund, supporting Counseling for the Rural World (ANCAR), and supporting peasant organizations	38.351		45.790	WB
	Rural Self-Promotion	2.122			Assistance to farmer's organizations in the Peanut Basin and capacity building on improved marketing and processing.	0.044		2.078	FRG / GTZ
	Rural Infrastructure	21.122	On 2001	4x3	Support for the process of rural decentralization, organization of a rural investment fund, rural roads, and monitoring and evaluation.			21.122	WB

Project Outputs Contribution to	Baseline Projects	Total Funding (US\$ million)	Starting Year	Duration Year	Activities	GOS ( US\$ million)	Beneficiaries (US\$ million)	Development Partners ( US\$ million)	
					Planned			Costs	Institution
	Village Self- Management and Dev	10.960			Strengthening capacities for economic planning, organization, and management of the VT and intensification of the agricultural production in the Peanut Basin.	1.478	0.244	7.998	IFAD
								1.240	BOAD
	Nat. Project to Fight Poverty	0.103			Stimulate growth with implementation of labor intensive micro-projects and community works. Improve the supply of basic social services and analyze the impacts of public policies on populations and encourage better coordination of social investments.	0.103			
	Local Development Funds	2.098	On 1997	4	Development and the implementation of municipal investment plan for Kédougou, and local development plans for its suburbs. Partnership with the Agency for Popular Credit to finance income generating activities in Kédougou.			0.254	UNDP
	Project to Fight Poverty	8.167	On 1998	4	Build capacity in government, civil society, private sector and local governments to better fight against poverty. This UNDP assisted project intervenes in Diourbel, Tambacounda, Dakar, and Saint Louis. With assistance from the LIFE program, a line of financing is provided for micro-credit for sustainable income generation. The project works through a partnership with the American Foundation for Development, the Senegalese Association for Credit support, and AFRICARE .	0.782		7.385	AfDB
	Rehabilitation of Borehole Equipment	2.433			Rehabilitation of 5 boreholes and promotion of community organizations for management in Northern Ferlo. Communities and government match funds to cover recurring costs.	0.114		2.319	Belgium
	Reinforcement of Borehole Management	9.914			Creation of boreholes, maintenance of the equipment, and training and sensibilization of the local communities in suburbs of Dakar.	0.141	1.620	8.153	CFD
	Fight Against Locusts (LOCUSTOX)	2.393			Locust control using chemical and biological methods, in all agricultural systems in the country.	0.015		2.378	Netherlands AIEA DPV

Project Outputs Contribution to	Baseline Projects	Total Funding (US\$ million)	Starting Year	Duration Year	Activities	GOS ( US\$ million)	Beneficiaries (US\$ million)	Development Partners ( US\$ million)	
					Planned			Costs	Institution
	Community-based NRM	10.836 (+1.000)	01/94	7	Assist 30 rural communities to identify decentralized approaches to and plan for effective natural resources management and stimulation of economic growth. The objective is to secure the participation of rural communities in the identification, planning, utilization, and protection of natural resources to : 1) define rural community management issues in a holistic framework; and 2) to make available to local government structures the means to strengthen their capacity for effective intervention. Some activities will be carried out in the UNDP-GEF project sites and these will be re-programmed to constitute co-financing for the project	1.639		5.788	USAID
	Pastoral Self- Promotion in the Ferlo	5.090 (+0.400)	On 1994	16	Strengthening educational system notably basic education and technical training for transhumants and agropastoralists; increase capacities for management of pastoral investments; institute a pastoral land tax; and assist in drought adaptation. The Project is at present in its 2nd phase ( 1999-2003 ) and covers mainly the northern and western Ferlo. Some activities will be carried out in the Sylvo-Pastoral Reserves which will be re-programmed to constitute co-financing for the project.	0.019		5.071	FRG / GTZ
	Forestry Sector Support Programme	9.995 (+0.594)			Project will improve planning, restoration and management of classified forests of Senegal with technical supports to Ministry and local governments. Some activities will be carried out in the UNDP-GEF Project Sites and will be re-programmed to constitute co-financing for the project.	4.386		5.609	Netherlands
	Self-Promotion of NRM	1.643			Improvement of the management of the natural resources in Sine Saloum through rural advisors, peasant associations and other village structures.	0.007		1.636	FRG / GTZ
	Support to Farmer Entrepreneurship	3.739	On 2000		Increase horticultural processing and marketing in Niayes, and some assistance to the regeneration of the filao ( <i>Casuarina equisetifolia</i> ).	0.354		3.385	CIDA
	Support Artisanal Fisheries	7.983	On 2001	4	Infrastructure improvement for artisanal fishing (loading and landing sites) along the "small coast" from Mbour to Ziguinchor, and in the islands of Saloum; training of fishermen organizations, and intensification of production.			5.029	EDF
	Saint Louis Fishing Complex	5.267			Rehabilitation of Saint Louis fishing port.			5.267	Japan

Project Outputs Contribution to	Baseline Projects	Total Funding (US\$ million)	Starting Year	Duration Year	Activities	GOS ( US\$ million)	Beneficiaries (US\$ million)	Development Partners ( US\$ million)	
					Planned			Costs	Institution
	Envrionmental Education and Information (PFIE)	2.770	1990	11	Environmental awareness and training program for schools, training of trainers in primary schools; development of environmental education tools and materials for teachers, school children, and parents; training for seedling, nurseries and school afforestation; exchange field trips in Sahelian countries for parents, school children, and teachers.			2.770	Japan
	National Forest Seeds (PRONASEF)	2.936			Research on forest seeds and seedlings quality and resistance to drought, and dissemination for better success in aforestation programs. Community training on nursery development and implementation. Creation of a selected national forest seeds and seedling stock.			2.936	Japan
	Research and development of improved bee keeping	0.329			Research on alternative options for bee keeping activities without fire, and dissemination of new adapted techniques on bee keeping along with incentives to adopt these new techniques.			0.329	Japan
<b>Subtotal O2</b>		<b>206.666</b>				<b>47.897</b>	<b>6.454</b>	<b>152.315</b>	

<b>Output 3: Conservation and sustainable management of Community Nature Reserves.</b>	Coastal Zone Reforestation	<b>9.888</b>	07/2001	5x2	The project objective is dune stabilization in the northern littoral zone (Zone des Niayes), which includes the regions of Thies and Louga, and aims to protect basins and wetlands and, as a consequence, will improve quality of life for local inhabitants. Measures will seek to minimize dune mobility. Protection of littoral belts consisting of 2,037 ha of dunes over a period of ten years by way of a contract with a private firm to stabilize dunes and protect basins and wetlands. The project is implemented in the context of climate change and specifically in relation to Article 12 of the Kyoto Protocol. About one fourth of the project will be redirected to address the UNDP-GEF project objectives, and therefore will count as co-financing.	<b>0.132</b>		<b>9.756</b>	JICA
<b>Subtotal O3</b>		<b>9.888</b>				<b>0.132</b>	<b>0.000</b>	<b>9.756</b>	

<b>Output 4: Sustainable conservation and co- management of natural resources in Protected Areas</b>	Equipment for Fighting Against Bush Fires	3.906			1] prevention of wild fires through awareness raising; 2] organization and equipment of village committees (hand tools) 3] opening firebreaks in PAs and VTs; 4] use of water cisterns where possible.	3.906			
	Rehabilitation of Niokolo-Koba National Park	0.608	05/1997	4	The project will create effective ecological, economic, institutional, and social management regimes for PNNK and its buffer zones, including : 1) rehabilitaton works for park infrastructure, 2) capacity building for national parks, 3) strengthening programs for enhanced tourism , 4) management of hunting in the buffer zone. Activities of the project meet some but nt all the infrastructure and capacity building needs of PNNK and cover only 16,000 sq. km. of rural communities in the northwest and southwest portions of the park.			0.608	FAC / FFEM
	Support to integrated NRM in the Niger and Gambia River Basins (AGIR)	3.877 (+1.105)	On 2000	4	Studies and evaluation of management of the biological resources of the PNNK; Investments in the improvement of infrastructures and equipments of the PNNK ; Support for socio economic activities and production intensification, elimination of illiteracy, improved communication. Some activities of this project will be redirected to address UNDP-GEF project goals, and therefore will count as co-financing.			3.877	CCE-8TH FED
	ENDA TM	N/A	Since 1977	Ongoing	Enda Energy is a program of the Enda Tiers Monde organization. Designed to promote efficient energy use through research and advocacy at all levels.				
	Centre of Ecological Monitoring (CSE)	N/A	Since 1989	Ongoing	GIS data base of Senegal for the National Program of Fight Against the Poverty; Long term studies of the state of environment and socio economic changes in the Kolda and Niayes regions after the reference studies of 1989 with Canadian cooperation.				

	DRPF / ISRA	N/A		Research on technologies for sustainable management of the natural resources concerning notably agro forestry, forest fallows, restoration of the soil fertility through leguminous plants, the rotation of crops, and other intensification techniques.				
<b>Subtotal O4</b>		<b>8.391</b>			<b>3.906</b>	<b>0.000</b>	<b>4.485</b>	

<b>Output 5:</b>	Fishery Research Ship	6.942	2000	Evaluation of species stock and environmental habitat evolution in industrial fisheries, marine ecological research, fish species migration studies used to determine fishing quotas.			6.942	Japan
<b>Participatory Monitoring and Evaluation of the ecosystems</b>								
<b>Subtotal O5</b>		<b>6.942</b>					<b>6.942</b>	
<b>TOTAL BASELINE</b>		<b>231.887</b>			<b>51.935</b>	<b>6.454</b>	<b>173.498</b>	



## ANNEX VI : PROJECT PHASES

Indicative benchmarks and financing plan for each phase are provided in Table VIa according to the major outputs of the project. The breakdown of measurable indicators per phase is given in Annex III (Logical Framework). The benchmarks and indicators will be fine-tuned if necessary during the feasibility study prior to project start-up. Table VIb provides a breakdown of the project financing according to the three phases and per output.

### Annex VI a. Phases and Benchmarks

PHASE (US\$ million)	OUTPUT 1	OUTPUT 2	OUTPUT 3	OUTPUT 4	OUTPUT 5
<b>ONE</b>	All legal and policy instruments established to encourage community based biodiversity conservation	100 VTs delimited, and provided with participatory land management plans.	CNRs legally established; protocols drawn up between VT and RC.	19 PAs mapped, boundaries marked, equipped with basic infrastructure.	Data bank on project sites designed and established.
<b>(3 years)</b>	Capacities for environmental impact studies created; EIAs systematically conducted prior to implementation of any new project	Capacity for eco-regional planning established and functional in RCs.	Capacity of local communities enhanced for adaptive planning , monitoring and enforcement	Capacity of PA, CERP, and other civil servants enhanced for co-management and eco-regional planning.	Monitoring protocols drawn up and initiated; baseline information on biodiversity in VT, CNR and PA exists.
<b>GEF = 4.000</b> <b>GoS = 2.350</b> <b>UNDP = 1.650</b> <b>EU = 0.900</b> <b>JICA = 1.100</b> <b>Dutch = 2.000</b> <b>Other = 2.500</b>  <b>TOTAL = 14.500</b>					

	<p>Appropriate models for local level micro-credit schemes created and tested.</p> <p>Pilot NRM activities not requiring prior removal of legal, policy and capacity barriers are conducted, using micro-credit where necessary.</p> <p>Sustainable harvesting regimes established for selected resources in CNR and PAs.</p> <p>Pastoral needs and issues integrated in all plans, including establishment of corridors.</p> <p>Design elements for early warning systems for fire management developed; eco-guards, PA agents and village vigilance committees trained through experiments and trials.</p>	<p>Study on integration of local knowledge in management plans completed and results incorporated into VT, CNR and PA plans.</p> <p>Biodiversity indicators also take into account local knowledge.</p>
	Environmental Awareness, training, information and communication programme is elaborated and initiated in all project sites.	
	Independent Monitoring and Evaluation at end of Phase 1.	

<p><b>TWO</b></p> <p><b>(4 years)</b></p>	Legal and policy changes disseminated to wide stakeholdership.	100 more VTs are delimited and provided with participatory land management plans.	20 CNRs delimited, and provided with participatory management plans that are integrated with VT and PA plans.	19 PAs provided with co-management plans, which are also adopted by local stakeholders.	A second inventory of biodiversity in all project sites conducted.
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**GEF = 4.320**  
**GoS = 2.357**  
**UNDP = 1.200**  
**EU = 0.205**  
**JICA = 1.100**  
**Other = 1.000**

**TOTAL =**  
**10.182**

	Transboundary agreements reached in the case of Niokolo-Koba	Local level micro-credit systems systematically applied in all 100 VTs. Micro-projects comply with participatory approved sustainable harvesting regimes and generate alternative income. Fire management and early warning systems in place and operational. Incidence of uncontrolled fire reduced by 50%. Mechanisms and incentives for financial sustainability of project activities tested.			VT, CNR, and PA management plans modified as required.
	Environmental awareness, training, information and communication programme continued and extended to 100 more VTs.				
	Analysis of interim lessons learnt carried out and disseminated within and outside project.				
	Independent Monitoring and Evaluation at end of Phase 2.				
<b>THREE</b>  <b>(3 years)</b>  <b>GEF = 1.400</b> <b>GoS = 3.609</b> <b>UNDP = 0.342</b> <b>JICA = 1.098</b>  <b>TOTAL = 6.449</b>	Legal and policy framework, including EIA system, reviewed and revised if necessary.	100 more VTs are delimited and development of participatory land management plans.	20 more CNRs delimited and provided with participatory management plans that are integrated with VT and PA plans.	Financial sustainability of all PA system assured.	A third inventory of biodiversity in all project sites conducted. VT, CNR and PA plans revised where necessary.
	Environmental awareness, training, information and communication programme continued and extended to 100 more VTs.				
	Analysis of all lessons learnt carried out and disseminated within and outside project.				
	Mechanisms and incentives for financial sustainability of project activities applied.				
	Preparation of total disengagement of project.				
	Independent Monitoring and Evaluation at end of Phase 3.				
<b>PDF B = 0.482</b>					
<b>GRAND TOTAL = 31.613</b>					

**Annex VIIb. Breakdown of project financing by output and by phase (in US\$ million)**

<b>Phase</b>	<b>Output</b>	<b>TOTAL</b>	<b>GEF</b>	<b>GOS</b>	<b>UNDP</b>	<b>EU</b>	<b>Nether lands</b>	<b>JICA</b>	<b>OTHER</b>
<b>ONE</b>	<b>1</b>	0.098	0.078	0.010	0.010				
	<b>2</b>	6.330	0.380	1.285	1.265		0.900		2.500
	<b>3</b>	2.762	0.612	0.100	0.350		0.600	1.100	
	<b>4</b>	5.120	2.800	0.920		0.900	0.500		
	<b>5</b>	0.190	0.130	0.035	0.025				
<b>Subtotal</b>		<b>14.500</b>	<b>4.000</b>	<b>2.350</b>	<b>1.650</b>	<b>0.900</b>	<b>2.000</b>	<b>1.100</b>	<b>2.500</b>
<b>TWO</b>	<b>1</b>	0.035	0.010	0.015	0.010				
	<b>2</b>	3.450	0.320	1.205	0.925				1.000
	<b>3</b>	2.300	0.740	0.210	0.250			1.100	
	<b>4</b>	4.202	3.100	0.897		0.205			
	<b>5</b>	0.195	0.150	0.030	0.015				
<b>Subtotal</b>		<b>10.182</b>	<b>4.320</b>	<b>2.357</b>	<b>1.200</b>	<b>0.205</b>	<b>0</b>	<b>1.100</b>	<b>1.000</b>
<b>THREE</b>	<b>1</b>	0.030	0.010	0.010	0.010				
	<b>2</b>	2.211	0.220	1.776	0.215				
	<b>3</b>	1.825	0.220	0.400	0.107			1.098	
	<b>4</b>	2.233	0.860	1.373					
	<b>5</b>	0.150	0.090	0.050	0.010				
<b>Subtotal</b>		<b>6.449</b>	<b>1.400</b>	<b>3.609</b>	<b>0.342</b>	<b>0</b>	<b>0</b>	<b>1.098</b>	<b>0</b>
<b>PDF B</b>		<b>0.482</b>	<b>0.350</b>	<b>0.081</b>	<b>0.051</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>GRAND TOTAL</b>		<b>31.613</b>	<b>10.070</b>	<b>8.397</b>	<b>3.243</b>	<b>1.105</b>	<b>2.000</b>	<b>3.298</b>	<b>3.500</b>

## ANNEX VII. Description of biodiversity status at Project Sites

### Site Selection

In 1998, during the formulation of the Senegalese biodiversity strategy and its action plan (BSAP), there was a consensus that more than 90% of plant and animal species, almost all endemics, and critical habitats are found in 4 major ecosystems in the country. The BSAP conservation priority entails protection and sustainable use of the habitats and species found in these four key ecosystems and to involve local communities in the care taking of biodiversity resources. Henceforth in 1999 and 2000 during the PDF B, participants at regional and national workshops followed suit to make and confirm original site selection to cover (a) most representative habitats of the country, (b) inside and outside protected areas boundaries, (c) in a manner to involve and entrust conservation of biodiversity primarily in the hands of adjacent communities to the protected areas, and (d) to provide global benefits from carbon sequestration. This is crucial as most threats to vegetation and globally significant biodiversity in Senegal originate from resource and land use by the villagers that surround protected areas, it is essential to improve productivity of the land and optimize resource use through community management. The critical habitats found in the four main ecosystems of the country are respectively: (1) steppes, grassland and woodland savannahs in the north and eastern region covering the Ferlo; (2) dry sub-guinean open forests in the south of the country around the Niokolo Koba National Park; (3) coastal and littoral habitats, also known as the Niayes ecosystem made of coastal dunes, which are located along the country's Atlantic coastline; (4) and the land and marine ecosystems of the Saloum Delta and Lower Casamance National Parks, whose habitats span from palm groves, bamboo groves, mangroves and wetlands.

The Table A7-1 provides a summary of the protected area status of these four ecosystems, and the samples selected for the first phase of the project. Table A7-2 provides the population, number of villages in the project area and the sample selected for the first phase. As a result of a GoS decision on 5<sup>th</sup> February 2001, the IEM project will focus its activities on sites and villages on terrestrial ecosystems. The following is a description of the four landscapes, their protection status, and the specific sites to be selected in Niayes and Saloum.

### Site I: Ferlo

The eastern Ferlo site has a total of 84 protected areas covering 4,156,680 ha of relatively undisturbed shrub savanna. The sample PA chosen in this site are : (a) the North Ferlo Faunal Reserve (332,000 ha), which is under DPN (Directorate of National Parks) management; (b) the South Ferlo Faunal Reserve (663,700 ha); (c) two adjacent classified forests (54,980 ha); and (d) 5 sylvo-pastoral reserves extending over a total of 1,514,000 ha. There are 14 other sylvo-pastoral reserves in western Ferlo. Depending on the soil and relief, species such as *Acacia senegal*, *Commiphora africana* and *Combretum glutinosum* appear and may even dominate. The most common grass are *Cenchrus biflorus*, *Schoenefeldia gracilis* and *Dactyloctenium aegyptium*. The lateritic Ferlo region shows a relatively dense tree stratum, dominated by *Pterocarpus lucens*, often in relatively pure formations. These are associated with other species such as *Acacia seyal*, *Combretum mivranthum*, and *Combretum nigricans*, depending on soils and relief. The soils are mainly of the ferruginous type over the entire area, with intersected sandy valleys and sandy clay depressions, adjacent to which the villages and camps are generally established. The lower vegetation stratum is dominated by *Loudetia togoensis* on gravel soils. Under normal rainfall conditions, these form pastures that meet livestock feeding needs, but bush fires destroy much of the grass biomass. Dry biomass production ranges from a maximum of 1,280 kg of dry matter per hectare in the Tiel pastoral

unit to 837 kg of dry matter per hectare in the Téssékéré pastoral unit. Average production revolves around 0.58 UBT per hectare while average real load is approximately 0.37 UBT per hectare (PRODAM, 2000). The vegetation in former stream valleys shows signs of the presence of important gallery forests up to a relatively recent past. These vast ecosystems are the only remaining locations in Senegal with wild ostriches, under severe threat. The Ferlo Reserves are also one of 12 sites in the world with Dama-Mhorr gazelles. The region also provides habitats and wintering grounds for several migratory palearctic bird species. The Ferlo reserves constitute preferred site for transhumant and sedentary pastoralism, particularly centred around waterholes. The Ferlo site includes 4 community reserves (RCs) with 162 villages and a total population of approximately 87,400. Bush fires are frequent in the Ferlo.

Several animal species have disappeared from the Ferlo including *Damaliscus lunatus*, *Gazella dama*, *Hippotragus equinus*, *Panthera pardus*, *Giraffa camelopardus*, *Crocodilus niloticus* and *Orycteropus afer*. The Ferlo area used to provide winter quarters for large herds of wildlife moving northward from the Niokolo-Koba National Park. These migrations were observed in the winter seasons and lasted until the end of the rainy seasons. The obstacles to wildlife migration from PNNK to the Ferlo area are related to: (1) extensive livestock often practised by farmers who kill wild carnivores to protect their herds and even herbivores for food; (2) encroachment on wild habitats by wells and boreholes with frequent breakdowns of equipment causing livestock concentration and overgrazing over several tens of square kilometers; (3) rapid drying of ponds with livestock concentration around remaining ponds; (4) implantation of new villages fragmenting the natural habitats for the migrating wildlife; (5) collection of ostrich and guinea fowl eggs; (6) capture of juveniles; and (7) late bush fires that destroy forage (PDF B, 2000).

The endemic plant species of the Ferlo are: *Abutilon macropodum*, *Digitaria aristulata*, and *Nesaca dodecandra*. The endangered plant species of the Ferlo that appear on the IUCN red lists are: *Justicia niokolo-kobae*, and *Digitaria aristulata*. Threatened animal species in the Ferlo reserves include: *Lycan pictus*; (African wolf), *Felis leo*; (Lion), *Taurotragus derbianus*; (Derby eland), *Syncerus caffer*; (Buffalo), *Hippotragus equinus*; (Roan antelope), *Hippopotamus amphibious*; (*Hippopotamus*, *Loxodonta africana*; (Elephant), *Pan troglodyte* (Chimpanzee), *Neotis cafra denhami*; (Denham bustard), *Bucorvus abyssinicus*; (Land calao), *Terthopius ecaudatus*; (Bateleur eagle), *Dendrocygma viduata*; (White-faced whistling duck), and *Polemaetus bellicosus*; (Martial eagle).

## **Site II: Niokolo-Koba National Park and surroundings**

Located in the south-east of Senegal, Niokolo Koba project zone has 6 PAs that occupy a total area of 2,981,250ha including the Niokolo-Koba National Park with an area of 913,000ha, which is surrounded by four Classified Forests (CF) covering 132,250 ha, and the Falémé Hunting Reserve covering 1,936,000 ha.. Niokolo-Koba National Park (NKNP) has been designated as both a World Heritage Site and a Biosphere Reserve. It is adjacent to the Badiar National Park in Guinea of a total surface area of 194,000 ha, both form a large ecological complex, that is one of the largest conservation area in west Africa. On the Senegalese side of the border, this ecological complex is girded by nine community reserves (CR) containing a total of 304 villages with a population of approximately 92,000 people. The sample PAs chosen for this project zone are : PNNK and 4 Classified Forests.

Niokolo-Koba comprises representative large extents of the savannas habitats of the country; and these are mainly grassland (dominated by *Andropogon* and *Pinnesitum*), shrubland (dominated by *Combretum glutinosum* and *C. nigricans*), open woodland (dominated by the woody *Bombax*, *Azelia*, *Pterocarpus*, *Xerroderris*; and *Diheteropogon* for grass species); and closed woodland (dominated by the following trees: *Pterocarpus*, *Terminalia*, *Erythrophleum*) savannas, and open (dominated by *Pterocarpus*, *Anogeissus*, and *Piliostigma*) and closed gallery forests, which make up to 78% of the Senegalese gallery forests.

Niokolo-Koba National Park contains 1,500 out of the 2,100 species of flowering plants known in Senegal. There are also 80 mammal species (out of 192 in Senegal), 330 bird species, 36 reptilian species, 2 amphibian species, 60 fish species and myriad of invertebrate species. Niokolo-Koba is also the last refuge for elephants in Senegal. It contains endemic and threatened species as follows. The endemic plant species of Niokolo-Koba are: *Acalypha senensis*, *Bauhinia senegalensis*, *Cyperus laberiticus*, *Ilysambles cangesta*, *Indigofera leptoclada*, *Lauvembergia villosa*, and *Naseae dodecandr*. The endangered plant species of NKNP, which appear on the IUCN red list, are: *Hygrophila micrantha*, *Justicia niokolo-kobae*, *Cyperus calocarpum*, *Indigofera leptoclada*, *Berhantia senegalensis*, *Measa nuda*, *Pavetta cinereifolia*, and *Striga bilabiaba*. The highly threatened animal species of Niokolo-Koba are: (for the mammals) *Lycaon pictus*; (wild dog), *Felix leo*; (Lion), *Taurotragus derbianus*; (Derby eland), *Syncerus caffer*; (Buffalo), *Hippotragus equines*; (Roan antelope), *Hippopotamus amphibious*; (Hippopotamus), *Loxodonta africana*; (Elephant), and *Pan troglodyte* (Chimpanzee); and *Neotis cafra denhami*; (Denham bustard), *Bucorvus abyssinicus*; (Land calao), *Terthopius ecaudatus*; (Bateleur eagle), *Dendrocygma viduata*; (White-faced whistling duck), and *Polemaetus bellicosus*; (Martial eagle) for the birds.

### Site III: Niayes Coastal Habitats

The Niayes are located along the northern coast of Senegal. They consist of a series of interdunal depressions bordered by coastal and continental sand dunes with sub-guinean climate that occurs only north of the 13th parallel. The Niayes project site has 8 PAs covering 29,411 ha of sub-guinean forests in the heart of the Sahel and includes six classified forests (CFs) covering 25,880 ha, two (national parks) NPs covering 2,720 ha, and one 16-ha botanical reserve. The area stretches over some 135 km along the Atlantic coast. With its humid climate of the sub-guinean type, the Niayes are characterized by a complex flora, unique in the Sahel with one of the highest occurrence of endemics in West Africa (Sambou, B.2000). The Niayes extends the coast of Senegal from Dakar to Saint Louis. They stretches over nearly 180 km and cover a narrow width from 30 to 35 km. The Niayes are bordered by eight community reserves (RCs) and have 449 villages with 200,500 people.

The sample of PA chosen in the Niayes site include 4 CFs and one Wildlife Reserve in terrestrial habitats characterized by a succession of dunes and interdunal depressions frequently containing ponds, that appear as the water table rises. The Niayes distinguish themselves from the rest of the country by a humid, maritime climate and strong, but relatively constant winds. The climate is of the sub-canary type, dominated by marine trade winds and the monsoon. Average yearly temperatures range between 23.7 and 27° C. Average rainfall varies from 300 to 500 mm, generally with a three-month rainy season. There is no specific hydrological regime in the Niayes. The depth of the water table varies between 0 and 60 metres, although there are areas where water is brackish to salty. Ancient sea arms have been transformed into depressions or lakes such as Lakes Retba, Tamna, Notto, Meckhé and Loumpoul-Kayar. Humid interdunal depressions alternate with the sand dunes, corresponding either to actual interdunal spaces or to traces of former hydrological networks. These low-lying areas are flooded by runoff from the water table during the rainy season. They dry up subsequently more or less rapidly according to their position. The hydrological regime often varies from one Niayes to the next, but in all of them the humidity level is particularly high. As a result, the Niayes region is a unique site, the richest one in terms of biodiversity north of the 13th parallel.

The dunes, which are sterile and active on the coast (white dunes), stabilize gradually as one progresses towards the interior (red dunes) with the appearance of a very fragile vegetation cover. In the interdunal depressions, the soils are rich and suited for the cultivation of vegetables and fruits, which constitute the

mainstay of the production system. The Niayes constitute the vegetable gardens of Senegal, and their productive environment integrates on-shore fishing, livestock farming and pluvial crops which are of major importance outside the flooded depressions during the rainy season.

The vegetation is of the sub-guinean type, with *Elae guinensis*, that dominates in the southern section of the Niayes. However the vegetation has been severely degraded due to human activities and droughts, which have now caused a drop in the water table level, gradual salinization and an acceleration of the encroachment on biodiversity rich dunes from cultivation of low-lying vegetables. Despite measures implemented to protect the area, the viability of these unique habitats remains uncertain. The Niayes habitats were originally abundant and very diversified, but their vegetation is in sharp regression, both in area covered and in the number of species.

The flora of the Niayes contains over thirty families for a total of nearly eighty broadly distributed ligneous species. The Niayes habitats contain nearly 20% of the entire flora of Senegal, a diversity level encountered nowhere else in Senegal nor north of the 13th parallel. Of the 31 plant species endemic to Senegal, 13 were found in the Niayes and 10 of them are threatened. The threatened species are: *Ceropegia praetemissa*, *Ceropegia senegalensis*, *Polycarpeae linearifolia*, *Polycarpon prostratum*, *Salicornia senegalensis*, *Lipocarpa prieuriana* var. *crassifolia*, *Scirpus grandispiscus*, *Scleria chevalieri*, *Eriocaulon inundatum*, *Rhynchosia albae-pauli*. The three endemic species, as yet not threatened, are: *Crotalaria sphaerocarpa*, *Urginea salmonea* and *Ficus dicranostyla*. The two species of the genus *Ceropegia* are also included in the 1996 CITES list. Two other non-endemic species (*Pluchea lanceolata* and *Digiraria arstulata*) are considered threatened in Senegal according to IUCN (1997 Red List).

The fauna of the Niayes is poor, probably because these habitats have already been severely degraded mainly in the northern section of the area, however, in the Gueumbeul Game Reserve and the Langue de Barbarie National Park, animal diversity is remarkable. The Gueumbeul Game Reserve is located near the coast, in the Rao District, some 12 km away from Saint-Louis. The Niayes are globally significant as a wintering area for thousands of birds, mainly waders. Important species found in the game reserve include the avocet (*Pluvialis squatorala*), the European spoonbill (*Platalea leucorodia*) and the greater plover (*Charadrius hiaticula*). The Langue de Barbarie National Park is located at the mouth of the Senegal River, 25 km south of Saint-Louis. It contains many marine avifauna, including numerous grey pelicans (*Pelecanus rufescens*), white pelicans (*P. onocotalus*), 3,000 pairs of grey-headed gulls (*Larus cirrhophalus*), the Caspian tern (*Hydroprogne caspi*), the royal tern (*Thalasessus maxims*), 2,000 species of slender-billed gulls (*Larus genei*), the Hansel tern (*Gelochelodon nilotica*) at the northern limit of its nesting area, the sooty tern (*Sterna fuscata*) and the little tern (*Sterna albifrons*) at the southern limit of its nesting area. The park is also a sanctuary for ducks and migratory waders. The marine fauna of the Niayes includes the green turtle, (*Chelonias mydas*), the leatherback turtle (*Dermochelys coriacea*), the loggerhead turtle (*Caretta caretta*) and the common dolphin (*Delphinus delphis*), all of them globally threatened and protected, which are sold for food on local markets and in the Saloum Delta.

The Niayes provide habitats both to a number of endemic species and globally threatened species included on the IUCN Red List. The threatened species are: *Ceropegia praetemissa*, *Ceropegia senegalensis*, *Polycarpeae linearifolia*, *Polycarpon prostratum*, *Salicornia senegalensis*, *Lipocarpa prieuriana* var. *crassifolia*, *Scirpus grandispiscus*, *Scleria chevalieri*, *Eriocaulon inundatum*, *Rhynchosia albae-pauli*. The three endemic species, as yet not threatened, are: *Crotalaria sphaerocarpa*, *Urginea salmonea* and *Ficus dicranostyla*. Two other non-endemic species (*Pluchea lanceolata* and *Digiraria arstulata*) are considered threatened in Senegal according to IUCN (1997 Red List). Important species found in the protected areas of the Niayes include the avocet (*Pluvialis squatorala*), the European spoonbill (*Platalea leucorodia*) and the greater plover (*Charadrius hiaticula*).



The endemic plant species found in the Niayes are: *Ceropegia pratermissa*, *Crotalaria sphaerocarpa*, *Ficus dechranostyla*, *Laurembergia villosa*, *Lipocarpa priemiana*, *Polycarpaea linearifolia*, *Rhonchosia alba-pauli*, *Sakucarnia senegalensis*, *Scirpus grandicuspis*, *Urginea salnidea*, and *Vernonia bambilarcensis*. Threatened bird species found in the Niayes include: *Pluvialis squatorala*; (Avocet), *Platalea leucorodia*; (European spoonbill), *Charadrius hiaticulata*; (Greater plover), *Pelecanus rufescens*; (Grey pelican), *Pelecanus onocrotalus*; (White pelican), *Larus cirrhophalus*; (Grey-headed gull), *Hydroprogne caspi*; (Caspian tern), *Thalasessus maxims*; (Royal tern), *Larus genei*; (Slender-billed gull), *Gelochelodon nilotica*; (Hansel tern), *Sterna fuscata*; (Sooty tern), and *Sterna albifrons*; (Little tern). The threatened turtles found in the Niayes are: *Chelonias midas*; (Green turtle), *Dermochelys coriacea*; (Leatherback turtle), *Caretta caretta*; and (Loggerhead turtle). Also the common dolphin, *Delphinus delphis*, is threatened and found in the Niayes.

Based on a GoS proposal, this project will concentrate on the in-land (red dune) areas as well as the Wild Reserve of Guembeul, while all other coastal areas will be included in the GEF/WB CZM project.

#### **Site IV: Saloum Delta and Lower Casamance National Parks**

The second project site cover both the Lower Casamance and Saloum Delta National Parks and their vicinities. The Lower Casamance National Park (5,000 ha.), the last rainforest in Senegal. It is home to over 50 mammal and 200 bird species. There are monkeys, such as Campbell's and the colobus monkeys, and several species of antelopes, such as the yellow-back duiker. The park also provides important nesting grounds for many bird species and a refuge for several eagle species. Biodiversity degradation in the Saloum Delta originates from overgrazing, logging, erosion, bush fires and drought.

The Saloum Delta National Park (SDNP) extends over a total area of 180,000 ha consisting of three major habitat types: (a) mangroves and wetlands, (b) dry forests and savannas, and (c) the ocean, estuarine delta and islands of sand strings. The park is part of the Saloum Delta Biosphere Reserve. It is covered on two thirds of its territory by the largest mangroves in Africa. These mangroves serve as regulators for floods and tides. They also provide reproductive habitats for numerous species of fish, dolphins, sirens, waterfowl and palearctic migratory birds. The park has also been designated a Ramsar site. Not far from the Saloum Delta National Park is located the Keur Samba Dia Biosphere Reserve (800 ha). Also 4 Classified Forests (CF) are adjacent to the SDNP covering 53,140 ha, in addition to coastal and insular areas that are contiguous to the park. The agricultural system is characterized by a southern multi-cropping regime, with pastoral, fishing and hunting activities on the increase due to favourable arable soils and better rainfall patterns than in the rest of the country. The complex consists of three Community Reserves (CR) with 99 villages surrounding the Saloum Delta National Park, with a population of 45,800. Despite numerous and intense anthropogenic pressures, the site still contains a number of endemic species and globally threatened species. Three of the 31 species endemic to Senegal can be found in the area. These endemics are *Lipocarpa priemiana*, *Scleria chevalieri* and *Ficus dicranostyla*. Threatened and rare species are (IUCN 1999 list): *Eriocaulon inundatum*, *Hygrophila micrantha*, *Uvaria thomsasii*, *Kigelia africana*, *Albizzia ferrutinea*, *Treculia africana*, *Pouchetia africana*, *Fagara rubescens*, *Parinar excelsa*, *Diospyros frrea*, *Mesneurum benthamianum*, *Tetrapleura tetraptera*, *Malacantha alnifolia*, and *Bridelia micrantha*.

Mangroves extend over 75% of the surface area of the Delta of Saloum National Park. Mangroves occupy part of the estuary (muddy grounds under daily tide influence) and grows in the intertidal zones, in particular in the low muddy sections of the channels. Its flora consists essentially of *Rhizophora racemosa* and *Rhizophora harissonii* (large trees bordering the bolongs), *R. mangle*, and *R. racemosa*, *Avicennia africana* and *A. nitida*. *Laguncularia racemosa* and *Conocarpus erectus* are considerably less represented and occupy an area exceptionally flooded by syzygy tides. There are also salt-tolerant vegetation (*Sesuvium*

*portulacastrum* and *Philoxerus vermicularis*). The southern part of the mangroves is luxuriant, particularly well protected and contains tall mangrove trees. It provides resting and sleeping shelter for many bird species. It is also a refuge for several animals, such as hyenas, and spawning and feeding grounds for fish.

The dry forests and savannas of the Delta of Saloum National Park are characterized by the presence of Guinean species in a biogeographically Sudanian area. These habitats consist mainly of gallery forests, open forests, savanna woodland and shrub savanna. The Fathala Classified Forest is the most important forest formation. The most common species of upland trees include: *Daniellia olivieri*, *Pterocarpus erinaceus*, *Prosopis africana*, *Terminalia macroptera*, *Lannea acida*, *Cordyla pinnata*, *Bombax costatum*, *Khaya senegalensis*, *Parkia biglobosa*, and *Sclerocaria birrea*. There are also *Azelia africana* and *Ceiba pentandra*.

The islands of sand strings and terraces contain diversified flora with Guinean species at the northern edge of their distribution area. The *Phoenix reclinata*, *Lophira lanceolata* and *Prosopis africana* stands found there are probably the last ones in the country and the sub-region. According to Lykke (1996), in the Fathala forest, there are at least 400 plant species, 160 tree species belonging to 39 families. The most diversified families are Moraceae (13 species), Cesalpiniaceae (12 species), Mimosaceae (11 species), Combretaceae (11 species), Anacardiaceae (8 species), Rubiaceae (6 species), Euphorbiaceae (6 species), and Meliaceae (5 species). There are also wildlife species dependent upon terrestrial plant formations, except for the clawless otter (*Aonyx capensis*), the marsh mongoose (*Herpestes paludinosus*), the African green monkey (*Cercopithecus aethiops*) and, obviously, the manatee, all of which have adapted to mangrove formations (A. Dupuy, 1982).

In the waters of the three delta/sea arms of the Saloum Delta, fish populations are dominated, both in numbers and in biomass, by a small number of species belonging to the *Clupeid*, *Pristigasterid*, *Gerreid* and *Carrangid* families. They are essentially estuarine forms of marine and estuarine fish species (as defined by Albaret and Diouf, 1994). Specific abundance is relatively high in the Saloum Delta, as evidenced by a comparison of the number of species recorded in the Saloum Delta and the numbers observed in 60 estuarine and lagunar environments world-wide which shows only six of those with higher specific abundance (Diouf, 1996).

The most diversified fish families found in the estuaries of the delta are *Carrangid* (11 species), *Mugilid* (7 species), *Haemulid* (6 species), *Cichlid* and *Clupeid* (4 species each), followed by *Ariid*, *Cynoglossid*, *Dasyatid*, *Ephippidae*, *Polynemid*, *Soleid* and *Sparid* (3 species each). Another factor accounting for the wealth of species in the delta is the high habitat diversity (major arms, numerous *bolongs* of all sizes, presence of mangroves on certain banks and absence on others, diverse bottom sediment, and space and time variations in physico-chemical factors).

Fishery resources include marine vertebrates, consisting of fish (cartilaginous and bony) and mammals. Cartilaginous fish (sharks and rays) are represented by 80 species belonging to 30 families. Bony fish (*teleosteans*) number nearly 470 species and 110 families. Inventoried marine mammals include whales (*Balaenoptera*), dolphins (*Delphinus tursiops*) and manatees (*Trichechus senegalensis*). Other mammals species were also observed (in this Senegalese designated exclusive economic zone of the delta), such as porpoises, pilot whales (*globicephales*) and monk seals.

Marine invertebrates (molluscs and crustaceans) are represented by bivalve, gastropod and cephalopod species. Among the crustaceans are some fifty species of lobsters, crayfish, slipper lobsters, shrimp, crabs and stomatopoda. However many marine species are still little known mainly due to their current lack of economic interest. The species populating the deep ocean floor (lower edge of continental slope and large abyssal plain) have not been inventoried as these depths are thought to be poor in biological resources. The

littoral fringe area also contains several marine invertebrate groups which have been the subject of very few inventories (sponges, sea cucumbers, sea urchins, starfish, corals, molluscs and various coelenterata).

Three fish species or groups of species have disappeared or have become extremely rare: the tarpon (*Tarpon atlanticus*), the sawfish (*Pristis spp*), and the straw-fish (*Rhynchobatus lubberti*). This is probably linked to fishing pressures, all the more so as the last two species have low fertility and very long gestation periods. Some species have become rare, including: (1) manatees, decimated by human populations but also impacted by the disappearance of fresh water resurgences; (2) *Lisa bandialensis*, formerly very abundant according to fishermen, but currently limited to a few (2 or 3) bolongs, the main one being that of Baguadadji. This species is highly dependent on fine sandy sediment and would be endemic to the Sine Saloum; (3) red carps (or yaakh) and groupers (*Epinephelus aenus*) or Thiof, highly sought after by Senegalese consumers, and almost as much *Lutjanus spp*, also in marked regression.

Several littoral species around the Saloum Delta have decreased in numbers. This is true particularly of sharks, *Caranx hipos*, *Tilapia guineensis* and turtles. The reduction in numbers of marine turtles is linked to disturbances in their nesting areas and their overexploitation. It should also be noted that within the Saloum Delta, these are protected species, but that they are nevertheless captured, sold and eaten by local populations. Sharks and rays, whose fins have a high commercial value, are subject to intense fishing pressures.

Endemic plant species in the Saloum Delta are: *Alechva basserei*, *Crotalaria aphaerocarpa*, *Eriocanlan inumdatum*, *Ficus dichanostyla*, *Laurembergia villosa*, *Lipocarpa priemviana*, *Polycarpaea linearifolia*, and *Scirpus grandicuspis*. Endangered and IUCN red listed plant species for the Saloum Delta site are: *Hygrophyla chevalieri*, *Livaria phomasii*, *Scleria chevalieri*, and *Lipocarpa prienriana*. Highly threatened animal species include: *Caranx hippos*; (Shark), *Trichechus senegalensis*; (Manatee), *Souza teuszii*; (Hump-backed dolphin), *Delphinus delphis* (Common dolphin), *Delphinus tursiops*, *Balaenoptera* (Whale), *Aonyx capensis*; (Clawless otter) *Herpestes paludinosus*; (Marsh mongoose), *Cercopithecus aethiops* (African green monkey). The endangered fish species are: *Tilapia guineensis*; (Tilapia), *atlanticus*; (Tarpon) *Pristis spp*; (Sawfish), *Rhynchobatus lubberti*; (Strawfish), *Lisa bandialensis*, *Epinephelus aenus* (Grouper), *Lutjanus ssp*.

Based on a GoS proposal, this project will select villages and landscapes in the dry savanna and mangrove habitats only, leaving the remainder for the GEF/WB CZM project.

**Table A7-1: Protected Areas in 4 project sites, and sample chosen for first phase of project.**

Ecosystem	National Parks		Classified Forests		Wildlife Reserves		Biosphere Reserves		Sylvo-pastoral Reserves		TOTAL
	No.	Hectares	No.	hectares	No.	hectares	No.	Hectares	No.	Hectares	Hectares
Ferlo			2	54,980	2	995,700			80	3,106,000	4,156,680
Niokolo	1	913,000	4	132,250	1	1,936,000					2,981,250
Niaye	2	2,720	6	25,875	2	816					29,411
Saloum	1	180,000	4	53,140			1	800			233,940
TOTAL	4	1,095,000	16	265,449	4	2,932,516	1	800	80	3,106,000	7,401,281

Project Sample											
Ferlo					2	995,700			4	1,514,000	2,509,700
Niokolo	1	913,000	4	132,250							1,045,250
Niaye			4	22,462	1	800 <sup>4</sup>					23,262
Saloum	1	100,000 <sup>5</sup>	3	2,340							102,340
TOTAL	2	1,013,000	11	157,052	3	996,500			4	1,514,000	3,680,552

<sup>4</sup> Sample site covers only the Wildlife Reserve of Gueumbeul, which contains the northern most population of mangroves in Africa.

<sup>5</sup> Sample site covers only the continental parts of the Park, including mangroves.

**Table A7-2 : Villages and populations in 4 project sites, and sample selected for first phase.**

<b>Ecosystem</b>	<b>Estimated Population</b>	<b>No. of Villages</b>	<b>No. of Community natural Reserves</b>
Ferlo	87,400	162	
Niokolo	92,000	304	
Niaye	200,500	449	
Saloum	45,000	99	
<b>TOTAL</b>	<b>424,900</b>	<b>1014</b>	

<b>Sample for project</b>			
Ferlo	8,700	15	6
Niokolo	9,200	30	5
Niaye	20,000	45	5
Saloum	4,500	10	4
<b>TOTAL</b>	<b>42,400</b>	<b>100</b>	<b>20</b>

## ANNEX VIII: Detailed Socio-Economic Context of the Senegal Protected Areas Project

### I. Introduction

Four sites have been selected for the implementation of the Senegal protected areas project. These sites are the following: (a) Ferlo Game Reserves and vicinities; (b) Niokolo Koba National Park and surroundings; (c) the Niayes coastal habitats; and (d) Basse Casamance and Saloum Delta National Parks and adjacent areas. This annex presents the socio-economic context for each of these four project sites, and some concluding remarks.

### II. Ferlo Game Reserves and Vicinities

The first Senegal protected areas project site is centered around two Ferlo Game Reserves, one in the north and the other in the south, and it also encompasses four community reserves (CRs) and 162 villages with a population of 87,400. The Ferlos and their surroundings constitute the livestock center for Senegal, and they are known as the sylvo-pastoral zone. Over the past five years, the Ferlo have contained 676,000 heads of cattle, 1,096,000 sheep, 96,000 horses and 78,000 asses, on average.

Traditional socio-economic activities of the sylvo-pastoral zone revolve around three main axes: livestock, agriculture and tapping of Arabic gum. However the situation is more complex, as these three axes can be combined with two distinct lifestyles the sedentary and nomadic ones. On the one hand people like the Wolof, Toucouleur and Sarakollé are sedentary and they cultivate by clearing the land; and on the other hand there are nomadic Peuhl, who are transhumant pastoralists. Indeed, this is an oversimplification, as the first lifestyle does not exclude livestock production, and the second one implies forest clearing to some extent, as the some motivated pastoralists of the Ferlo also practice crop farming. The Peuhl of the Ferlo sylvo-pastoral zone complement their livelihood through livestock farming that provides a relatively important share of their subsistence. Crop farming, essentially of grain, is the mainstay activity that allows sedentarians to meet their basic needs. Gathering and collecting gum Arabic from acacias (*Acacia senegal*) complement the income of sedentary and nomadic households. The two Ferlo reserves hold together an intricate socio-economic system that is hinged around livestock that make movements between the northern and southern reserve, following rainfall patterns, availability of forage and water, cereal cultivation cycles, and tapping activities for the collection of Arabic gum.

First of all, livestock is accorded greater value than any other economic activity in the sylvo-pastoral zone, as livestock is the preferred way of saving wealth and regulating social relationships. Besides sedentary livestock, there is the traditional pastoralism, that is characterized by continuous mobility of the animals and people as a strategy for risks abatement. Risks are linked to climate, health, policy and environmental conditions that often happen to be harsh. Fortunately livestock movements are well adapted to the stress from the Sahelian environment, as a land use strategy transhumance makes the most out of the potential and biological diversity of the Sahel. In addition, it provides pastoralists with the opportunity to enter into exchange relationships with farmers and to take advantage of the various local markets, found along their transhumance path, to sell livestock products and by-products (milk and dairy products) wherever needed.

Livestock plays a central role in pastoral activities, it ensures food and income. Also livestock plays a crucial role in regulating the constitution and dismantlement of the social groups in that it structures all exchanges, such as gifts, loans and other forms of mutual aid. Herd management based on mobility (nomadism and transhumance) result in regrouping the animals when environmental constraints are acute, and oblige the herd to move away, where water and forage can be found. Pastoralists with large herds tend to keep their animals away from crop areas and their home base of origin. Transhumant households that possess several hundreds of heads of cattle (or small ruminants) settle with their livestock close to large ponds/ waterholes and devote all of their time to pastoral activities. For these groups, the herd locations vary from year to year depending on resource availability; on the contrary, the vast majority of farmers are sedentary.

Transhumants as well as sedentary farmers cultivate cereal crops, while they look after their herds. Herds are actually under strict supervision only at night. In the day time, cattle are not closely watched, and the farmers as well as the transhumants take care of their crops. The animals are generally left free to graze but away from the fields. At the end of the day, the shepherd bring livestock back to camp. Then, after the evening meals, herds are taken back to pasture and they are watched by another shepherd, who returns to camp in the early morning. During the entire wet season, animal movements remain circumscribed to the camp vicinity. The water resources and pasture lands available within 4 to 5 km around the living quarters are generally sufficient to meet livestock needs. During the wet season, livestock is often brought to the Waalo areas to lick salt.

At the end of the wet season, waterholes dry off and cause changes in the herd movements. Movements become increasingly long and stressful as forage reserves are depleted. While the transhumants move, the sedentary farmers do not move during the dry season. Also certain groups of transhumants elect to stay, and their cattle use their fallow fields to fertilize the soil. Immediately after the harvest, young herders build shelters in the fields (one or two huts made from millet stalks covered with straw). In the evening, the animals are gathered on a specific section of the field. In order to keep the herd together during the night, some herders make fire in the middle of the field, while others tie up the calves to tree stumps with ropes. The herd is moved periodically from one section of the field to the other in order to fertilize the entire parcel. When the livestock belongs to the sedentary field owner, the animals are kept in the field until sowing. When the herd is transhumant, land fertilization may cease sooner due to the depletion of forage or an elder decision to move to other areas that have received early rains.

During the dry season, nomadic people generally apply the “centrifugal grazing method” which consists in making the livestock to graze the periphery of the boreholes, and in letting it move gradually to more remote areas, far away from waterholes. Thus, as soon as the ponds dry up, most pastoralists leave their wintering sites to move closer to permanent water supply points. This would shorten the distance to be covered from the watering point to the grazing grounds, thus leaving more time to search for food. Centrifugal grazing allows to limit waste, which are caused by trampling the soil in the paths that lead to the waterholes. Land use in the sylvo-pastoral systems of Senegal is organized around water for livestock, and it pays attention to a careful use of the land around the watering point.

Access to the remote dry-season pastures is facilitated by a hydraulic infrastructure along the transhumant pathways. Several boreholes were placed in service over the past decades. Also cemented wells were constructed, most of them at the pastoralists’ initiative but with support from the Water Department and NGOs. The increased water supply brought about improved control and land management, with the advantage of reducing the distance the herds need to cover between each watering. The disadvantage is that the enhanced availability of water attracts

numerous pastoralists from surrounding areas, resulting in the overgrazing and saturation of the space in the well-watered sectors, while other places remain practically unused. Competition for access to water and pastureland between the sedentary and nomadic pastoralists is particularly keen around certain boreholes, e.g. at Ranérou, Gaay Kaadar, and Luumbi. Around these watered sectors, transhumant herders set up their temporary camps 10 to 15 km away from the borehole, and they get readily access to good pastures and still get access to the waterhole within a walking distance for the livestock. However, the sedentary pastoralists claim that this transhumant strategy is conducive to the reduction of overall pastoral space. Sedentary pastoralists, while recognizing that they cannot legally oppose the seasonal settlement of transhumants on their territories, they complain with despair of the influx of transhumant livestock that come to pasture their rangelands and depart when there is no grass left, leaving the land and their own livestock in poor conditions. In the south-eastern of the sylvo-pastoral area, more particularly in Lambango and Denndudi, measures have been taken to regulate the movements of outside herds. The Egge Egge and alike transhumant herders arriving in large numbers during the dry season are restricted to a few sectors, and they are not allowed to access the best available grazing grounds. This confines the transhumant livestock on a relatively small portion of the territory, leaving sufficient grazing area for the sedentary users.

In other areas, sedentary users do not seek to penalize the transhumant newcomers, but they organize themselves to prevent competition among themselves. Such a competition might prove favourable to incoming herds. At Gaay Kaadar, Njayeen Fuuta and Ranérou, for example, newcomers must use pre-existing camps or settle in harvested fields and refrain in any event from settling near farmed pasturelands. In order to circumvent the control exercised on land by sedentary users, some Egge Egge transhumants go to the Water and Forestry Department in charge of the wildlife/game reserves to request permission to use these public grounds. Granting permission to graze on public grounds has drawn protests from the sedentary pastoralists, who have demanded that local regulations be followed, even in the public grounds. Conflicts over pastureland and waterholes between local and outsiders remain unresolved and dormant, and on and often incidents flare-up and cause grievance between sedentary and transhumant herders.

The traditional livestock systems here have evolved from experiences gained from transhumant to sedentary and vice-versa. As an example, according to sedentary pastoralists, the increase in the number of sheep and goat herds is due to the massive influx of Waalwaalbe families, traditionally specialized in sheep and goat farming. Since the climate crisis of 1972-73, these transhumants have settled in the area, although without fixed camps. Their nomadic lifestyle, even restricted, and the perpetual mobility of the herds explain, to a large extent, the good results of this system of animal farming. Their successes have motivated sedentary livestock farmers to start raising, with restricted mobility, sheep and goats. This situation has been also in response to the dramatic droughts that occurred in the area over the past few years. Indeed, repeated droughts have proven the remarkable resistance of small ruminants, their ability to recover and grow rapidly in numbers, and their contribution for food and commercial purposes. Pastoralists willingly recognize the advantages of small livestock production. Sheep and goats serve as a short-term investment within family farms, both a highly profitable and easily realizable one. This livestock is present in all categories of farms and constitute a means, according to the classical scheme, to reinforce the cattle herds or to limit their expansion.

Cattle raising can contribute to the inception and development of smaller ruminant farming. Indeed a number of households have purchased small ruminants with the proceeds from the sale of cattle or by exchanging cattle for sheep/goats. Small ruminant farming constitutes a means to protect the income derived from gathering activities and sales of surplus crop production. If small ruminant farming appears very interesting under present conditions, its development is



nevertheless difficult because of diseases and herding style. Contrary to cattle which is allowed to graze freely most of the time, smaller livestock must be strictly controlled throughout the year. The generalized presence of crops around camps requires close surveillance of sheep and goats during the growing season. These also need to be closely watched during the other seasons because of predators such as hyenas and jackals, and to limit the risks of theft. For these very reasons, small ruminants are taken back to the camp at the end of the day and gathered in pens close to human quarters for the night.

Extensive livestock farming is practised in the Ferlo region, with transhumance varying in range and in duration according to availability and quality of water and therefore of rainfall regime. During good rainfall years, the livestock is concentrated around the ponds where forage and water are to be found. Hamlets become established in the vicinity of large ponds, with subsistence (grain) and commercial crops that are marketed weekly. Animal farming are concentrated first around ponds before moving toward permanent water points as the rain generated ponds dry up. Then livestock concentrations become so high that large degraded areas are found over a radius of several kilometres around the wells and boreholes. The degradation of the sylvo-pastoral ecosystems is compounded by frequent breakdowns of hydraulic equipment resulting in higher herd concentration, hence more severe degradation of the vegetation cover. As a result, the grazing grounds around the boreholes are of poor quality. The toxic and neglected plants by the animals, such as *Calotropis procera* and *Ademium obesum* strive and expand to reach hundreds of hectares at places. To solve this problem, large herd owners chose transhumance as a strategy, with departures generally linked to the quality of local winter conditions. During rainy seasons, the abundance of forage and availability of water in the ponds allow livestock farmers to keep their herds longer in the Ferlo region. At the same time they remain confident that when the rain dry out in the Ferlo, they would still find enough water during the long trek southeast to the Niokolo-Koba National Park. However delayed departure from the Ferlo imposes strong pressures on the sylvo-pastoral ecosystems and along the transhumance corridors. This also leads to conflicts with sedentary farmers in the villages located along the transhumance corridors, whose resources are taken away as a result of the large numbers of livestock that exceed rangeland carrying capacity. Such conflicts are frequently the cause of numerous arson fires set either by sedentary populations to save their water supply or by transhumants as a reaction to the opposition manifested by the sedentary farmers.

On the contrary, less rainfall in the rainy season induces an early departure from the Ferlo region to ensure the herds will still find water in the ponds along the transhumance pathways. The early transhumance movements reduce degradation of rangelands in the Ferlo and along the transhumance corridors, but they transfer the pressures to the Niokolo-Koba National Park where large transhumant herds reside over a longer period of time, with negative consequences on wildlife such as poaching and competition for food and water, including mutual contamination and spreading of disease between domesticated livestock and wildlife due to the use of the same water points.

Another movement of transhumance in the Ferlo poses threats to ecosystem and biodiversity conservation. It concerns the herds from the Niayes and the lateritic Ferlo that move into the sandy Ferlo areas. This erratic transhumance is unorganized and becomes essentially nomadism, where the herds roam haphazardly the land in search of forage and water, selecting the best pastures. Such nomadic movements may even force the larger herds to leave the Ferlo area early in the season, even under good rain conditions. The consequences of this type of transhumance include excessive pruning of certain woody species such as *Pterocarpus lucens* and *Pterocarpus erinaceus*, trampling of the soil and grass cover, and excessive tapping of the acacias (*Acacia senegal*) for Arabic gum which the transhumant herders sell for additional income. In many

areas, the impact of grazing results in favouring the growth of invasive thorny species, that degrade the pasturelands.

New settlements by incoming migrants and their clearing of valley-bottom land for cultivation as well as exploitation of Arabic gum are causing loss of wildlife habitats. Despite that Senegalese Law prohibits new settlements in reserves, people are not abiding by the Law. Also anarchic well permits in the reserves have attracted migrant populations to settle permanently in these away from authorized transhumant corridors, and that is causing more wildlife habitat loss or degradation. In the northern Ferlo, transhumants are coming from everywhere, including Mauritania, and they settle down anywhere regardless of the Law. In the south, new settlements are blocking the paths used by the wildlife migrating from and back to the Niokolo Koba National Park (NKNP). Finally transhumance corridors to the PNNK are subject to poaching on wildlife by transhumant herders to feed themselves and to protect their livestock.

The second major axis for socio-economic activities in the Ferlo is the tapping of Arabic gum from Acacias, especially *Acacia senegal*. At the end of the rainy season, farmers identify plots inside and outside the Ferlo Game Reserves, where they tap Arabic gum from the tree that are ready for exploitation. People pay attention not to have uncontrolled fires that would burn the trees being tapped, hence gum exploitation combats bush fires. It also combats overgrazing, mostly from small ruminants, that may strip out the bark of the Acacias being tapped. Unfortunately, when large herds of transhumant livestock reach an area being tapped for Arabic gum there clashes between transhumants and gum farmers. Also when the herders settle in unfenced gum tree stands, the goats eat the bark, thus reducing gum production, leading to conflicts with the gum tappers. The latter do everything they can to chase the livestock farmers as soon as they see them near their trees; in such cases, the transhumant herders depart but only after setting fire to the disputed plots.

Production systems are now marked by the development of new gathering activities, more particularly those concerning gum arabic, jojoba (*Ziziphus mauritiana*) and sump fruit (*Balanites aegyptiaca*). Gum marketing channels are almost entirely controlled by a group of Wolof and Moor traders. Due to the depletion of gum tree stands in the western Ferlo area, these activities have shifted southwards. Eastern Ferlo holds considerable potential and is one of the main areas for gum production. The stands are so dense that in certain sectors, (in particular around Ranérou), natural gum tree stands do not appear to be entirely exploited. Traditionally, tapping activities were conducted mainly by poor local families or some Moorish groups from outside the area. But for the past few years, they are practised by all social strata and categories. This generalization of gathering activities is the result of two major causes:

- difficulties encountered by the populations within the current climate conditions, which encourage them increasingly to look for additional income that they reinvest in the purchase of various equipment (cultivation and transportation, lighting) or livestock, such as sheep and goats; and
- the drop in gum production during drought years that rekindled interest in that activity, due to a marked increase in producer prices.

Arabic gum tree stands are appropriated like other natural resources. Due to their abundance, family domains are usually quite extensive, which enables certain families to lend part of their holdings to neighbours or parents; the latter frequently attempt to claim ownership based on the National Domain Law which stipulates that the land belongs to those who develop it.

The third and last main axis around which evolves socio-economic activities in the Ferlo is agriculture. Contrary to the nearby Jeery area where precipitation is low and irregular, the Ferlo region enjoys relatively high rainfall. Rainfed agriculture therefore occupies a more important place than irrigated cultivation or on washed terrain by receding floods in the Waalo. Groundnut production is prohibited in the reserves. Short-cycle millet, which does not suffer too much from low rainfall, is the most common crop and constitutes the staple food for the Ferlo populations. Cultivated areas are significant and cereal fields extend over 2 to 3 hectares for each household.

The fields located within sylvo-pastoral reserves, away from the hamlets, are cultivated using a shifting cultivation system. Mixed crops are grown on each parcel, depending on the type of soil and location. Millet is grown in association with beans, groundnuts and/or hibiscus on sandy clay soils. Late sorghum is grown in valley-bottom areas that have clay soils. Soil fertility is maintained using various techniques including:

- extended grazing on a given parcel to fertilize the soil with animal excreta;
- trampling the soil by feeding livestock which facilitates soil improvement after harvesting;
- fallow periods to rest the land; and
- crop rotation.

### III. Niokolo Koba National Park and Surroundings

The second project site is Niokolo-Koba National Park and surroundings made up of 9 RCs containing 304 villages with a total population of approximately 92,000 people in the south-east of Senegal. Economic activity is dominated by the primary agricultural sector, as the vast majority (91%) of the active population in the Tambacounda region is involved in agriculture, either at the subsistence or commercial levels. Despite the low occupation rate of arable land in the region, around 3.9% only, agricultural activities strongly mobilize the population during the entire rainy season and much of the dry season. Food crops consist of cereals (millet, maize, sorghum and rice) for rural and urban household consumption. They extend over 58% of the cultivated areas, of which 72% for millet and sorghum and 25% for maize. Agriculture is barely mechanized and use high labor intensity; crop farming contribute as much as 40% of the GDP in the area.

Peanut production is the major commercial crop, a secondary one being cotton. Peanut occupies over 85% of the areas under cultivation, with strong extension towards the Tambacounda and Bakel Districts. Cotton and peanut have benefited from State policies that require obtaining export receipts in order to secure support for general development in the region of Niokolo-Koba. New settlement (Koumpentoum, Kaffrine and Koussanar) strongly contributed to the sustained eastward expansion of the groundnut basin, while the construction of earth roads reinforced cotton production with SODEFITEX. The migrations encouraged by a new land settlement policy after the soils in the traditional groundnut basin became depleted contributed to massive clearing in the protected areas. In certain places, this led to the rapid desertification of large expanses in the forest habitats near Niokolo-Koba. Such practices, which were based on slash-and-burn cultivation, severely disturbed the natural habitats and pasturelands, which were systematically cleared for these commercial crops.

The livestock sector contributes 30% to GDP of the area, an indication of the importance of this activity in the forest ecosystems where nearly three quarters of the country's livestock find forage and water during the dry season. The area residents increasingly practice livestock

farming, not only cattle but also sheep and goats. Between 1982 and 1996, the livestock grew by 65.56%, i.e. an average 6.6% of annual growth rate. Average annual growth rate was 2.85% for cattle and 6.95% for sheep and goats. This positive trend was attributable to the implementation of livestock farming extension programmes such as PDESO initially, then PICOGERNA. Competition between livestock and crop farming forced livestock to marginal areas, and which in turn made the herders lead livestock to use the forest and community reserves and even strict protected areas such as Niokolo-Koba National Park, where feeding and watering conditions were better. Frequent preying on the livestock by wild carnivores has brought about intense poaching by the villagers to protect their herds. In addition, in many cases, at the edge of the PAs where the forest cover is dense, transhumant herders prefer to set fires to eliminate parasitic insects, which are feared to decimate their herds. Even though these fires help regenerate some pastures located within the PAs, this action appear to shift the forces where livestock seem to win the competition over wildlife.

Timber harvesting is almost entirely carried out in this Niokolo-Koba area, and it contributes to meeting the needs for household energy in the major cities of western Senegal, whose population is rapidly increasing. Forestry operations generate approximately 6% of the GDP. It should be noted that 95% of the revenues come from logging. A total of 55% of the country's domestic energy needs are met with wood and charcoal (UNDP, 1999:204), almost all of which is extracted and produced in the Niokolo-Koba project site. Carbonization of trees for charcoal is carried inefficiently in traditional open ovens, which are prone to setting bush fires. In addition, the poorer population groups surviving mainly on PA resources also use fire for clearing. Due to the lack of income generating alternatives, villagers increasing in numbers practice logging and produce charcoal during the dry season and sell their products by the roadside. Other socio-economic survival strategies include, beside poaching, Arabic gum tapping or gathering, honey production in south-eastern Senegal; these operations using fire in the production of honey also contribute to starting bush fires. Such rudimentary methods lead to the ecosystem degradation and sometimes destruction.

Trophy hunting is significant in the region and it generates consistent revenues. To ensure wildlife population control at the national park periphery, some forest reserves have been leased out with a view to ensuring rational use of surplus fauna and limiting the damage caused by wildlife in the VTs. However, the distribution of these areas around the PAs gives rise to problems regarding coordination and harmonization of the game cropping activities. The management of these leased areas, some of which are adjacent to the national park, is not necessarily entrusted to professionals, so that some lessees are unable to manage rationally the leased areas due to lack of capacities. In addition to the attraction of quick profits, this impotency leads to abuses. Also lack of demarcation of national park boundaries, trophy hunters cross into the parkland to kill wildlife. Poaching is also carried out by transhumant and sedentary livestock farmers to protect their herds from predators, as well as by agriculturalists to protect their crops. Their pretext is that there are no State provisions to compensate for damages caused by wildlife. Poaching has claimed loss of certain species, such as the giraffe and the topi and for the decrease in elephant and antelope numbers. The lack of human and physical resources in the PAs, the rigidity of the legal status of the Pas and the low interest in conservation by the population exacerbate the situation.

Mining operations could become the most important economic activity in years to come near Niokolo-Koba National Park. Over the past five years, south-east Senegal's mining potential has been attracting exploration and exploitation. Few multinational mining companies have begun work under licenses granted by the State; they are now a major source of jobs in the area, which is reducing unemployment around NKNP. In 1988, the labor force in the area numbered 142,605

people, of whom 135,052 were employed (94.7%) and 7,552 unemployed (5.3%). The labor force accounted for 38% of the total population; 73.8% were males and 88.7% rural. The unemployment rate in the area is an estimated 3.5%, which is relatively low compared to the 15% national rate. However, in south-eastern Senegal there still is one area, the Kédougou District, where 80% of the households and 89% of the individuals live under the poverty line. If this situation develops further, it may have to be taken into consideration in eco-regional planning and developing strategies to conserve biodiversity, as it is likely that mining industries will attract more people in this region, and who would exert more pressures on the NKNP biodiversity. Guidance from the IUCN/World Commission on Protected Areas, policy on Mining and Protected Areas, and the IUCN Resolution on Mining and Protected Areas (Amman Oct 2000) may be relevant.

Overall, the viability of the PNNK is in jeopardy due to the extent of the pressures exerted by the population within and around the park. The main cause for this situation is the non-participation of the population in the management and conservation of animal and plant resources, despite new attempts at relaxing PNNK regulations. There is a dire need to seek ways to involve the neighbouring populations in PA management

#### **IV. Saloum Delta**

The third project site is the Saloum Delta and Basse Casamance National Parks. This project site covers 2 national parks, and 3 community reserves (CRs) that contain a total of 99 villages with 45,800 people. In 1997, the Saloum Delta area was home to an estimated 610,000 people, with an annual population growth rate of 2.8%. The population is characterized by its extreme youth: 55% of the total population is under 30 years of age. Population density ranges from 21 to 61 inhabitants per square kilometre, according to the District commissioner. The two major ethnic groups are the Serer and the Mandingo. Family “squares” consist of large homesteads under the authority of the older male. Within these family units, social organization varies from one group to the other and responsibilities for control of the resources are distributed according to gender.

Economic activities comprise fishing, salt extraction, agriculture, livestock farming, and a putative tourism industry. Fishing and trade are the main economic activities in the Saloum Delta. Local people belong mostly to the Niominka, who have a high sense of collective property, which is the key factor in their successful economic sector. Women are in charge of gathering activities and processing of fish products for sale. The Niominka have no cast system and observe perfect equality between the individuals, the only differentiation being based on know-how and knowledge of the sea. Horizontal and vertical solidarity, i.e. between the villages and the islands, is very strong and deeply rooted in attitudes.

Fishing activities concern all species of fish, molluscs, crustaceans and cetacea present in the area. They take place in the Saloum Delta sea arms (Saloum, Diomboss and Bandiala). Fishing resources hold considerable potential and have enabled the riparian populations to develop important fishing operations. Fishing in the bolongs (along the sea front between the mangroves) is of the traditional type. People in the Saloum Delta are now reporting a drop in fisheries production due to over fishing and lower rainfall. Also there difficulties linked to the fisheries operations, such as under-development, under-equipment, and insufficient means of conservation and marketing for women in charge of these activities. In addition, the use of beach seines with small mesh size gravely compromises resource replenishment. The fishing center of Missirah at the border of the SDNP (Saloum Delta National Park) has regularly recorded annual landings of 12,000tons from community fishing ever since its creation in 1979. However, this sustained production dropped to 2,000 tons only in 2000. This situation caused considerable hardship for all

actors in the fishing sector, from fishermen to fishmongers and to women in charge of processing (drying, smoking), storing and marketing the catch. In order to be successful, the GEF alternative will need to build on these lessons from experience to achieve sustainable development and conservation of the marine, coastal and littoral biodiversity.

Gathering of molluscs, oysters and shells, another feminine activity, is made in the bolongs, mangrove and mudflats, and it contributes to the large consumption wood resources for fish smoking. Both oyster gathering, performed by cutting off the roots of mangroves, and processing of molluscs, oysters and shells involve the consumption of significant quantities of fuel wood.

Salt extraction is another significant activity, carried out in village lands at the periphery of the reserve, in the Fimela district in particular. This age-old activity is generally managed by women, although men are becoming more and more involved since the drought years, more specifically since the decrease in incomes from fishing and commercial agriculture.

Among the Mandingo, agriculture is the dominant activity, with the older male generally in charge of managing production. Men generally cultivate on the plateau cash crops, while women work in the valley bottoms by growing rice for household consumption and vegetables as a supplemental source of income. Major food crops are pearl millet, sorghum, rice and maize. Commercial crops include groundnuts, cotton, cashew nuts and, to a lesser extent, soybean. During the dry season, valleys and the lowlands are used to grow vegetables.

Extensive livestock farming is also well developed in the area, despite the presence of the tsetse fly. Cattle is of the trypano-tolerant N'dama breed in the south, with zebu and gobra breeds in the north. Sheep and goats are also here. The main constraints on livestock farming include lack of water, risks of botulism, endo-parasitic diseases and lack of rangelands.

Despite the high tourism potential, with at least 25 islands in the Saloum Delta and the high demand from the younger population, tourism industry remains practically non-existent to this day, except for three private enterprises tapping only a minimal percentage of the ecotourism potential.

Generally, the relationship between PA authorities at the selected sites and peripheral population groups is of a conflictual nature. One of the main sources of these conflicts is the absence of a buffer zone. The fields cultivated by the population are adjacent to the PAs. As a result, predation on livestock and damage to crops due to wildlife (hyenas, warthogs, monkeys and ground squirrels) pose problems, especially as forestry legislation does not explicitly provide for compensation for damages caused by wildlife. Human populations are sometimes confronted with difficulties in accessing certain commodities that are rare in the village lands and abundant in the PAs (fuel wood, straw, medicinal plants, fruit). The benefits accruing to the population from conservation in the PAs are not sufficient to encourage greater popular involvement in management. The lack of operational consultation mechanisms between the various PA actors and lack of consistency of legal and regulatory provisions in effect in neighbouring countries adjacent to the selected sites such as Guinea and the Gambia also hinder conservation efforts. In addition, the close proximity to the parks of the areas under lease and the relatively high cost of customary hunting permits encourage poaching. Within the current socio-economic context, the parks' tourism potential, which could benefit both the parks and the riparian population, remains insufficiently developed.

Mangroves constitute the main habitat in the Saloum Delta, but they are subject to massive destruction from fuel wood gatherings and cutting off the roots to harvest oysters. Furthermore,

excessive salinity due to repeated droughts causes high fish mortality in the mangroves. Also changes in ocean currents between Toubacouta and Niodior unearth large numbers of tree roots. The fresh water resurgences in the mangroves make the waters brackish, allowing them to support dolphins, dugongs and manatees, which are severely threatened from socio-economic pressures. This mangrove is a unique environment with rich biodiversity and fertile soils, without which many of the villages and the Saloum islands and vast expanses of coastline forests would be submerged.

## **V. The Niayes Coastal Habitats**

The fourth project site is the Niayes coastal habitats that comprise 8 community reserves (RCs) along few core forest reserves. This project site covers 449 villages with a total population of approximately 200,500 people. The intensity and diversity of the pressures clearly explain the increasing speed of biodiversity erosion in the Niayes area. This area once very rich in natural resources has suffered substantial loss of biodiversity. It is both an ecologically fragile environment and a horticultural production area. The Niayes are an important source of vegetable products for Dakar and all of Senegal, providing 2/3rds of Dakar's consumption and 89% of the national production of vegetables. This production supports more than 150,000 people, who earn much of their income from it. The area has great potential, but freshwater is a scarce resources and the production systems remain archaic. The main produces are tomatoes, maize, lettuce, onions, carrots, beets, sweet potatoes, cabbages, strawberries, beans and to a lesser extent rice. Average agricultural plot size is approximately 0.5 ha; and because of droughts and urban extension cultivated areas in the Niayes are reduced from year to year. Beside off-season crops, the depressions of sand dunes and surrounding areas are under constant exploitation, producing vegetables crops and fruits.

The Niayes are also used for extensive cattle and sheep and goat farming. There are an estimated 90,000 heads of cattle in the Dakar region alone. Most of the time, the cattle out of the Niayes is forced to move, partly during the rainy season when most of the land is flooded and also during the dry season because of the lack of forage and to avoid conflicts with vegetable growers. Niayes' livestock migrate to the neighbouring sylvo-pastoral area, where it takes the form of nomadic grazing, with no fixed home base in a village, but rather following randomly the best pastures. This in turn pushes the large Ferlo herds towards the NKNP. Industrial and semi-industrial poultry farming is sharply on the increase in the Niayes area, relying mainly on imports of chicks and hatching eggs.

Fish population has generally decreased in the Niayes ponds and lakes. Some formerly abundant species, such as *Protopterus*, have become very rare. Purse seining used at sea has strong negative impacts on the aquatic fauna. Due to the very small mesh size, many juveniles are captured. The boats illegally plying the coastal area constitute a threat on biodiversity and community fisheries. Turtle nesting grounds on the coast, mainly in the central and northern Niayes, are severely disturbed. Pollution from chemical industry appears to affect the aquatic fauna. As advocated by the local populations, it would be wise to consider creating marine protected areas to allow a reconstitution of the stocks undergoing strong regression as evidenced by increasingly smaller catches in spite of an improvement in traditional fishing equipment. Likewise, strengthening the Fisheries Monitoring Project (Projet de Surveillance des Pêches - PSP) is needed in order to limit illegal fishing by boats and to save jobs in the communities.

In addition, organization, training and diffusion of adapted techniques benefiting all actors in the fishing sector (i.e. fishermen, fishmongers and women in charge of marketing and processing the fish at the Kayar fishing centre) are needed to ensure the sustainability of the activities

envisioned under the GEF alternative for the conservation of biodiversity in traditional fisheries. The sustainability of the GEF alternative in the area will depend to a large extent on the durability of the **filaos** strip, established on 150 kilometres several decades ago and showing signs of ageing. This ageing causes serious regeneration problems due to the considerable thickness of the accumulated litter preventing the seeds from reaching the soil.

Overall, the socio-economic situation in the Niayes area is characterized by: (1) water balance deficit linked to drought and resulting in a drop of the water table due to excessive withdrawal; (2) poor management of vegetable cultivation with bad drainage and soil salinization; (3) strong migrations of human populations into the area, leading to land clearing and erosion within an already fragile ecosystem; and (4) overfishing due to the lack of control and poor management of fisheries.

## **VI. Concluding Remarks**

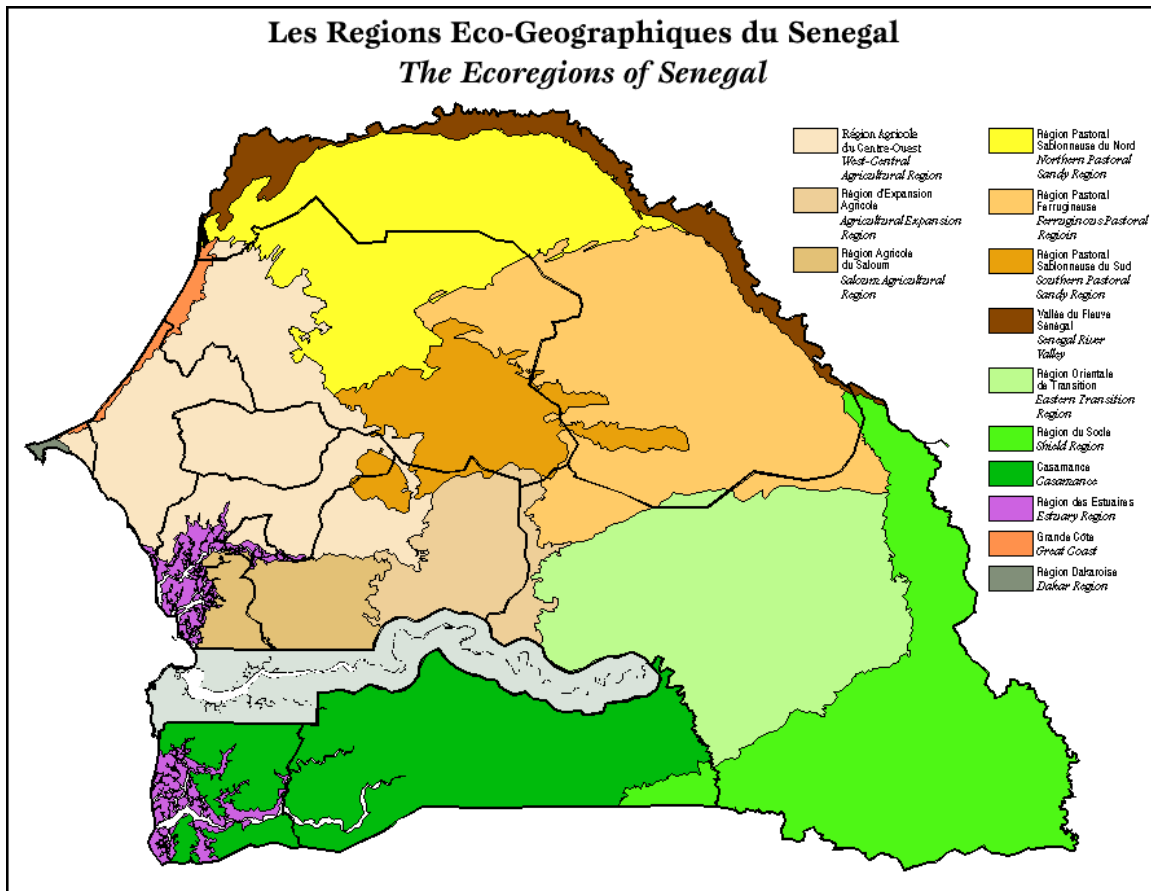
Despite the creation of an extensive (more than 40% of the country's land mass) PA system extending over more than 12 million hectares, the negative consequences of the socio-economic situation on biodiversity conservation have prompted Senegal to consolidating its approaches and reviewing its policy and institutional context with a view to introducing changes to adapt them to sustainable development and adopting participatory biodiversity conservation strategies. Senegal expect from the international community and GEF, assistance to achieve its goal of biodiversity conservation of its unique, endemic, specific and eco-systemic assemblages that have worldwide bearings and recognition.

Increasing pressures and competition over resources in the Ferlo reserves pose threats to the survival of the wild flora and fauna. In view of these threats, the government of Senegal has come to the conclusion that the preservation of the Ferlo will have to go through its classification as a Biosphere Reserve. This would make it possible to organize interventions around majors objectives, namely: (1) to conserve biodiversity and the natural environment; (2) ongoing monitoring of the condition and evolution of the resource; (3) actions targeting the population in the form of information and training; (4) development initiatives likely to have lasting influence on the standard of living of the local populations; and (4) sustainable management of hydraulic installations and waterholes, an essential condition to the survival of livestock farming and the sylvo-pastoral ecosystem of the Ferlo. The GEF alternative will thus need to capitalize on the lessons from experience to ensure favourable conditions for long term conservation and sustainable development. The positive impacts of the GEF alternative will be felt in the forest ecosystems of eastern Senegal, containing the NKNP, a complex with which the Ferlo area maintains systemic relationships, involving transhumance, animal migration and bush fire management. The northern sylvo-pastoral ecosystems of Ferlo and the eastern forest ecosystems of Niokolo-Koba are two different ecological entities, still united by their complementarity through the transhumance and shifting use during different times of the year. Such complementarity must be taken into consideration in the management of these two biodiversity rich areas of Senegal, and it is important to favor optimal rotation of the use of forage and water resources, which neither entity could achieve in isolation year round. Without the traditional rotation system hinged upon agriculture, tapping and gathering activities and transhumance, the large demand by humans and livestock as waged against rangeland low carrying capacities especially during the dry season, semi-sedentary livestock farming cannot be sustainable in the Ferlo nor the Niokolo-Koba area alone.

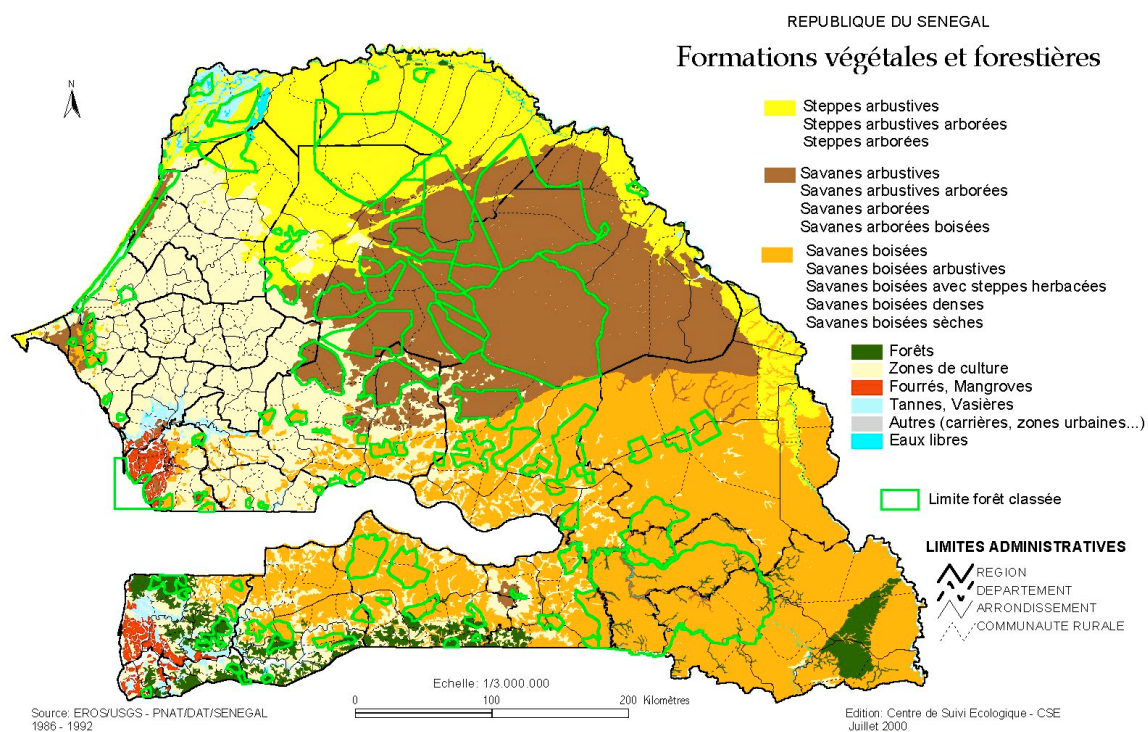




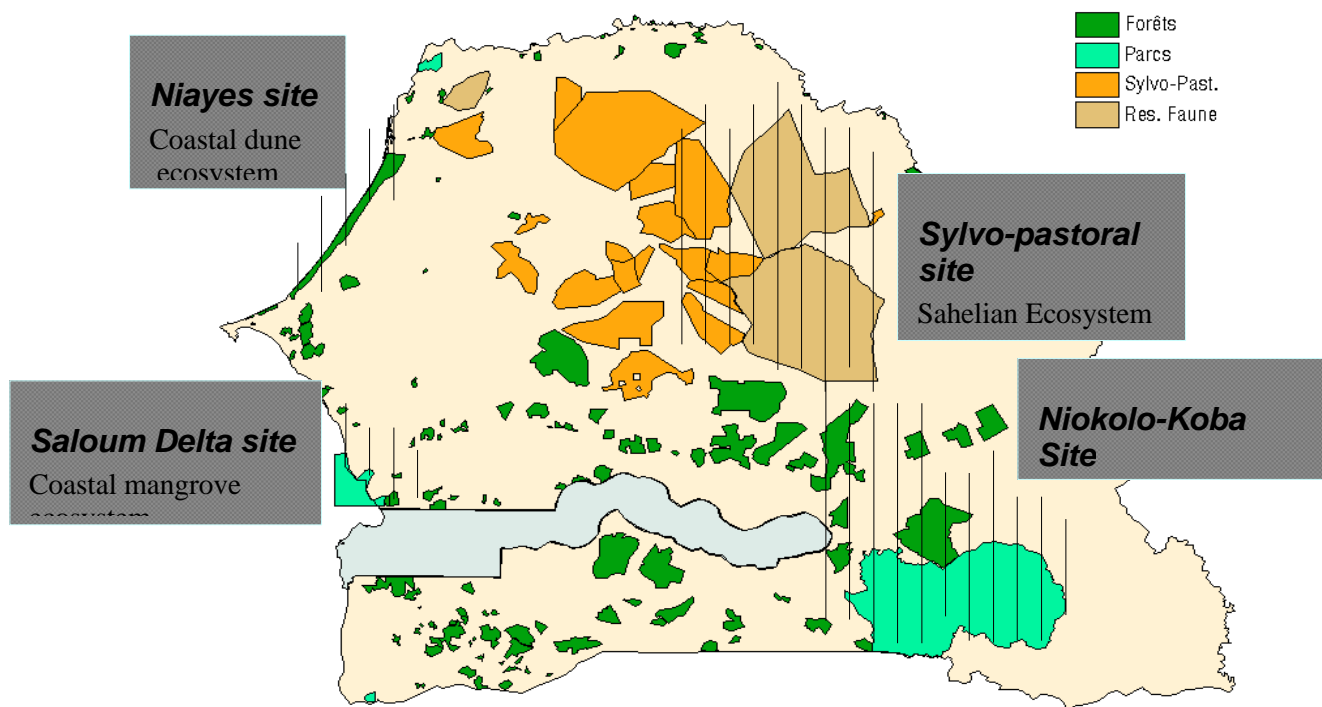
## ANNEX IXa. ECOREGIONS OF SENEGAL



## ANNEX IXb. MAJOR ECOSYSTEMS AND CLASSIFIED FORESTS OF SENEGAL



**ANNEX IXc : Map of Senegal's protected area system and location of four project sites**



## ANNEX X. THREATS AND ROOT CAUSES ANALYSIS

<b>PROBLEM</b>	<b>THREATS</b>	<b>ROOT CAUSES</b>	<b>ALTERNATIVE STRATEGY</b>
<p><i>Loss of globally significant biodiversity in protected areas</i></p> <p>Fragmentation of protected area System</p> <p>Land degradation in and around protected areas</p> <p>Decreased rates of natural regeneration of endemic fish and tree species.</p>	<p><i>Cultivation encroaching onto protected areas</i></p>	<p>§ Population increase (local and Due to immigration)</p> <p>§ Lack of environmentally and economically appropriate techniques for agricultural intensification</p> <p>§ Unclear procedural rules and uncertain tenure for land use planning</p> <p>§ Lack of alternatives for income generation</p>	<p>ü Legal and policy framework strengthened to better devolve land use planning and enforcement; to reconcile sectoral inconsistencies; and create incentives for sustainable agriculture (Output1).</p> <p>ü Appropriate techniques for agricultural intensification tested, demonstrated and replicated (Output 2)</p> <p>ü Local land use planning capacities strengthened (Output 2)</p> <p>ü Capacity and institutions for eco-regional planning enhanced (Outputs 2,3,4)</p> <p>ü Alternative incomes generated through credit system in support of intensification (Output 2).</p> <p>ü Capacity of local authorities enhanced for participatory M&amp;E and adaptive management (Output 5).</p>

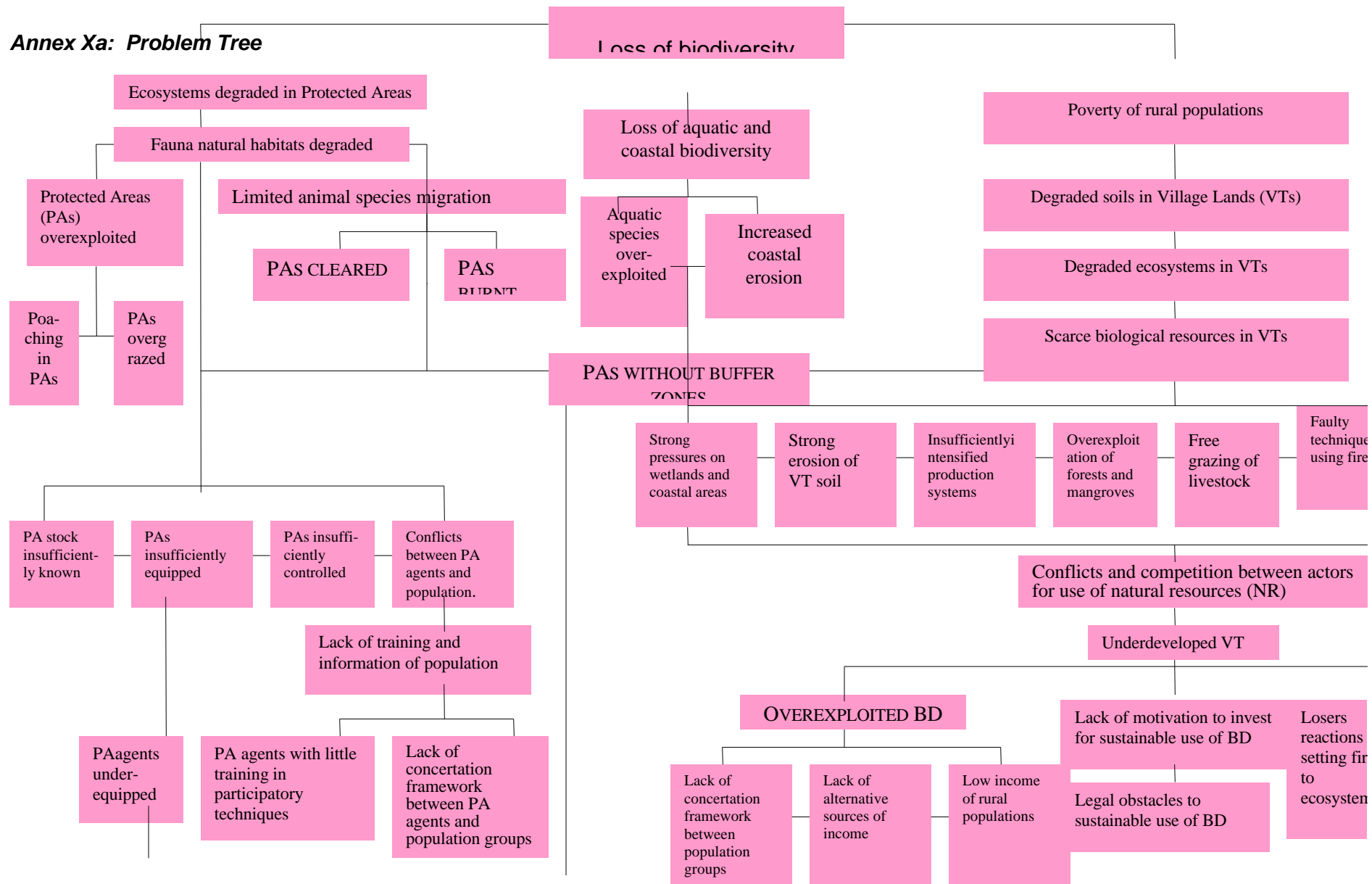
<i>Excessive fuelwood harvesting in and around protected areas</i>	<p>§ Conversion of woodland to crops</p> <p>§ Population increase and high demand for fuelwood</p> <p>§ Destructive harvesting practices (woodland and mangrove)</p> <p>§ Lack of participation and incentives for protected area management</p> <p>§ Lack of legislation for co-management</p> <p>§ Lack of consistency in tax law</p>	<p>ü Appropriate fuelwood harvesting techniques demonstrated and replicated (Output 2,3,4)</p> <p>ü Community and private woodlots demonstrated and replicated (Output 2)</p> <p>ü Sustainable harvesting regime established, implemented and monitored in CNR and PAs (Outputs 3,4)</p> <p>ü Legislation clarified for co-management of PA (Output 1,4)</p> <p>ü Inconsistencies in tax laws reconciled (Output 1)</p>
<i>Excessive hunting of predators and other wildlife</i>	<p>§ High demand from poachers for customary leases</p> <p>§ Mismanagement of public concessions</p> <p>§ No compensation for damage to crops or livestock</p> <p>§ Lack of participation and incentives for protected area management</p>	<p>ü Co-management of PA and benefit sharing instituted as incentive for protection of wildlife (Output 4)</p> <p>ü Sustainable harvesting regimes and benefit sharing systems established for wildlife in CNRs</p> <p>ü Eco-guards established (Output 3,4)</p> <p>ü PA management and infrastructure strengthened (Output 4)</p>

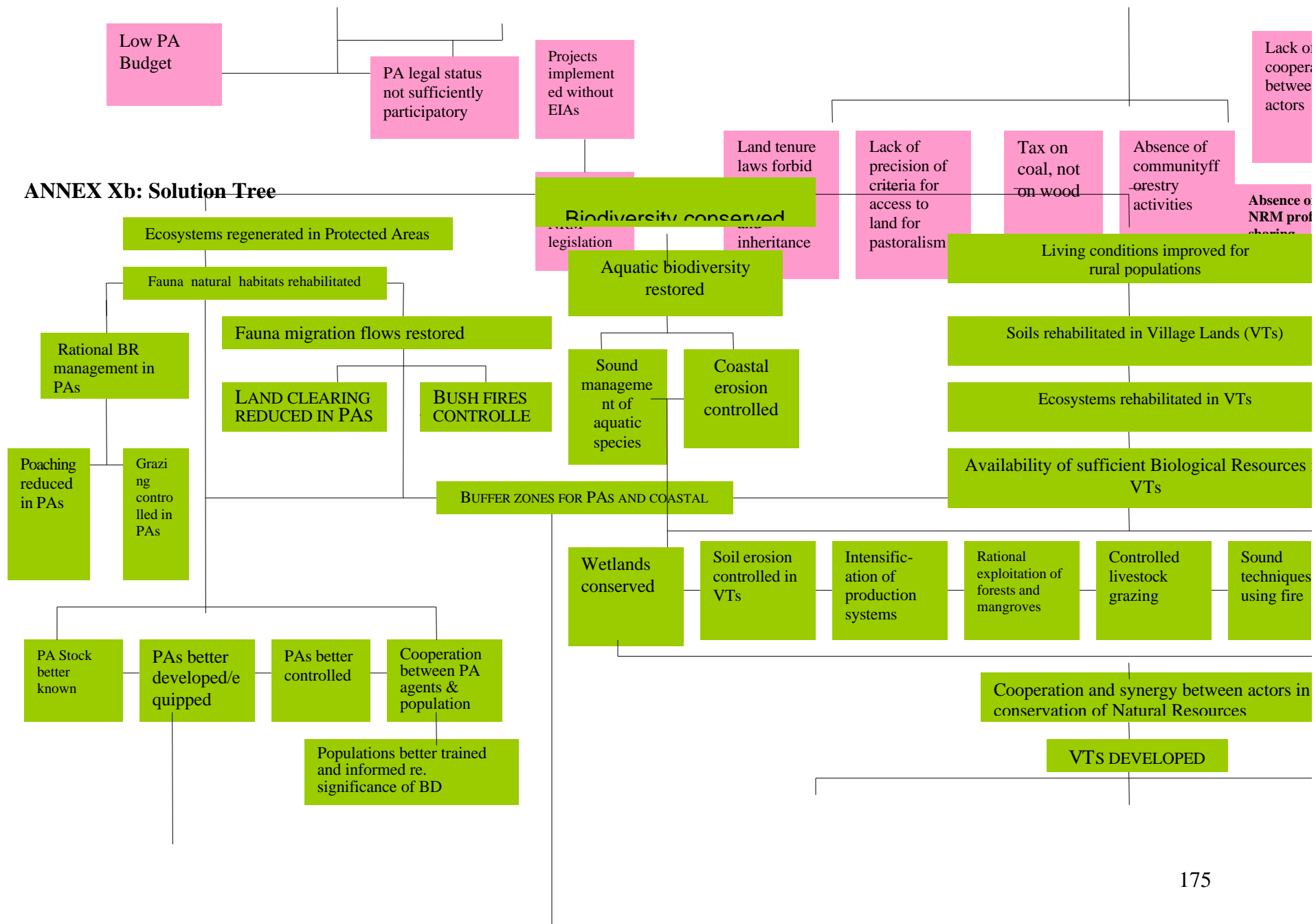
<p><i>Overgrazing by domestic animals in and around protected areas</i></p>	<p>§ <i>Conversion of pasture to crops</i></p> <p>§ Badly managed water resources</p> <p>§ Lack of appropriate intensification techniques</p> <p>§ Unregulated transhumance and conflicts on land access and land use</p> <p>§ Lack of participation and incentives for protected area management</p>	<p>ü <i>Needs of pastoralists and transhumants enshrined in local and eco-regional planning (Output 2,3)</i></p> <p>ü Selective and targeted investments in pastoral infrastructure (Output 2,3)</p> <p>ü Appropriate techniques for intensification demonstrated around boreholes (Output 2,3)</p> <p>ü Grazing and water fees instituted in improved pastures, and contributing to VT revolving funds (Output 2)</p> <p>ü Eco-guards established (Output 3,4)</p> <p>ü Participatory M&amp;E established for adaptive management (Output 5)</p> <p>ü Local knowledge incorporated in all planning and M&amp;E (Output 5)</p>
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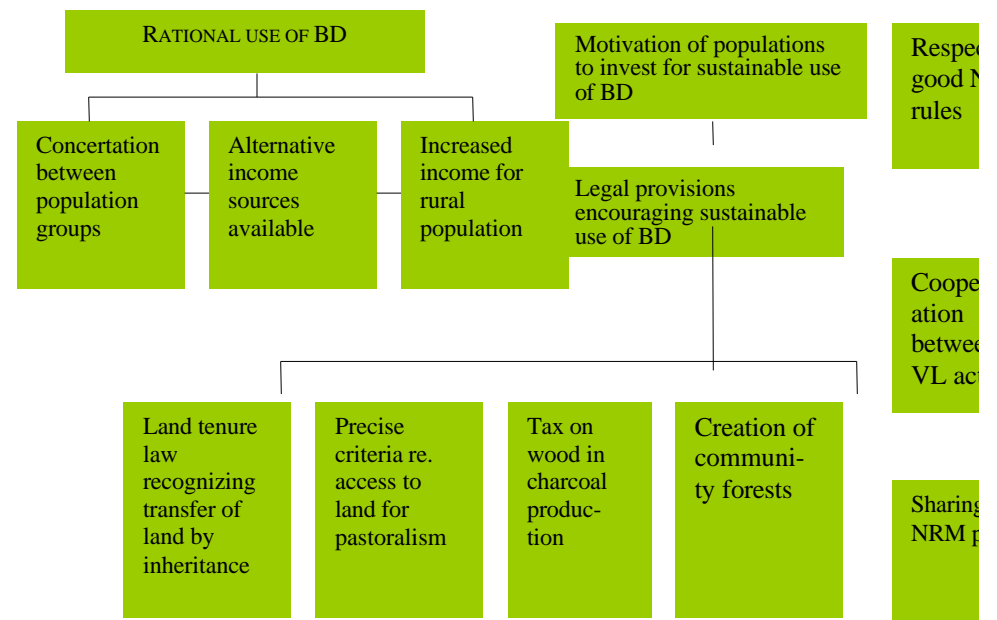
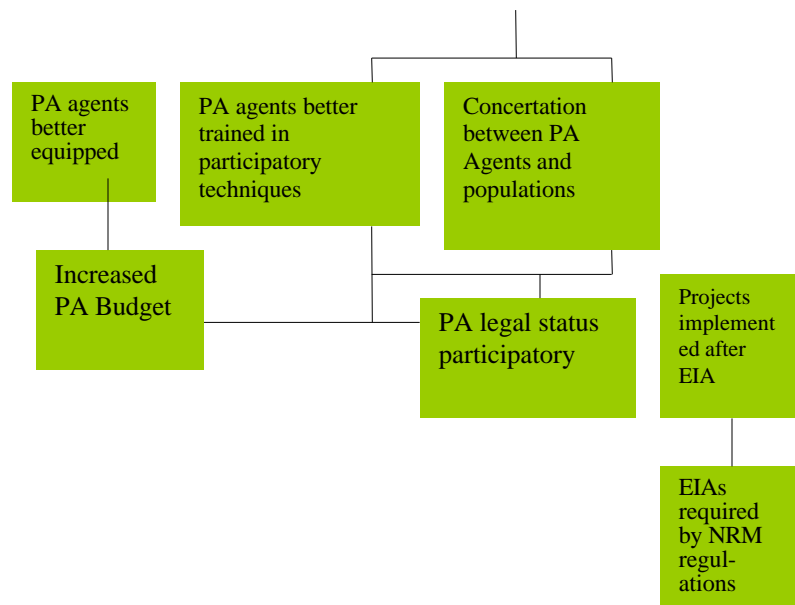
<p><i>Excessive and uncontrolled</i> bush fires damage ecosystems and biological resources</p>	<p>§ <i>Traditional use of fire (clearing, pasture regeneration, honey harvesting, charcoal production) is not efficient.</i></p> <p>§ With population increase, traditional use is of scale beyond that required for healthy system</p> <p>§ Lack of traditional, or modern, means to combat fire at these scales, without coordination.</p> <p>§ Lack of participation and incentives for protected area management; and lack of effective management of VT and CNR.</p>	<p>ü <i>Fire-less technologies promoted for charcoal, beekeeping, etc. (Output 2)</i></p> <p>ü <i>Firebreaks created, and maintained through controlled grazing and selective biomass harvesting (Output 2,3,4)</i></p> <p>ü <i>Appropriate techniques for fire management tested, demonstrated and replicated in VT, CNR, and PA (Outputs 2,3,4)</i></p> <p>ü Local community and PA staff , including eco-guards, capacities strengthened (training, equipment) for fire management (Output 3,4)</p> <p>ü Traditional village “vigilance” committees re-established, coordinated, and operational for early warning systems (output 3,4).</p>
<p><i>Excessive and unsustainable</i> Harvesting of marine and non-timber resources</p>	<p>§ <i>Inefficient and destructive harvesting technologies</i></p> <p>§ Habitat conversion in mangroves</p> <p>§ Lack of alternative income generation</p>	<p>ü <i>Sustainable harvesting regimes tested, demonstrated and replicated for selected resources (Output 2,3)</i></p> <p>ü Alternative incomes generated through credit system in support of intensification (Output 2).</p>



## Annex Xa: Problem Tree







## ANNEX XI: Project Technical Specifications and Strategies

The activities to be conducted within the GEF alternative at the legal, policy and institutional levels in the VTs, the CNRs and the PAs are aimed at applying sustainable solutions to the biodiversity degradation problems that were identified. Those proposed activities will help to remove the obstacles to sustainable development which are not addressed in the baseline and ensure the sustainability of the measures implemented and their success into the post-project phase. The technical specifications and strategies are based on a review of lessons learnt in Senegal and elsewhere. They were also reviewed by all stakeholders in the PDF B process. Many of the techniques below have been tested elsewhere, some also in Senegal. However, they have often not been replicated spontaneously. This is either because the technology still needs improvement, or there are policy, technological, financial or other barriers to their widespread adoption. In the case of the former, the project will endeavour to show innovative improvements, and in the case of the latter, the project will assist in lifting these barriers.

### **7. Legal, policy and institutional issues**

Promoting pilot activities for PA joint management will require amending the present legal status of the PAs and adapting it to allow effective popular participation. In addition, once present obstacles to participation have been removed, the legal provisions will need to be revised in order to guarantee access to and ownership of community biological resources and equitable sharing in the profits achieved in the PAs. In this regard, the criteria for development, which is the basis for land attribution or retirement will also need to include livestock farming, whether individual or collective as confirmed by one or several of the local pastoral management committees both at the Ferlo site and at other project sites. Furthermore, it will be necessary to legalize the CNRs by means of a real transfer of authority and responsibility and by instituting them by a decision of the RC or RCs concerned.

At policy level, development policies will have to be made equitable for all categories of actors and stakeholders in the area of natural resource management. In particular, the current bias against pastoralists in policies and laws has to be lifted. This is crucial to the success of the cooperation and concertation mechanisms. In addition, a review of the current development policies in the agricultural, pastoral, forestry and hunting sectors, will be conducted in order to identify and remove the obstacles to encouragement of individual and community initiatives for the sustainable management of biological resources. Experience elsewhere in Africa shows that lifting these legal and policy barriers is a pre-requisite for sustainable natural resource management.

In order to ensure synergistic effects between project activities and the expected outputs of other projects to be implemented at project sites, the GEF alternative provides for mandatory Environmental Impact Assessments (EIAs) for all future projects so as to limit their adverse effects and to preserve and reinforce the results achieved as regards sustainable biodiversity conservation.

### **8. Micro-credit and savings schemes**

Lessons learnt have shown that activities that generate alternative incomes often need initial capitalization to take off and become financially sustainable. Micro-credit projects have been tested in Senegal. Experience shows that revolving community systems are sustainable only when : (a) potential users contribute to their capitalization; (b) funds are tightly managed by competent and trust worthy local people (including businessmen); (c) checks and balances are established through communal oversight to avoid abuse ensure timely repayment of loans; (d) micro-projects are vetted stringently according to business

principles, to ensure adequate rates of return, before acceptance; (e) links to local development banks are established so as to encourage borrowers to graduate to the commercial sector.

## **9. Eco-regional planning**

Classical regional planning (including economic stratification; regional land use planning; population and infrastructure nodes and links; etc.) has been part of the baseline for many years. Recent policies on decentralization have mandated the regional governments and Rural Councils to conduct regional planning, within the framework of a national plan. However, current regional planning approaches do not incorporate biological and ecosystemic factors. On the one hand, there is a need to incorporate bio-regional approaches (including corridors and connectivity between protected areas), and on the other, to incorporate IEM principles. This will ensure that population pressure and movements (migration, transhumance) between one landscape and the next are adequately planned and managed in order to allow all development and conservation needs to be effectively integrated and addressed. In the context of this project, the two neighboring landscapes of Ferlo and Niokolo offer a golden opportunity to test and demonstrate these principles, because of their proximity, the presence of a system of classified forests in the corridors, and relatively lower population pressure (compared to the linkages between Niaye and Ferlo landscapes, for example). The project will build capacity for eco-regional planning at all relevant local, regional and national levels.

## **10. Intensification of production systems**

These activities will target crop production, livestock production and fish production. They will be aimed at encouraging the stakeholders, to increase soil productivity so as to reduce the pressures on natural ecosystems, and reduce excessive land clearing.

Tree planting through spreading organic manure in the fields: In the Ferlo and Forest areas, forestry research has demonstrated that 30 to 40 individuals of *Acacia albida* in a field can increase millet production by 40 to 50%. This is due to the following facts: (1) this tree is a legume, therefore capable of fixing nitrogen in the soil with its root nodules; (2) litter mineralization is considerably faster than for many other species; (3) the tree is native to the southern hemisphere and one of the few trees in the Sahel to keep its foliage during the dry season, thus providing shade which attracts livestock, also drawn by its fruit which it finds very palatable; (4) this species is among the few that drop their foliage during the rainy season, thus providing humidity to activate the mineralization process while providing water for crops under the canopy. *Acacia albida*, a companion of agrarian societies, generally germinates only after the seeds have transited through ruminants' digestive tract, because of its very tough tegument. By feeding the seeds of these species to animals and spreading the manure over the fields, one promotes the regeneration of these species in the fields. This is an innovative idea that requires field testing before dissemination.

Agro-forestry: This consists in integrating trees in agricultural production systems. The best option with this technique is to use legume species that are capable of fixating nitrogen, as are most of the species of the *Acacia* genus. The trees are placed in a row to allow passage for mechanized implements whether drawn by animal or by tractors. The optimal density is 100 trees per hectare on the average, i.e. one tree every 10 meters. Generally, the species used in this field plantation technique are multi-purpose species which, beside increasing crop yields, also produce fruit, forage and gum, while serving as windbreaks and stabilizing the soil. Among the species used in this manner are *Acacia albida*, *Cordia pinnata*, and *Parkia biglobosa* which are all local species in Senegal, as well as cashew trees (*Anacardium occidentale*), strongly adopted by farmers in the Saloum Delta. The main constraint to widespread adoption has been the lack of land security.

Windbreaks and live hedges: These consist in planting two or three rows of trees or shrubs in offset position orientated perpendicularly to prevailing wind direction. They may be located at the periphery or within the fields, delimiting sections of crops. They provide the advantage of reducing wind speed and water runoff speed, increasing water infiltration, mineralizing the litter or fixing nitrogen, and protecting crops against free-grazing animals if the windbreak is sufficiently dense. Windbreaks and live hedges also lend themselves to multiple uses depending on the species and can produce fruit, gum, oil, forage and sustainable income. In order to avoid whirlwind effects on crops, the windbreak must be permeable to the wind. Current obstacles to the use of these techniques are the difficulties linked to land transfer, as these land improvement activities are medium- to long-term investments. Also, knowledge on seedling production of native species is limited and needs assistance.

Ecological farming: This consists in integrating crops, animal breeding and forestry (agro-sylvo-pastoralism) using conservation farming and organic farming techniques. A plot where livestock was kept pasturing in the post-harvest phase during the dry season becomes enriched with manure. Seeds from the desired plant species which were fed to the livestock are collected and sown on the same plot which will be cultivated over a three-year period while fertilizing it with manure from the animals that are kept in pens. During the next season, the animals are pastured on another plot for three consecutive years to enhance tree regeneration. The first plot may then be used for pasturing after the harvest while the second or third plots, depending on land availability (sylvo-pastoral ecosystems and forest ecosystems) is temporarily off-limits to animals. This rotation is complemented by two-year forest fallows. Under this land management regime, the plots are fertilized, used for crops, then for trees in alternation over different periods. Combined with crop rotation, this method produces the highest reported yields per space unit. The major constraint for this innovation is the lack of land security, and some technical know-how.

Compost pit techniques: In agricultural areas where organic fertilization with livestock manure is a limiting factor, the project will undertake pilot activities demonstrating the use of compost pits using agricultural by-products and biological household waste. These products are buried and placed in a cement compost pit which is covered while allowing some ventilation. Regular watering activates the mineralization process. Compost pits are located either in the fields or next to the dwellings. After complete mineralization, compost is retrieved from the pits and spread on the fields. This is a very common technique in Senegal's Peanut Basin which has the highest rural density on the poorest soils, where it is being adopted by the populations with good results. The main constraint is the information/extension services to be provided and the cost of construction of the pit which can be used for over five years. Applying a reduced (almost halved) quantity of compost by surface area produce better results than chemical fertilizer while preserving soil texture and fertility sustainably. In addition, these positive effects are cumulative over time. These techniques may be advocated for farmers in the Delta and Niaye.

Rock bund technique for soil and water conservation: It consists in constructing small dikes (rock bunds) placing a line of stones on hills in a perpendicular orientation to the slope, in order to reduce the speed of surface runoff during the rainy season. The technique can be applied to one or several fields in the same catchment area, at village level for instance. This is where the technique is most efficient as it reinforces individual actions undertaken in each field. This technique enhances water infiltration and organic matter and silt retention. It is a proven technique to rehabilitate degraded soil and increase land potential in the VTs. The major constraint is that it requires hard work to collect the stones and great care to construct the dikes. Such initiatives can be supported and encouraged. In addition, it should be noted that maintenance work is far less demanding and that once they are constructed, the farmers see their profits, which ensures sustainability. The constraint lies at the initial stage in convincing the stakeholders of the benefits of the technique. The project will do so with awareness raising techniques, including organising cultural events, shows, competitions, etc. Farmers will also be encouraged to take micro-loans to hire labourers for the work.

Livestock pasturing: Efforts will be made, in the Ferlo area in particular, to encourage the pasturing of livestock in the fields after the harvest. Both livestock owners and less wealthy households will be encouraged to avail themselves of this option. The latter will thus exchange agricultural by-products in their fields against livestock pasturing for a duration to be negotiated. Such pasturing adds value to agricultural by-products by fertilizing the fields with organic manure, an ecologically sound and valuable operation. It has been established that this technique more than double the yields, for cereal crops and commercial crops alike. The only constraint regarding this natural fertilization technique is that the livestock must be allowed in some fields, while the owners of other surrounding fields need their agricultural by-products to feed their own pen livestock such as sheep or goats. Concertation mechanisms may provide a solution, as will encouragement of widespread use of live hedges using impenetrable euphorbias and acacias.

Sheep and cattle fattening: This is a type of pastoral intensification which consists in taking forage to the animal instead of the traditional, opposite approach. As it causes less energy loss for the animals, the methods increases weight gain considerably over a short period of time, particular when couple with close phytosanitary control. This is a very profitable technique, one adopted by several livestock farmers and even crop farmers. The most popular form is sheep fattening for the annual Tabaski feast, but cattle fattening is also practised. The animals may be bought during the “junction” period, when prices reach their lowest level, and are then fattened for resale, realizing upwards of 100% profit per head. The main constraints are providing information and making the initial investment.

Aquaculture: Aquaculture refers to techniques aimed at using aquatic biological resources (shrimp, oyster or fish) while reducing pressures on PA resources. One type of aquaculture consists in delimiting an area in a body of water where animal raising activities are conducted according to sustainable resource management principles. For fish farming, for instance, in a marigot or cut-off meander or a seasonal stream fed by rainwater, the outlet is blocked to retain water as long as possible; the fish are fed appropriately and captured selectively by size, either medium or large, according to market objectives. Ultimately, after a while, as the reservoir is drying out, all fish needs to be removed gradually in order to avoid asphyxia. This technique can provide considerable amounts of animal protein with very little recurring expenses, but has rarely been tried in Senegal. The fish may be sold fresh or processed before marketing. This type of operation is profitable both at the individual and community levels. The main requirement is training; few other means are required. The technique can be used in areas with favourable rainfall regime and preferably near fisheries so as to benefit as much as possible from initial transfers when the rains begin.

Pisciculture: This refers to fish farming in artificial ponds where juvenile individuals are introduced and fed appropriately. This technique provides animal protein while limiting pressures on the natural environment. The activities extend over a relatively longer period of time as the bottom is less permeable than in natural bodies of water as used for aquaculture, and the expenses far greater. These operations have shown profits depending on the species and demand. The main constraint here is the high start-up cost. The most widely used species in pisciculture in Senegal is *Tilapia nilotica*.

Processing and marketing of plant, animal and fish products: Micro-projects aimed at income diversification will encourage to a large extent activities related to the processing of products from market gardening and fruit-trees, as well as animal products such as curdled milk, butter and cheese, and fishery products, with dried, smoked and salted shrimp, fish and oysters and their packaging. Processing of gathering products such as palm oil and cashew nuts and production of jams and fruit juices will also be encouraged in order to alleviate pressures on the natural environment. In addition, storage and marketing operations carried out by women groups will also be encouraged, to benefit the most disadvantaged groups. The current constraint to such operations are financial, as well as lack of information on markets.

## 11. Extensive production and sustainable harvesting

Pasture improvement: This is an income-generating activity which also produces environmental benefits as it conserves biodiversity and regenerated the ecosystems. It consists in developing the pastures and enriching them on a rotational basis. A number of pasture units are placed off-limits to grazing and enriched both with palatable species such as *styloxantes* and with shrub or tree forage species such as *Acacia senegal*. After a pre-determined period of time, the enriched sections are opened to grazing and other blocs previous used are enriched and placed off-limits. In this regard, over the 10-year duration of the project, it will be possible to assess the results of such rotation as regards both sustainable development and conservation. This rotation system provides quality forage at all times while protecting the natural habitat of wild fauna species, which incidentally also benefit from this quality forage. In addition to this benefit for the wild fauna, pastureland management is also favourable to environmental balance and provides income from the sale of gum arabic. In view of the high international demand for this product from breweries, the pharmaceutical sector and confectionery, sustainability is insured as a result of the high price of gum, in excess of US\$2.00 per kilogram. The obstacle to the realization of these pastureland improvements is the fact that pastoralism is not explicitly included in legal provisions as a land-development criterion and therefore is not considered as such by land-use planners, who allocate land according to such criteria. Therefore no land has ever been allocated either individually or collectively for pastoral use by the RCs. Pastureland access is open and free of charge to anyone and, as a consequently, no pastoralist is inclined to investing or become involved in the management of such land. As a result, pasturelands are not only increasingly degraded, leading to transhumance over longer distances with the attendant conflicts, but they are also subjected to clearing for cultivation thus relegating the livestock on mediocre soils. This technique also includes grazing and water fees on improved pastures, which should generate revenues which are put back into communal management of the system.

Plantation of green firebreaks: These are plantations of two or three rows separated with alleys along a firebreak either at the perimeter of an area or within an area to form compartments, with evergreen forest species with low flammability. One such species is *Anacardium occidentale*. These green firebreaks are also multi-purpose as the fruit of the tree is eaten raw or dried and its seed, the cashew nut is roasted and consumed as snack food. There are outlets for these products and the high national and international demand far exceeds supply. The income derived from this tree is durable, as one tree can yield up to 300 kg of cashew nuts and for a minimum of 20 years. In the Saloum Delta area where the species was introduced with GTZ support, 10 years after project completion, the villagers continue to plant it using their own money because of the substantial income it provides. According to the villages income per hectare is higher for *Anacardium* than for groundnut or cotton. Due to its rapid growth, the species covers the soil quickly and serves as an effective windbreak for crops while improving the environment. The constraint regarding replication is the initial investment due to the high price of seeds for farmers and their lack of knowledge regarding its culture. In this regard, the national forestry seed project has already been a good experience, but it does not assume the costs of planting of this species.

Reforestation and forest regeneration: The baseline situation in Senegal shows strong preferences for exotic species because of their faster growth rate compared to local species. However, local species are better suited to regenerate the ecosystems, of which they are natural components providing habitat and food for the fauna. These often multiple-use local species are competitive over the long term and are drought resistant. While eucalyptus can be harvested much sooner, and 2 or 3 times for the same tree owing to stump regeneration, local species begin to yield products between 18 to 20 years of age. Although in the long term local species generate greater economic and financial gains due to their multiple uses, this waiting period alone is enough to discourage investment. In this context, in order to remove the obstacles to reforestation with local species, there is a need for supportive research activities on local species sylviculture, the creation of private and community tree nurseries for endemics, sustainable management



technologies for these species as well as dissemination and diffusion of lessons learned in this area. In addition, another obstacle to be removed is that of transfer of land ownership by inheritance.

Streamlining charcoal production and consumption: Charcoal has become the most widely used source of household energy in Senegal, both in rural and urban areas. Its production using still rudimentary processes restricts supply and conversely increase the weight of demand. As few Senegal's forest have a management plan, logging for carbonization purpose is conducted according to the needs, without taking into consideration actual forest production capacity. There is thus a need to streamline charcoal production and consumption. Current production methods are of the open kiln type, often starting forest fires, requiring 5 kg of wood to produce 1 kg of charcoal. There does exist improved carbonization techniques which were successfully tested in Senegal by USAID in the 80's, but despite the 30% savings in wood consumption obtained using improved kilns with a metal chimney for the same amount of charcoal produced plus pyroigneous by-products, the local charcoalers failed to adopt these techniques. This is due to the fact that taxes are levied on the finished product instead of the raw material (wood) which should be taxed in order to promote the use of these improved techniques. Support is also needed for the initial investment required to purchase a chimney. On the consumption side, the Malagasy stoves currently used are being replace by improved stoves burning both charcoal and fuel wood, with a 40% gain in efficiency. The initial investment is, again, the obstacle preventing widespread adoption of these stoves, although this additional investment is rapidly recouped thanks to the lower fuel consumption.

Rangeland Management: Based on the experience from previous projects implemented in the sylvo-pastoral area, both sedentary and transhumant pastoralists who have traditional access rights must together invest and become involved in stewardship of activities to improve range management, and create and manage ponds and boreholes in rangelands. This willingness on the part of both categories of pastoralists was noted during the PDF-B consultation process and resulted in acceptance of grazing fees on parcels developed by the project at a rate of CFAF 50 per head of cattle/per month and watering fees at a rate of CFAF 100 per head of cattle/per month. According to the statistics of the Directorate of Livestock for 1999, the figures for the livestock population in the Ferlo area during the dry season is given in the Table below.

In view of these numbers, the fees paid for grazing and watering during the 9 months of the dry season are expected to generate a total of US\$3,756,000, demonstrating the potential financial sustainability of this option, providing resources beyond pasture regeneration and water supply point management requirements which will cover expenses for animal health and salaries for the elected members of the pastoral unit local management committees.

Livestock	Number	Costs of watering and grazing for 9 months (@CFAF150/head/month) In US\$ millions
Bovines	676,000	1.303
Sheep	1,096,000	2.113
Horses	96,000	0.185
Asses	78,000	0.150
Camels	2,750	0.005
Total		3.756

It should be noted that this figure is a minimum, as: (1) Fees currently paid in the PRODAM pastoral units are for pastures that were not improved with valuable fodder plants capable of increasing growth and milk

production, and (2) The herds are supposed to remain in the area even during the rainy season when Ferlo pastures are of better quality, which brings the total time to 12 months, i.e. US\$5,008,000 per year if all Ferlo area livestock benefited from the creation of pastoral units and organization of pastoral management committees. Therefore, economic durability is ensured since the recurring costs both for the management of water points such as ponds and boreholes and for animal health services can be assumed entirely by user fees. One remaining requirement is to strengthen the organizational structure, including enhancing the cooperation between stakeholders, and the dissemination of the pasture enrichment techniques which will result in better milk production and therefore ability to pay fees.

Leasing of community hunting zones: These leasing activities will concern the hunting zones located in the territories devolved to RCs for management. Formerly a State responsibility, as a result of the transfer of authority in NRM, these activities are now within the purview of the local communities. The RCs will thus have to collect culling fees on a number of prolific animals, during the hunting season. In addition to those high fees paid by hunting tourists, private promoters are leasing hunting lodges to house the tourists in these areas. In the PNNK area and in the Saloum Delta alike, this is an emerging sector. During the hunting season, one single lodge can accommodate up to 20 hunters per week, collecting receipts in excess of US\$7,300 per week. Data for the past five years provided by the lessees show that the number of hunters is on the rise at a rate of more than 10% per year. This sector is organized by clubs planning the tourists' stay entirely from their departure to their return to their homeland. In view of the sustainable profits generated by this activity, it is expected that the villagers will be able to protect biodiversity in the PAs as it is the excess game animals from the PAs that spill over into the leased community areas. The creation of Community Nature Reserves at the level of the villages bordering the PAs will allow those villages to participate in the development of ecotourism, where they will find promising outlets for other types of products such as artefacts, thus diversifying income sources. At the same time, these Community Nature Reserves will provide connections between the various PAs, contributing to environmental balance between the ecosystems.

## **12. Protected Area management and sustainability**

Co-management: This will be an innovation in Senegal, where the current legal status of the National Parks left little room for such an approach. The GEF alternative, by removing the legal, policy and institutional obstacles (Output 1), will lay the foundation for genuine stakeholders' participation and co-management of the National Parks. In Senegal, co-management responsibilities could be shared between a Steering Committee, an Implementation Committee, and a Management Committee.

The Steering Committee will be the entity in charge of guiding the programme, making decisions and validating the recommendations issued by the other committees. It will consist of representatives of DPN, DEFCCS, administrative authorities for the region or regions concerned, traditional and religious leaders of the RC adjacent to the Park, and individuals in charge of specialized institutions dealing with the conservation of biological resources. It will be convened at least once a year.

The Implementation Committee will be responsible for defining the general method to be applied to implement the programme, reviewing the various work plans and outputs, and supervising the monitoring and evaluation of the activities. Its membership will include the Rural Councillors of the RCs concerned and experts in the appropriate areas pertaining to the conservation of biological resources. This committee may be chaired by the presidents of the adjacent RCs on a bi-annual or annual rotation basis.

The Management Committee will provide its support for the execution of the programmes by coordinating in the field the activities of the sub-committees in charge of plant and animal resources. These sub-committees will consist of the various actors intervening on the ground, including women's groups, socio-professional organizations, transhumant livestock farmers, sedentary livestock farmers, areas lessees, hotel

managers, forest farmers, bee keepers, fishermen, crop farmers and processors of biological resource by-products.

Co-management will thus enable the actors and stakeholders to carry out all conservation activities in the PAs according to a specific work plan based on compromise decisions. In this regard, bee keeping, ecotourism, straw harvesting, consumption of forage by resident or transhumant livestock, harvest of various fruit in the multiple use firebreaks and supervision of the lessees activities will be carried out in conformity with rules adopted by all. In addition, as regards the distribution of profits from conservation, the populations will receive from the PAs an income representing equitable sharing of these profits. With variations depending on the sites and efforts put into conservation by the parties, a percentage of the receipts to be returned to the communities will be determined by the stakeholders themselves on a negotiated basis. Such profits will thus provide support for sustainable development in the VTs and the CNRs while serving to ensure the durability of the activities. Eventually, with the concertation framework, the SFIECE programme and the support of the eco-guards, the NPs are expected to achieve self-sufficiency as a result of the co-management regime. In addition, VT artistic and cultural products will be developed and promoted within the PA ecotourism activities.

Ecotourism: The GEF alternative will place particular emphasis on the development of ecotourism recognizing the fact that it is one of the very few options generating income from conservation without extracting resources from nature. The selected sites afford innumerable ecotourism potentialities. Visits to the PNNK exceed 2,000 per year and to the Saloum Delta no fewer than 1,000 visits per year. Policy options will endeavour to integrate ecotourism and NP management in order to remove the obstacles to self-sufficient management of the parks. With all hotel receipts, park entry fees, fines and confiscation of property, the revenues from the biodiversity conservation would amount to a minimum of US\$2,488,000 over the 7 year period. This figure is computed on the basis of a constant projection of the current visits, in a statu quo scenario.

Rents from eco-tourism, referring to sharing park entrance and other fees between PA and peripheral VTs, are expected to accrue to local communities. Although most ecotourism is a package deal gathered in home country of the traveler, there is significant scope for income generation at the local level through : sale of crafts; offering touristic attractions, such as fêtes, dances and theatrical shows; and offering accommodation and other services. Other sources of revenue will be from granting controlled hunting licences (both for CNR and PAs), and from fines and confiscations.

The GEF alternative is expected to make the parks, World Heritage sites and Biosphere reserves more attractive which would result in a significant increase in the number of visitors. According to this scenario, total receipts beyond baseline contributions are likely to exceed \$2.5 million with the total cost for the component for PA management improvement reaching US\$7,485,000. In other words, the durability of PA management will be assured, eventually, by the PAs' self-sufficiency once the legal obstacle to self-management has been removed (Output 1). The joint management initiative involving the local communities will help to enhance PA tourism potentialities, which will translate into improved biodiversity conservation and increased durability of the joint management activities, in particular as a result of the sharing of the profits from PA conservation. In this regard, an annual percentage of the profits to be determined in consultation with the stakeholders will be allocated to neighbouring VTs as a return and reinvested in the sustainable management of VT and CNR resources, feeding back into PA conservation (Outputs 2 and 3). To ensure a positive effect of this return, it would be advisable to conduct a study involving all of the actors so as to factor in, on an inversely proportional basis, the number of recorded infractions to the rules constituting illegal use of the PAs. Such a system would encourage the VT populations to cooperate and abide by the PA management rules and to denounce any individual, whether local or foreign, about to breach the regulations established and adopted by all stakeholders.

Bee keeping: Honey production will simultaneously generate sustainable income and protect the PAs where this activity is conducted. Conservation in this context is due to the fact that in the event of a forest fire, the bee keepers will be the first ones to want to extinguish it because of the threat to their production. Honey production while improving the local diet will also generate sustainable income through sales. The only obstacles to bee keeping is the lack of access to initial micro-credit for the populations of the isolated villages located at the PA periphery. The durability of this activity resides in its economic and financial profitability. For bee keeping, the initial funds required are for the purchase of a protective suit and chemicals to put the bees to sleep for 35 minutes. All told, this fireless bee keeping technique requires an initial investment of US\$100, plus the honeycombs. As one hive can yield at least 25 kg of honey and the price of honey is US\$11 per kg, profit for one hive is US\$175. For one season, a bee keeper can tend a minimum of 5 hives, with two harvest per season, making a net profit of US\$1,750 per season. The honey production season goes from March to July, which is also the latest period for forest fires, when they are most threatening. Bee keepers therefore take basic precautions to minimize the risks of fires which would destroy their hives using firebreaks.

Hay harvesting: As a consequence of village land degradation, straw to build or repair huts in the villages has become a scarce therefore expensive, commodity and its harvesting in the PAs, the only place where it is still available, is a lucrative activity. As a result, despite explicit prohibition on straw harvesting in the NPs and the dangers of confronting parks agents, the populations indulge in this activity either for their own personal use or to sell the straw which is in high demand as the hut roofs have to be redone every other year to remain water tight. The GEF alternative, while eliminating the obstacles to a conservative management of biological resources, will test the option of involving the riparian populations in the cleaning of peripheral firebreaks and of amending NP legal status so that they may use the straw collected in this manner to use or sell as they please. Such an activity will protect the ecosystems against bush fires and generate substantial sustainable income. The only obstacle is the current legal status of the NPs and nature reserves which prohibits the use of resources in these areas under any form whatsoever.

## ANNEX XII: PUBLIC INVOLVEMENT

### 1. Brief preparation and PDF B process:

The Senegal Protected Areas (SPA) project is a country driven initiative taken during the national biodiversity strategy formulation process. The SPA project received a GEF pdf B grant and co-financing from the Government of Senegal (GoS) as well as UNDP. The pdf B process was undertaken for 18 months between 1999 and 2000. The project preparatory activities included: (1) a series of consultations among country's biodiversity stakeholders regarding the selection of project sites and the significance of biodiversity for sustainable development; (2) participatory rural appraisal (PRA) exercises, that involved 150 villages and over 2,000 residents of four selected project sites, to gather biophysical and socio-economic data; (3) an objective oriented planning (ZOPP) exercise at each of the four project sites with the grassroots to determine the problems, solutions, results and actions required to conserve biodiversity at each site; and (4) a ZOPP synthesis workshop that lasted 5 days with 41 delegates, who were representing their constituent stakeholders from the four project sites.

Among the stakeholders that participated in the ZOPP exercises were representatives from public services and the LCs involved, village leaders, rural animators, transhumant and resident livestock farmers, tree farmers, fishermen, women's groups concerned with vegetable gardening and processing of sea products, lessees of hunting areas, vegetable producers, hotel managers, hunting camp managers, NGOs, staff of ongoing baseline projects, researchers, national consultants and the pdf B project technical staff. The ZOPP exercises resulted in a consensus on the problems of biodiversity and their root causes, solutions tree, expected outputs to meet the stated objectives, and activities to produce the expected outputs (see Logical Framework in Annex IV). Also indicators, their source of verification and risks were assessed during these workshops. The project site workshops were conducted in the national languages, but the national workshop was held in French, and they made it possible to quantify and budget the activities and to complete the project logical framework with full participation of the stakeholders. Baseline and incremental costs were assessed by national consultants with support from the project staff and finalization by UNDP-GEF headquarters; (6) resource mobilization efforts were lead by the ME for co-financing among the country's bilateral and multilateral donors; and (7) the project team drafted a brief (see references in Annex XIX) and made its translation from French into English. A letter of endorsement of the project by the Operational Focal Point (see Annex I) was then obtained. The draft brief was distributed to the donor community and members of the project steering committee. The discussions that followed with these institutions in addition to those held with ME and the country designated GEF Focal Point led to the finalization of the project brief.

The project covers four sites which were selected because of the presence of unique ecosystems relatively well conserved, their interconnectedness and the wealth and diversity of biological resources therein. The four sites correspond to ecological and socio-economic complexes that extend over a total 5.7 million ha of Protected Areas including 989,000 ha of National Parks, 266,250 ha of Classified Forests and 995,988 ha of Reserves. As one of its output, the project will be creating an additional 100 Community Reserves (CRs) as identified with the stakeholders during the PDF-B activities. Adjacent to these areas is a total of 24 Rural Communities including 1,014 villages with a total population of over 425,000 people to be involved in the project. The population includes various socio-professional categories that make out their living upon PA products. Some clear protected areas land for agriculture or grazing grounds, other collect fuel wood, undertake commercial logging, gather forest fruits, hunting for food or trophy, and many more work as hunting guides, tour guides or staff at the hotels located on park land or its periphery.

In supporting this PA biodiversity project, the GoS' objective is to provide sustainable benefits to a maximum number of people over the long term, while fostering development options for future generations. This will require a sustainable use of biological resources as recommended in the PNAE, the SNCB and the PNACB on which the present project is based. For this purpose, stakeholders will be full involved in the planning, development and management of both VTs and PAs to implement community-based biodiversity conservation and sustainable use. Participatory sustainable development of the VTs adjacent to the PAs is assumed here to serve as a socio-economic shield against the activities of poachers and illegal users of the PAs, while ensuring stakeholders' cooperation in the definition, adoption and respect of rules for the sustainable use of natural resources.

Participatory sustainable use will be based on four principles. First it will entail (1) encouragement of individuals and community initiatives by strengthening the stakeholders' capacities; (2) identification and implementation of incentives for conservation by reinforcing capacities through an SFIECE programme aimed at promoting the value of conservation in productive activities; (3) generation of income thanks to a credit programme for micro-projects about sustainable use of biological resources at all stages of production, transformation, conservation and commercialization, also integrating ecotourism activities; (4) promotion of the local know-how and artistic diversity in key selected activities, such as wood carving; and (5) promotion of improved control of the local institutions by the stakeholders and end-users by ensuring their training in planning, community-based co-management, monitoring, and evaluation of measures for the sustainable use of biological resources.

## **2. Project beneficiaries**

The project beneficiaries are the users of the goods and services pertaining to biological resources. They include mainly the poor rural dwellers, who depend on PA biological resources for their survival, as well as several socio-professional categories around the protected areas. Overall, project will involve and reach out a total of 24 RCs, 1,014 villages and 425,517 people. The benefits will consist of training, capacity building, co-management, conflict resolution, and equitable redistribution of wealth and services that accrue from sustainable use/management of biodiversity resources. The primary target population consists of the riparian groups (local communities) that live at the edge of the PAs, but at large there are five groups to benefit from the project. These include: (a) the poor rural dwellers; (b) the professional biodiversity resource users; (c) the civil servants and the civil society; (d) the private sector; and (d) future generations.

The first group of communities living around PAs contain the poorest segment of the rural population in Senegal. They often are landless, without much to invest or to purchase agricultural equipment and inputs. They daily see PAs as the main cause of their misgivings. Most of these live below poverty levels (<US \$1 per day) especially the women and the youth, who are the most vulnerable segment of the society. For this group, the project will first try to bring about their sympathy from their participation in PA co-management. Then the project will foster their food security by promoting better living conditions that are necessary for them to participate in generating global conservation benefits and sustainable development. The project will build on the baseline pertaining to poverty alleviation in identifying the obstacles to development and bringing appropriate solutions.

The second group of beneficiaries will be the professional resource users comprising forest operators, hunting zone lessees, agro-pastoralists, beekeepers, various women groups (vegetable gardening and fruit farming), fishermen, and actors in the processing, packaging and marketing channels of gathering, agricultural, fishing and dairy products. The project will bring to them the input they need to perform well in their sector of society by initiating catalytic initiatives, such as

micro-credit schemes and alternative source of income that are compatible with biodiversity conservation.

The project will also benefit a third group of public servants and the staff of the civil society made essentially of the PA agents, the eco-guards, CERP technical agents, NGOs, and other baseline projects. These would be provided training, extension services, demonstration of techniques for the sustainable use of biological resources, income diversification, alternative income sources, and sharing in the benefits derived from conservation.

The fourth group of beneficiaries, the private sector will also benefit from the positive effects of the project, in particular from eco-tourism and the distribution of cultural and artistic products from the villages benefiting hotels keepers, restaurant owners and village groups engaged in marketing of such artefacts as woven materials, baskets, sculptures and dyed fabrics.

Finally by safeguarding the ecological processes and the contemplative value of landscape and biodiversity conservation is assumed to provide development options for the last and fifth group, the future generations. The project will also ensure that benefits are redistributed in the VLs by establishing social infrastructures such as boreholes, hillside reservoirs, anti-salinization dykes and other hydraulic installations, and by assuming the recurrent operating costs. This redistribution will ensure the durability of the activities undertaken in the VLs, providing benefits to a great number of people over the long term, thus integrating future generations. The benefits will improve social cohesion and economic, cultural, biological and physical conditions, at the village, VT, CNR, RC, regional, national and even international levels when there are global environmental benefits

### **3. Strategies for Community and Public Involvement During Project Implementation**

Strategic approaches to community and public participation during project implementation were identified, detailed, adopted, and validated by the stakeholders during the PDF-B consultation processes, and they are described below. First of all, for each of the RCs adjacent to PAs, a plan for biological resource management will be made on the basis of the existing watershed plans in order to improve the management of natural resources without conflict and duplication of efforts. This will entail the participation of the RC leadership, especially its president, and the rural councillors of the village when it encompasses a whole RC and its watershed. For those watersheds involving several RCs, concertation will be sought among villages, and an inter-RC management committee will be created. All RCs adjacent to PAs will be represented on a Local Natural Resource Management Council (LNRMC); one representative for each RC will be elected by the rural councillors to sit on the board governing the PA in their vicinities; members of the governing board will assume chairmanship on a rotational basis. Secondly, at each RC level, plans for the management of natural resources of the PAs and VTs will be elaborated in a participatory manner to ensure integrated development.

In each village, a Village Group for the Community-Based Conservation of Natural Resources and Environmental Protection will be created. Each village group will include at least one representative of the Rural Councillors and will form several committees, particularly a Management Committee, Bush Fires Control Committee and a Vigilance Committee to monitor infractions to the rules elaborated for the VT planning and management. In connection with these local organizations and institutions, project activities will include the following set of strategies for public involvement:

- s) The formulation of a SFIECE programme and its implementation in cooperation with agents of the CERPs and technical services involved in natural resource management. The purposes of the SPIECE programme are: (1) to provide to villagers needed explanations on the project objectives, expected outputs, activities and role for each category of stakeholders; (2) to raise awareness of stakeholders about financial and environmental benefits and their bearings on the project expected outputs; (3) to define the roles and responsibilities of each category of stakeholders; (4) to define clearly the role of the concertation committees that would reinforce solidarity of the stakeholders to ensure synergy of their activities for the sustainable improvement of living conditions and to mitigate conflicts; (5) to seek consensus in decision making for the management and sustainable use of biological resources; (6) to implement community-based monitoring and evaluation of project activities and their adaptation to the evolving biophysical conditions as well as socio-economic values that would be integrating local knowledge and know-how; (7) to ensure transparency of the decision-making processes to obtain popular approval of project activities; (8) to adopt and disseminate successful pilot activities in areas not directly involved in the project.
- t) Prospective village trainers will be identified, to receive training in management, communication and dissemination of new techniques and technologies for the sustainable management of biological resources. Once trained, these village trainers will become members of the local NRM Councils and of the Village Groups for Community-Based NR Conservation; they will play a key role within the village committees according to their areas of competence;
- u) Each of these Village Groups will be represented on the Local NRM Council by one elected member to represent the interest of the villages in generating win-win solutions, while also promoting conservation concerns during RC meetings/deliberations;
- v) Regular meetings will be held for collective discussion on activities regarding the planning, development and management of natural resources both at RC and VT levels, in order to take into account everybody's concerns;
- w) Project implementation agreements will be negotiated and signed between the RCs and villagers' leadership and other villagers' organizations;
- x) A map depicting the limits of village lands will be established and for each VT, a land use plan as well as a plan for the management of natural resources will be elaborated with the rules and provisions for implementation of those plans through own financing form villagers' savings and credit schemes out of conservation oriented micro-projects;
- y) A map of the PAs will be established and their limits will be materialized on the ground; for every PAs, a Governing Council involving the adjacent RCs will be instituted, with RC representatives assuming chairmanship on a rotation basis;
- z) A Project Steering Committee will be established for each of the four project sites with one representative of each adjacent RC to PAs;
- aa) Study tours will be organized for rural stakeholders to visit project sites in other VTs to promote exchanges of experience and expertise regarding sustainable use of biological resources;
- bb) Community Nature Reserves will be delimited and their sustainable management will



be instituted through promotion of eco-tourism and leasing of hunting areas under the control of eco-guards and tour guides recruited from the villages;

- cc) All these actions will also involve both the staff of the public domain especially those of the NPs, the agents of the Water and Forestry Service and, at the grassroots community levels, the agents of the CERP multidisciplinary teams and locals NGOs. These agents will establish the SFIECE programme and provide technical and methodological guidance to implement the activities; they will also participate in inter-group visits. This structural organization will contribute to ensure the success of post-project activities in view to sustain the entities involved at the grassroots levels;
- dd) Under the project implementation agreements, the RCs will guarantee access to land to people living around the PAs in order to benefit from eco-development without opposing conservation of biodiversity;
- ee) Both at RC and VT levels, monitoring and evaluation committees will be instituted to assess the nature of the products and benefits obtained from alternative income-generating activities linked to conservation, to identify the weaknesses to remedy them, and to identify existing potentials to promote them and disseminate lessons learned;
- ff) In each VT, project disengagement will be effective after three years and the monitoring and evaluation committees will work in close collaboration with the project team to capitalize on lessons learned, in order to increase the chances of success of VT activities during the project maturity phase;
- gg) At each RC level, annual discussions will be held on the results obtained from socio-economic development and sustainable conservation of natural resources to disseminate lessons learned;
- hh) The VTs, where project disengagement has been successfully completed, will contribute advice and conduct information exchanges to other VTs where activities are underway so that they may benefit from their experience;
- ii) Information garnered throughout the project will be recorded in socio-economic and biophysical databases to serve other projects, NGOs and village groups outside the 4 project sites to ensure dissemination of learned lessons; and
- jj) The project will also report regularly on its achievements to ME and UNDP for consideration within the Country Cooperation Framework and programmes implemented with other development partners.

#### **4. Stages to Ensure Community Participation**

In order to ensure the durability of the expected outputs, the activities identified with the stakeholders during the formulation of the logical framework will necessitate: (1) legal backing of initiatives in connection with the sustainable management of biological resources; (2) strengthening stakeholders' capacities through the project's Environmental, Training, Information, Education and Communication programme together with planning, development and management activities; (3) integration of local knowledge and know-how during the project implementation, and evaluation and monitoring stages. For this purpose, the project will build respectively on the needs, capacities, knowledge of the grassroots actors in seven stages.

The seven stages of the process required to achieve the objectives of community-based biodiversity conservation will be as follows:

## **PHASE ONE**

Stage 1: Preparation stage. It consists of all preliminary activities required for the implementation of a good project, including in particular:

- § Selection of public entities and NGOs which need to be involved in animation, organization and training of the grassroots actors;
- § Organization of the Rural Councils of the various concerned RCs at each site into Local NRM Councils;
- § Organization of the populations of VTs adjacent to PAs in structured groups with specific committees;
- § Identification and selection of rural trainers to be trained by the project;
- § Elaboration of the SFIECE programme;

Stage 2: RC and VT recruitment stage. This stage will gradually involve the RCs and VTs adjacent to PAs and will include the following activities:

- § Implementation of SFIECE programme to clarify the expected benefits and eligibility criteria of RCs, Villages and Groups to the savings and credit programmes for the implementation of alternative options designed to generating income from conservation.
- § Elaboration and signature of implementation agreements with RCs;
- § Elaboration and signature of protocols with VTs concerned, with counter-signature of the RC or RCs involved;
- § Realization of VT and PA maps;
- § Materialization of VT and PA limits;

Stage 3: Planning stage. It involves community activities to elaborate the plans for development and sound management of natural resources and their validation. This includes:

- § Survey of traditional knowledge, local knowledge and know-how in the area of community-based conservation of natural resources;
- § Elaboration of VT development plan including establishment of Community Nature Reserves;
- § Elaboration of the VT and PA resource management plan;
- § Elaboration of community rules for natural resource management;
- § Evaluation of the VT and PA plans as formulated, through public discussions;
- § Validation of each VT and PA development and management plans by the village(s) and RC(s) involved;
- § Taking stock of VT and PA natural resources to establish the pre-project baseline;
- § Elaboration of a community-base natural resource conservation programme including a participation plan specifying in detail the roles and responsibilities of the stakeholders;
- § Establishment of a local entity in charge of the project involving RCs and VTs, with elaboration of the Local project organization chart;

## **PHASE TWO**

Stage 4 : Implementation of the community-based programme for the conservation of natural resources. This stage will include the following activities:

- § Continued implementation of the SFIECE programme;

- § Establishment of the savings and credit scheme with definition of eligibility criteria;
- § Dissemination of eligibility criteria for micro-project credits to be entrusted to a local bank in order to avoid negative reactions on the part of the grassroots partners toward the project in case credit is denied;
- § Instauration of the various decision-making, supervisory and control entities both at RC and VT levels;
- § Participatory monitoring and evaluation and capitalization of lessons learned;
- § Dissemination of lessons learned through inter-group visits, discussions and publications on acquired knowledge and monitoring of biodiversity;
- § Equitable sharing in the profits derived from conservation activities; and
- § Strengthening cooperation by fostering solidarity among stakeholders;

Stage 5: Leveraging stage. This will consist of actions to leverage the results obtained in order to ensure the continuation of conservation activities into the post-project stage. Activities of the fifth stage will include:

- § Strengthening the role of Village Groups and Committees in local decision-making regarding the planning, development and sustainable management of natural resources;
- § Convening periodic meetings between stakeholders, with RC involvement; and
- § Strengthening the vigilance committees for sustainable natural resource management.

### **PHASE THREE**

Stage 6: Project disengagement stage. Activities included in this sixth stage are those required prior to project disengagement. They will vary according to the findings of the monitoring and evaluation and the capitalization of lessons learned.

Stage 7: Disengagement stage. This will mark the total pull-out of the project and termination of financial support and guidance activities. After project disengagement in given RCs and VTs, the allowed actions there will be those to extract lessons learned in order to enhance chances of success for the next VTs to benefit project support.

## ANNEX XIII: IMPLEMENTATION ARRANGEMENTS

The project will be executed under the National Execution modality by the Ministry of Environment (ME) with the assistance of UNDP. Ministry of Economy and Finance (MEF) will provide financial supervision and will open a bank account for the project. GoS will undertake to transfer a total of US\$1.519 million in budgetary allocations to this bank account, in three equal instalments to coincide with the beginning of each project phase.

The project will be implemented by a streamlined Project Coordination Unit (PCU) based in Dakar and placed under the direct technical oversight of the Ministry of Environment (DPN), and under the supervision of UNDP-GEF, UNDP-Senegal, and the MEF. The PCU will be responsible for the design, planning, monitoring, evaluation and adaptation of the project to the new visions of the stakeholders and for the timely production of the expected outputs. Four streamlined Field Units will also be established in each project zone. The Field Units will work directly through PA, CERP and other Ministry agencies, as well as local NGOs.

Under DPN supervision, the NP Curators concerned, together with the Regional Inspectors of Water and Forestry Agriculture, Livestock and Fisheries together with their staff will be the linchpins for project implementation on the ground in their areas of competence. PA agents will focus on the NPs and surrounding areas including the CNRs. The Water and Forestry agents will focus on the Classified Forests and CNRs in synergy with the NP agents and the Livestock Service agents. Finally, the agents in charge of agriculture and fisheries, with support of the Livestock and Water and Forestry Services, will focus their activities on the VTs to ensure the environmentally sound intensification of the production systems. At VT level the CERP and NGO team will ensure the implementation of the project, acting in connection with the parks' curators, and the eco-guards. In this regard, a series of capacity-building activities will be conducted in particular for the benefit of DPN and DEFFCS so that by project completion, the capacities required to ensure appropriate sustainability of the activities will be in place.

The Project Steering Committee (PSC) is formed by CONSERE which is an entity in charge of coordinating government actions as regards the management of the interfaces between development and environmental protection. CONSERE is presided over by the Prime Minister and its Secretariat is provided by the Ministry of Environment. This body also includes the Ministry of the Interior overseeing NGOs and CERPs in order to ensure consistency and integration of grass root actions. UNDP/GEF and/or UNDP-Senegal will also be part of the Project Steering Committee.

A Scientific and Technical Committee will be established to include prominent members of the academic and research establishment in Senegal. The role of this Committee will be to evaluate project impact and provide guidance on technical specifications, in particular bringing to the attention of the project staff pertinent innovations that could be tested or replicated in the project site during its 10 years.

The following two organigrams provide a description of (a) existing public structures; and (b) the project's organizational chart.

### **Cooperation and Co-financing arrangements**

GoS has agreed to commit US\$ 1.050 million from its national budget for the project. Other co-financing is considered in-kind and will entail : staff salaries, premises, equipment, etc. Given the participatory nature of the project, it is expected that local communities will also contribute in-kind resources (labour, minor equipment, land), but these have not been quantified. UNDP has committed US\$ 1.650 from the core resources of its 2002-2004 CCF to the project. Assuming that the project will show successful results during

its first phase, it is likely that such cash co-financing will continue in the next two CCF cycles. UNDP co-financing is expected to gradually diminish towards the third phase so as to ensure an orderly phase-out. Cooperation and synergies will be built with the soon to be prepared GEF/WB project for Coastal Zone Management. These modalities will be discussed and fine-tuned during the feasibility stage of this project, but can include for example : coordination through CONSERE at the national level; joint project meetings in Niaye and Saloum at regular intervals; and common choice of local implementing agencies, such as IUCN in Saloum.

In addition, the co-financing arrangements with three projects have already been negotiated. Other coordination arrangements will be determined during the Feasibility Study. These projects are the AGIR (Transboundary project for Niokolo-Koba National Park and Badiar National Park in Guinea); the Coastal Zone Afforestation Project for Niaye (JICA); and the Dutch/IUCN project support to PNDS. Other co-financing is expected to be negotiated during the feasibility stage of the project with USAID, GTZ and CIDA.

The AGIR project will start March 2001 and run for four years. Based on an agreement reached with the AGIR project in February 2001, that project will use its co-financing for zoning of the PNNK, construction of a ferry, rehabilitation of dirt roads, and construction of eco-tourism camps. It will also support the Dalaba Training Center (equipment, training of trainers); and conduct awareness raising actions in surrounding villages.

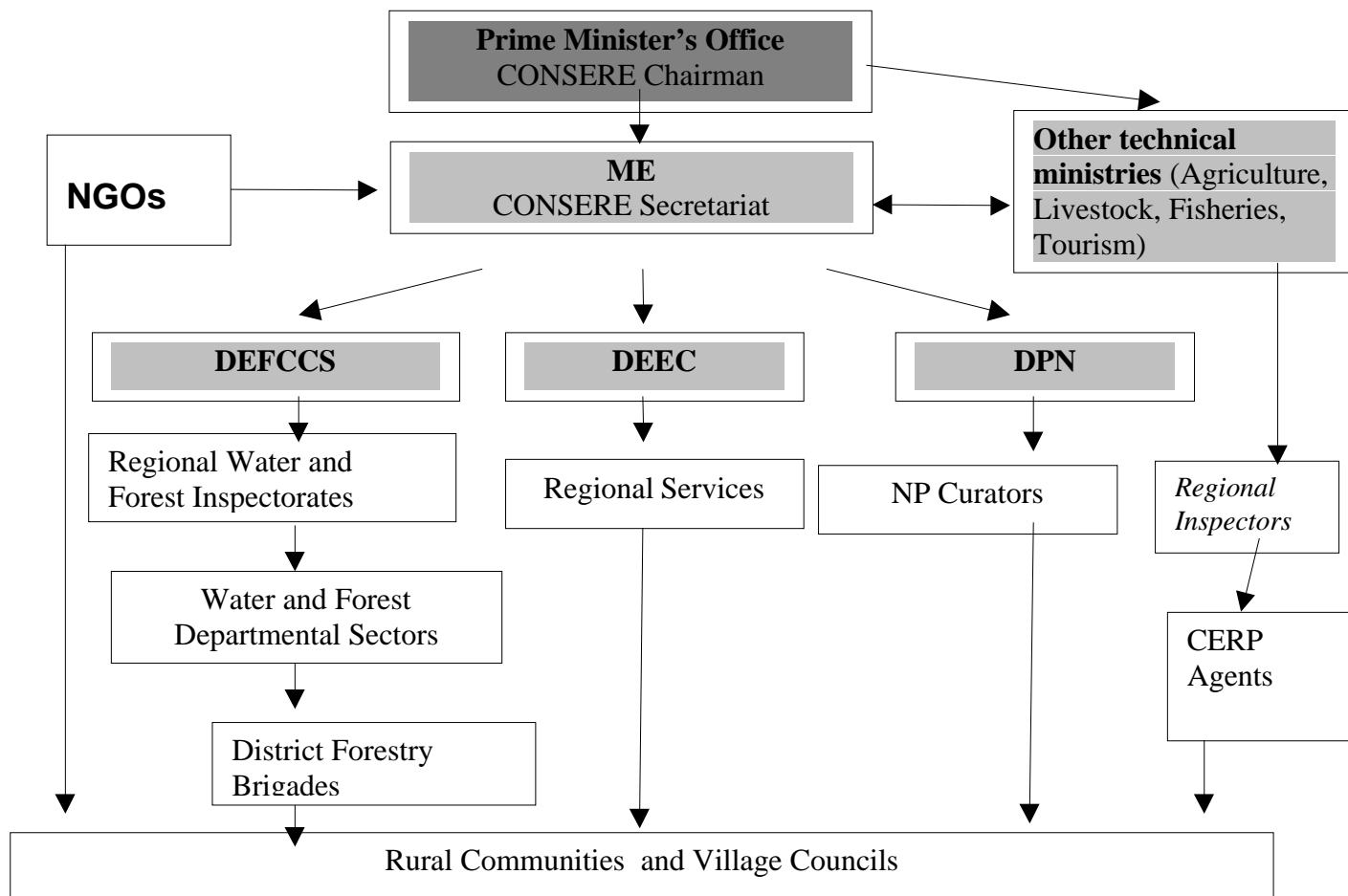
Based on agreement reached with the Niayes Coastal Afforestation Project, the co-financing from this project will bear the cost of large-scale sand dune fixation in the coastal region of Thies and Louga (through a subcontract with the private sector). The GEF project will bear the cost of community based windbreaks around inter-dunal vegetable gardens, which will help to extend the impact of the large scale afforestation closer to the communities. The JICA project will start in 2001 and will run for 10 years, for a total cost of US\$13.192 million. It is expected to result in 2037 hectares of fixed sand dunes or 101.850 km wide by 200 m strip of tree plantations. Only one fourth of this plantation is expected to directly cover the GEF project site, therefore co-financing is estimated at US\$3.298 million.

In the PNDS, the Netherlands funded project (through IUCN) will start in 2002 and run until 2004, for a total of US\$ 2 million. Negotiations have been held to re-align this support so as to constitute co-financing for the UNDP-GEF project. The IUCN/Dutch project will cover activities related to some of Component 2 and Component 3, and all Component 4 activities only in the Saloum Delta. The two projects will arrange yearly coordination meetings between the project field units, and further coordination will be ensured at the national level through CONSERE and the Project Steering Committees. Wherever possible, joint monitoring and evaluation activities will be conducted.

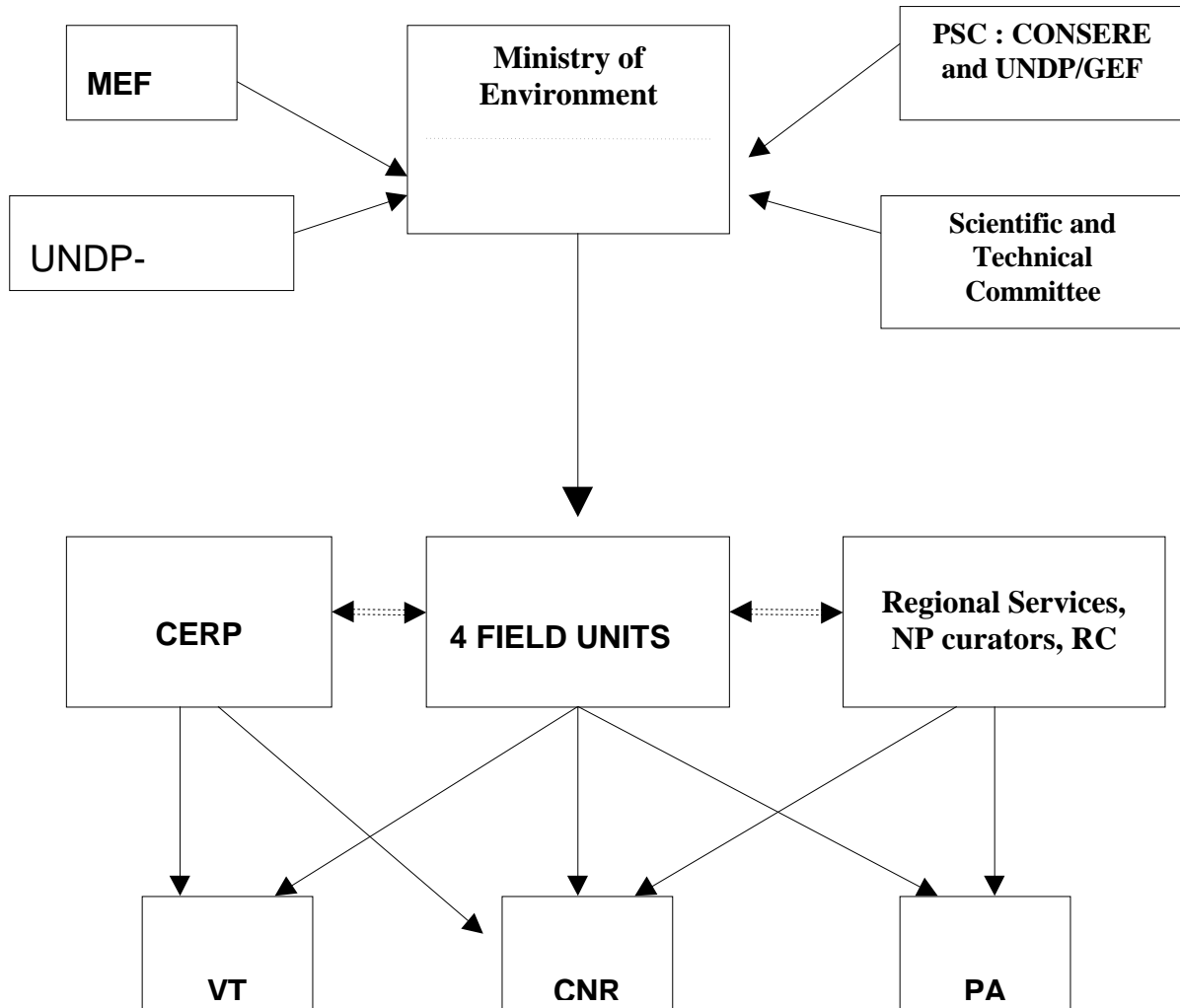
The FFEM and FAC are financing a project for support to PNNK for \$608,000. The project started in 1997 and will terminate soon. It has helped PNNK in some preliminary infrastructure development (e.g. sign posts, gate, etc.) ; initiated discussion on co-management planning with PNNK staff; and conducted preventive awareness campaigns in a few selected villages in the northern and western borders of the Park where threats to biodiversity are not very strong. By the time the GEF project comes on line, it is expected that the FFEM project will have been completed. However, if the FFEM project is re-financed for a second phase, then cooperative arrangements will be established in order to avoid duplication and build synergies.

The project will be closely with the 11 projects listed as Associated Projects, by having yearly coordination meetings, and in closely designing interventions so as not to duplicate efforts.

**Annex XIII a. Environmental Management Institutions in Senegal**



**ANNEX XVIII: Project Organizational Chart and Implementation**



## ANNEX XIV: Thematic Areas and Types of Project Activities

Thematic Areas						
Biodiversity		Climate Change		International Waters		Ozone Protection
Conservation 4		Energy conservation (prod./distribution) 4		Transboundary Analysis		Monitoring:
in situ 4	Ex situ		ESCO's	Efficient Designs 4	Strat. Action Plan Development	ODS phase out (Production)
Sustainable Use 4		Solar:		Freshwater Basin		ODS Phase Out (Consumption)
Benefit-sharing 4		Biomass: 4		Marine Ecosystem 4		Other:
Agrobiodiversity		Wind:		Wetland Habitat 4		
Trust fund		Hydro:		Ship-based		
Ecotourism 4		Geothermal:		Toxic Contaminants		
Biosafety		Fuel cells:		Demonstration 4		
Policy & Legislation 4		Methane recovery:		Fisheries Protection 4		
Buffer Zone Dev. 4		Other: Carbon sequestration 4		Global Support:		
b. Categories of General Interest						
Investment 4		Technical Assistance 4		Targeted Research 4		Land Degrad. 4
Technology Transf. 4		Small Islands		Info/Awareness 4		Private Sector 4



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# Cover Note

**Project Title: Integrated Ecosystem Management in Four Representative Landscapes of Senegal**

**Date: 5 March 2001**

	Work Program Inclusion	Reference/Note:
<b>1. Country Ownership</b>		
Country Eligibility		Senegal has ratified the CBD and is eligible for UN assistance.
Country Drivenness	Clear description of project's fit within: National reports/communications to Conventions National or sector development plans Recommendations of appropriate regional intergovernmental meetings or agreements.	Para. 27 shows project fit with national communications to conventions Paras. 28-30 show project fit with national sectoral plans
Endorsement	Endorsement by national operational focal point.	OFP endorsement dated 27 July 2000 on file
<b>2. Program &amp; Policy Conformity</b>		
Program Designation & Conformity	Describe how project objectives are consistent with Operational Program objectives or operational criteria.	Para. 63 shows project consistency with OP 1 and 12.
Project Design	Describe: sector issues, root causes, threats, barriers, etc, affecting global environment. Project logical framework, including a consistent strategy, goals, objectives, outputs, inputs/activities, measurable performance indicators, risks and assumptions. Detailed description of goals, objectives, outputs, and related assumptions, risks and performance indicators. Brief description of proposed project activities, including an explanation how the activities would result in project outputs (in no more than 2 pages). <sup>1</sup>	Para. 1-15 provide global significance; and Annex 7 gives more details. paras. 16-26 provide socio-economic issues and threats and root causes to biodiversity; and Annex 8 gives more details. threats and barriers are summarized in paras. 36-43; and matrix provided in Annex 10. Baseline course of action is summarized in paras. 44-53 Annex 3 gives the Logical Framework, and 67-72 summarize the LFA.

<sup>1</sup> A project/program could undertake detailed design (specification of project outputs) during the first phase of implementation, with clear benchmarks for approval of the subsequent phase. A project could also be an adaptable program loan with several phases, where achievement of the clear benchmarks at the end of each phase is a necessary condition for approval of the next phase. In such projects, describe in detail the project output for the first phase and describe briefly the project activities for that phase.

	Work Program Inclusion	Reference/Note:
	<p>Global environmental benefits of project.</p> <p>Incremental cost estimation based on the project logical framework</p> <p>Describe project outputs (and related activities and costs) that result in global environmental benefits</p> <p>Describe project outputs ( and related activities and costs) that result in joint global and national environmental benefits</p> <p>Describe project outputs ( and related activities and costs) that result in national environmental benefits</p> <p>Describe the process used to jointly estimate incremental cost with in-country project partner</p> <p>Present the incremental cost estimate. If presented as a range, then brief explanation of challenges and constraints and how these would be addressed by the time of CEO endorsement</p>	<p>Global environment benefits are described in parag 73, and in Annex 2.</p> <p>Project Objectives are given in paras. 54-55</p> <p>Paras. 56-57, and 59 provide the project strategy and sites</p> <p>Paras. 60-62 describe project phasing, and Annex 6 gives more details</p> <p>Para 58 summarizes the GEF increment, and Annex 2 provides incremental cost estimation, as well as description of global and national benefits</p> <p>Annex 12 and 13 describe the process and results of negotiation of incremental costs with partners</p> <p>Detailed incremental cost analysis is given in Annex 2.</p>
Sustainability (including financial sustainability)	Describe proposed approach to address factors influencing sustainability, within and/or outside the project to deal with these factors.	<p>Para. 76-77 describes the approach to address economic and financial sustainability</p> <p>Para 77 describes the approach to address institutional sustainability</p>
Replicability	Describe the proposed approach to replication,(for e.g., dissemination of lessons, training workshops, information exchange, national and regional forum, etc) (could be within project description).	Para79 describes the proposed approach to replicability
Stakeholder Involvement	<p>Describe how stakeholders have been involved in project development.</p> <p>Describe the approach for stakeholder involvement in further project development and implementation.</p>	Para. 80 summarizes stakeholder involvement, and Annex 12 describes in detail the involvement to date, and the participatory approach in project implementation
Monitoring & Evaluation	Describe how the project design has incorporated lessons from similar projects in the past.	Para 66 summarizes how lessons learnt were incorporated, and Annex XI provides

	Work Program Inclusion	Reference/Note:
	<p>Describe approach for project M&amp;E system, based on the project logical framework, including the following elements:</p> <p>Specification of indicators for objectives and outputs, including intermediate benchmarks, and means of measurement.</p> <p>Outline organizational arrangement for implementing M&amp;E.</p> <p>Indicative total cost of M&amp;E (may be reflected in total project cost).</p>	<p>detailed technical specifications based on lessons learnt.</p> <p>M&amp;E system is summarized in para.85; and described in para. 72.</p> <p>Annex 3 provides verifiable indicators.</p> <p>Annex 6 provides benchmarks at end of each phase</p> <p>Para 85, and Annex 13 provide organizational arrangements for implementation of M&amp;E.</p> <p>Indicative Costs of M&amp;E are reflected in Component 5.</p>
<b>3. Financing</b>		
Financing Plan	<p>Estimate total project cost</p> <p>Estimate contribution by financing partners.</p> <p>Propose type of financing instrument</p>	<p>Paras 83-84 and the Output Table provide the financing plan including total project cost and co-financing.</p> <p>Annex 6 breaks down project cost by phase, output and source.</p> <p>Annex 13 describes the co-financing arrangements with major partners</p>
Implementing Agency Fees	Propose IA fee	
Cost-effectiveness	<p>Estimate cost effectiveness, if feasible.</p> <p>Describe alternate project approaches considered and discarded.</p>	<p>An alternative project approach considered initially by GoS was to have a massive investment of \$40 million to cover all PAs and surrounding VTs. This approach was discarded in favor of a demonstration approach covering a sample of PA (18%) and VT (10%).</p>
<b>4. Institutional Coordination &amp; Support</b>		
IA Coordination and Support Core commitments & Linkages	<p>Describe how the proposed project is located within the IA's: Country/regional/global/sector programs.</p> <p>GEF activities with potential influence on the proposed project (design and implementation).</p>	<p>Para 64 provides linkages to UNDP programmes.</p> <p>Para 65 provides linkages to other Donor programmes</p>
Consultation, Coordination and Collaboration between IAs, and IAs and EAs, if appropriate.	<p>Describe how the proposed project relates to activities of other IAs (and 4 RDBs) in the country/region.</p> <p>Describe planned/agreed coordination, collaboration between IAs</p>	<p>Para 64 and 65 show coordination with relevant GEF/WB projects</p> <p>Annex 13 describes coordination arrangements in project implementation.</p>

	Work Program Inclusion	Reference/Note:
	in project implementation.	
<b>5. Response to Reviews</b>		
Council	Respond to Council Comments at pipeline entry.	
Convention Secretariat	Respond to comments from Convention Secretariats .	
GEF Secretariat	Respond to comments from GEFSEC on draft project brief.	All comments at PDF B entry addressed; including suggestion to phase the project.
Other IAs and 4 RDBs	Respond to comments from other IAs, 4RDBss on draft project brief.	All comments at PDF B entry addressed.
STAP	Respond to comments by STAP at work program inclusion	
Review by expert from STAP Roster	Respond to review by expert from STAP roster. <sup>2</sup>	

<sup>2</sup> STAP Roster Review, and IA response, is a required annex of the project brief.