

Project Document

United Nations Development Programme
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Ministry of the Environment (MMA) of the Federative Republic of Brazil

Effective Conservation and Sustainable Use of Mangrove Ecosystems in Brazil (PIMS 3280)
Atlas Project No.00055992

Summary

Mangrove ecosystems are among the most productive on earth, supporting globally significant biodiversity and providing resources and environmental services that underpin economic activities and ensure the environmental integrity of coastal areas. Moreover, their role in increasing the resilience of coastal ecosystems, communities and economic activities to climate change is increasingly recognized. While Brazil has put in place a comprehensive framework for ensuring that mangrove ecosystems are conserved, there are a number of weaknesses in the systems which undermine the deliver of effective protection. The result is the loss of mangrove habitats and the provision of resources on which many communities and sectors depend. This project will directly address this problem by tailoring existing protected area management tools in the National System of Conservation Units (SNUC) to address the specific characteristics of mangrove ecosystems and increase capacities for their implementation, thus establishing minimum standards and improved approaches to mangrove conservation and sustainable use across the country. In doing so it would provide the operational consolidation of a sub-set of mangroves PA based on field tested innovative management approaches in both sustainable use and strict conservation categories thus advancing the maturation of the SNUC. The result would be direct conservation benefits to 568,000 ha of globally significant mangroves, positive impacts on the livelihoods of some of the poorest segments of Brazilian society and a framework through which lessons learnt could be replicated to all Brazilian mangrove ecosystems and others globally.

The long term goal of this project is the conservation and sustainable use of Brazil's mangrove ecosystems and the environmental services and functions important for national development and the well-being of traditional coastal communities. The Project objective is to contribute to this goal by providing a field tested protected area management strategy that is adopted for the effective conservation of a representative sample of mangrove ecosystems in Brazil. This will be achieved through four Outcomes: (i) The enabling environment for a sub-system of mangrove ecosystem PA is in place, including policy, regulatory, and financial mechanisms. This will also provide an enabling environment for the implementation, sustainability and replication of the Project strategy (ii) Replicable models are in place for the management of mangrove resources in SNUC sustainable-use protected areas. This will focus on environmental and pro-poor issues through working with communities to improve the sustainability of their livelihoods; (iii) Conservation of mangroves is improved by piloting the alignment of UC management with sectoral and spatial planning. This will tackle barriers from a sectoral perspective; and (iv) Mangrove-related outreach, dissemination and adaptive management will be increased. This will focus on M&E and information generation for adaptive management of mangrove PAs and their resources. The Project will be executed by Brazil's Ministry of the Environment (MMA), in cooperation with IBAMA, with UNDP acting as the GEF implementing agency.

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Acronyms

ANA	National Water Agency (Agencia Nacional de Agua)
APA	Environmental Protection Area (Área de Proteção Ambiental)
APP	Area of Permanent Preservation (Área de Preservação Permanente)
CBD	Convention on Biological Diversity
CGEAM	IBAMA's General Coordination for Environmental Education (Coordenação Geral de Educação Ambiental)
CI/Brazil	Conservation International/Brazil
CNPT	National Centre of Traditional Populations and Sustainable Development (Centro Nacional de Populações Tradicionais)
CNRH	National Water Resources Council (Conselho Nacional de Recursos Hídricos)
CNZU	National Wetlands Committee (Comitê Nacional de Zonas Úmidas)
CONABIO	National Biodiversity Commission (Comitê Nacional de Biodiversidade)
CONAMA	National Environmental Council (Comitê Nacional de Meio Ambiente)
CoP 7	7th Conference of the Parties
CP	Country Programme
CSO	Civil Society Organization
CTM	Comitê Técnico de Manguezal
DAI	Directorate of Institutional Cooperation (Diretoria de Articulação Institucional)
DAP	MMA's Directorate of Protected Areas (Diretoria de (Áreas Protegidas)
DCBio	MMA's Directorate for the Conservation of Biodiversity (Diretoria de Conservação de Biodiversidade)
DIFAP	IBAMA's Directorate of Fauna and Fisheries Resources (Diretoria de Fauna e Recursos Pesqueiros)
DIREC	IBAMA's Directorate of Ecosystems (Diretoria de Ecossistemas)
DISAM	IBAMA's Directorate of Socio-Environmental Development (Diretoria de Desenvolvimento Socio Ambiental)
EEZ	Ecological-economic zoning
EIA	Environmental Impact Assessment
EMBRAPA	Brazilian Agricultural Research Enterprise (Empresa Brasileira de Pesquisa Agropecuária)
FAO	United Nations Food and Agriculture Organization
GEF	Global Environment Facility
GoB	Government of Brazil
HDI	United Nations Human Development Index
IADB	Inter-American Development Bank
IBAMA	Brazilian Institute for the Environment and Renewable Natural Resources (Instituto Brasileiro de Meio Ambiente e dos Recursos Naturais Renováveis)
ICMS-E	Ecological value-added tax (Imposto sobre Circulação de Mercadorias e Serviços Ecológicos)
INCRA	National Institute of Settlement and Agrarian Reform (Instituto Nacional de Colonização e Reforma Agrária)
MMA	Ministry of the Environment (Ministerio do Meio Ambiente)
MYFF	Multi-Year Funding Framework
NBS	National Biodiversity Strategy
NGO	Non-governmental Organization
NZCM	Ministry of the Environment's Coastal and Marine Zone Division (Núcleo da Zona Costeira e Marinha)
OEMA	State Level Environmental Agency (Orgão Estadual de Meio Ambiente)
OSCIP	Public Interest Civil Society Organizations (Organizações da Sociedade Civil de Interesse Público)
PA	Protected Area

PAN-Bio	Action Plan for the Implementation of the National Biodiversity Policy (Plano de Ação para a Implementação da Política Nacional de Biodiversidade)
PNAP	National Protected Areas Plan (Plano Nacional de Áreas Protegidas)
PROECOTUR	IADB Program for the Development of Ecotourism in the Amazon (Programa Para o Desenvolvimento do Ecoturismo na Amazônia Legal)
RAPPAM	Rapid Assessment and Prioritization of Protected Area Management
RESEX	Extractive Reserve (Reserva Extrativista)
RIMA	Environmental Impact Report (Relatório de Impacto Ambiental)
SEAP	Special Secretariat for Aquaculture and Fisheries (Secretaria Especial de Aquicultura e Pesca)
SEBRAE	Brazilian Small and Medium Enterprise Support Service
SNUC	National System of Conservation Units (Sistema Nacional de Unidades de Conservação)
UC	Conservation Unit (Unidade de Conservação)
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

SECTION I: Elaboration of the Narrative

PART I: Situation Analysis

CONTEXT

Mangroves as complex coastal ecosystems

1. Mangroves are among the most productive ecosystems on earth. They are considered 'key ecosystems' as they provide a wide variety of environmental services that support economic activities and ensure the environmental integrity of coastal areas, as well as housing a wide array of species. The 2005 Millennium Ecosystem Assessment¹ groups these services into four categories: *provisioning* services, such as building materials for houses and fisheries resources for local consumption and for commercial purposes; *regulating*, including recharge and discharge of groundwater and providing shoreline protection; *cultural*, including ancestral or sacred sites and more recently tourist destinations; and *supporting* services essential to the maintenance of plant and animal life cycles in these areas and the associated ecosystems such as coral reefs, estuaries, coastal lagoons, and inland terrestrial habitats. See *Annex I for details on mangrove services*.

2. As coastal wetland ecosystems, mangroves are physically and biologically fragile and have very complex hydrological balances. They are characterized by salt-tolerant mangrove forests and a transition zone (ecotone) known as '*tannes*' (or *apicum*) on the inland side of the mangrove forest. These *tannes* are sandy areas with sparse vegetation and an extensive network of channels running across them. They play a key role in mangrove forest functionality and maintaining diversity. Variations in high and low tides leave a cover of phytoplankton on sandy ground, forming the basic level of the food chain. *Tannes* are also reservoirs of nutrients for the mangrove ecosystem and are essential in maintaining their mineral and organic balance. At low tide, the network of canals distributes nutrients and regulates temperature, salinity, pH, and channels freshwater from ground sources to rivers and streams. At high tide, these canals flood and serve as conduits for spreading seeds throughout mangrove areas for germination and thus contribute to maintenance of vegetation in the mangrove ecosystem. *Tannes* are home to various species of crabs and mollusks and are frequented seasonally by migratory birds.

Brazil's mangrove ecosystems

3. Brazil's mangrove ecosystems cover an estimated 13,400 km² corresponding to 9% of the world's mangroves². The states of Maranhão and Pará alone house the largest swath of mangroves in the world and represent 57% of the country's total mangrove cover³. This includes two Ramsar sites⁴, the *Baixada Maranhense* and the *Reentrâncias Maranhenses*. This latter site forms part of the Western Hemisphere Shorebird Reserve Network. Mangroves are not only restricted to these two States. They are spread along approximately 80% of the country's 7,367 km coastline, covering 16 States, from the Oiapoque River mouth in Amapá in the North, to the Laguna Jaguaruna border in the state of Santa Catarina in the South.

4. Given this vast extension and the biophysical diversity of the coastline, there is considerable regional variability in Brazil's mangrove ecosystems. According to Dinerstein et al., they represent 7 of the 37 mangrove eco-regions classified as having high significance for conservation in LAC⁵. Based on a

¹ Millennium Ecosystem Assessment. 2005.

² Globally, mangrove ecosystems cover an area of 162,000 km², approximately 30% of which are found in Tropical America.

³ Souza-Filho, 2004.

⁴ Brazil ratified the Ramsar Convention on Wetlands (Ramsar - Iran, 1971) in 1996. With 6,456,896 ha of wetlands designated as Ramsar Sites, Brazil is the country with the seventh largest area recognized as Ramsar sites.

⁵ Olson, D. M., et al. 1996. lists 37 mangrove ecoregion in LAC.

classification developed solely on Brazilian mangroves and marshes, eight physical-environmental units can be differentiated, each with similar environmental and physiographic conditions and specific environmental processes⁶. Each unit has broadly similar systems in terms of productivity levels, vulnerabilities and responses to disturbances, and is equally responsive to certain types of protection activities. Thus, this offers a classification with great potential for identifying conservation and management priorities and strategies tailored to each unit. The Project has used this Brazilian classification of mangrove units for selection of sites and in discussion of representativity. *Further information on physical-environmental units is found in Annex 1.*

5. While these distinct mangrove units exist, in general terms seven mangrove tree species are found in Brazil (*Rhizophora mangle*, *R. harrisonii*, *R. racemosa*, *Avicennia schaueriana*, *A. germinans*, *Laguncularia racemosa* and *Conocarpus erectus*). These ecosystems also support a vast number of different microorganisms and a diverse and abundant assortment of plants, arthropods, mollusks, fish, and birds, totaling approximately 776 species. These include 226 fish species, 86 bird species, 27 mammal species, 131 crustacean species, 112 associated plant species, 50 algae species, 29 associated macrobenthic species, 21 foraminifer species, 31 annelid species, 52 mollusk species and five reptile species. Among these are rare and endangered species such as the scarlet ibis (*Eudocimus ruber*), the manatee (*Trichechus manatus*), caimans (*Cayman sp.*), and primate species including the red-handed howler monkey (*Alouatta belzebul ululante*). Brazil's mangrove ecosystems are also resting and feeding grounds for several neoartic and neotropical migratory birds, including the stripe-backed bittern (*Ixobrychus involucris*) and masked duck (*Oxyura dominica*). This information was derived through the work of Probio in 1999⁷ as part of an exercise on identifying biodiversity priorities per biome. *A list of endangered species associated with mangroves is found in Annex 1.*

Socio-economic context of Brazil's mangroves

6. Brazil has a population of 188,256,934 inhabitants, spread across a territory of 8,514,215.3 km². According to the most conservative estimates, nearly 20% of the Brazilian population lives on the coastal fringe⁸, representing more than 37 million people and a demographic density five times greater than the national average⁹. Moreover, if an area 200 kilometers inland is considered, nearly half of the country's population lives in the coastal zone. Eighty-seven percent of the coastal populations live in cities and the ten largest concentrate more than 25 million inhabitants¹⁰. The other 13% live in rural areas and can be further divided into agricultural communities, fishing communities, traditional communities including agro-extractive populations, Afro-descendants (*quilombolas*) and indigenous groups, among others. These groups represent a socially and anthropologically important part of Brazil's coastal population. *See Annex 3 for more information on these groups.*

7. An important part of Brazil's GDP comes from the service sectors of the larger cities, as well as from tourism, industries and the oil sector, which are also concentrated around larger urban centres in the coastal areas. However, tourism is also expanding beyond city boundaries and in 2003 represented 2.2% of the national economy¹¹. Shrimp farming is one of the most rapidly expanding activities along the coast and particularly in the *tannes*, given the readily available water sources and outlets to the ocean. Between 1997 and 2003 alone, shrimp production increased 97% along with an average yearly increase of 20% in the total area of shrimp farms. Originally largely restricted to the states of Rio Grande do Norte and

⁶ Schaeffer-Novelli, Y. et al., 1990. In practice there are only seven units with which to work since marshes are the primary ecosystem found in the eighth. This is due to low winter temperatures which inhibit the growth of mangrove species.

⁷ Probio workshop report, 1999.

⁸ Information provided by GERCO.

⁹ Demographic densities are 87 inhabitants/m² in coastal zones and 17 in inland areas.

¹⁰ Avaliação e ações prioritárias para a conservação da biodiversidade costeira e marinha. MMA, 2005.

¹¹ www.turismo.gov.br

Ceará, it is now expanding to Piauí and Maranhão. In 2005, shrimp farming accounted for 7.7% of fisheries catches nationwide¹², contributing to the country's position as the 8th producer worldwide and generating more than US\$ 270 million dollars. Industrial fishing near mangrove areas is concentrated largely in the South.

8. The primary economic activities of coastal traditional communities include the exploitation of mangrove resources and include fishing activities (i.e. fish, crabs, mollusks and oysters), timber extraction, and some limited instances of tourism and agriculture. Subsistence and artisanal fishing are the main components. Despite the paucity of statistical data on fisheries production in Brazilian mangrove areas, estimates indicate that, in some states, these ecosystems contribute up to 50% of total artisanal fisheries production.

9. Incomes for traditional groups depend in many areas on collection of the *uçá* crab. Crab collectors are among Brazil's poorest populations. The Project's target regions in the North and Northeast of Brazil present the lowest HDI rates in the country. Indeed, these communities have limited access to basic social benefits (education, health, and housing, among others), contributing to their dependence on mangroves resources. For example, collectors of the *uçá* crab, rarely have more than a basic elementary education, normally have an average of four children and a monthly family income of approximately US\$147. These communities are economically marginalized in that they are extremely poor, not recognized by formal fishing colonies as artisanal fishers, usually unregistered and thus have no right to any of the benefits that registered fishermen associated to formal colonies enjoy, including temporary unemployment insurance during no-catch periods, social service health or retirement benefits.

10. In general, primary fishing activities in Brazil are traditionally undertaken by men. However, with the exception of *marisqueiras*, women shellfish collectors and/or sellers, there is very little literature on the role of women in fishing. This reflects the socio-cultural aspects of those communities, in which women may assist men in salting the fish, preparing nets, even collecting mollusks and crabs, but usually do not go to the sea because they are responsible for taking care of the family and other domestic activities.

Institutional and Regulatory frameworks

11. Brazil has an extensive framework of regulations and institutions that underpin mangrove conservation. The Ministry of the Environment (MMA) is the federal institution responsible for the policy and planning of environmental activities including the use and conservation of mangrove resources. The Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) is the MMA's principal executing agency responsible for implementing policies. At the State level, State Environmental Management Agencies (OEMAs) are responsible for execution of policy within their jurisdiction. At the municipal level, municipal environmental agencies are responsible for local environmental policies as well as municipal-level environmental zoning diagnostics, licensing and enforcement. These agencies are part of the Brazilian National Environmental System (SISNAMA). SISNAMA is governed by the National Environmental Council (CONAMA), a high-level advisory and deliberative committee that brings together representatives of the States and civil society organizations, including from the National Industry, Agriculture and Trade Confederations, as well as of the Brazilian Nature Conservation Foundation (FBCN), among others.

12. At the sectoral level, practices are regulated by a series of norms. For example, Decree 4.895/2003 regulates the use of water bodies under Federal domain for aquaculture activities; Law 9.966/2000 institutes the prevention, control and monitoring of pollution caused by oil and other dangerous substances in waters under national jurisdiction; Decree 9.433/1997 approved the National Policy for

¹² www.mma.gov.br

Water Resources; Law 8.174/1991 establishes the principles of the Agriculture Policy, including support to small producers; Law 7.679/1988 forbids fishing of species during certain points in their reproductive cycle; and Law 7.661/1988 institutes the National Plan for Coastal Management, to mention a few.

13. Sectoral frameworks also determine specific procedures for the installation of productive practices. Relevant sectoral institutions make an initial assessment of proposed activities, followed where necessary by the emission of water use rights by the National or State Water Agencies, and then proceed to the environmental sector to determine environmental viability. Potential negative impacts of sectoral activities are controlled at this point through an environmental licensing process based on an Environmental Impact Assessment (EIA) and corresponding Report (RIMA). Activities requiring environmental permits are defined under Annex 1 of the 1997 CONAMA Resolution nº 237 and cover a wide range of sectoral activities¹³.

14. There are three separate phases in the licensing of activities: in the first stages of planning the location or concept of the activity is approved along with its environmental viability; the second is the authorization for installing the activity and the third for the operations. These permits define the conditions, restrictions and environmental control measures of activities and are issued by the environmental agencies that constitute SISNAMA based largely on the significance and scope of the impact. IBAMA is responsible for those actions that are considered to have a significant impact at the national or regional level and include, for example, those in the sea, in indigenous lands, in Federal Conservation Units and in areas covering more than one State. OEMAs generally have responsibilities for those activities in State UC, those in Areas of Permanent Preservation (APP) and whose impacts or locations occur within more than one municipality. Municipal agencies have responsibilities for activities with local impacts or those delegated by the State through a legal instrument or agreement. When activities requiring EIA/RIMA are within 10km of UC boundaries, additional consultations are required. Specifically, UC managers must be consulted on proposed actions and measures, thus imparting increased vigilance over potential negative impacts on biodiversity.

15. In addition to the sector specific regulations and licensing process, mangrove conservation is also governed through Brazil's protected area approach to biodiversity conservation. Brazil accepts the CBD definition of protected areas as those "*areas of land or sea specially dedicated to the protection and maintenance of biological diversity and associated nature and cultural aspects and managed through legal instruments or other effective measures*"¹⁴. A number of legal instruments are used to define these protected areas. Amongst these are land-use restrictions under the Forest Code that provide protection area status through the category of Areas of Permanent Preservation (APP) in which the total or partial extraction of natural vegetation is only permitted through the authorization by relevant government agencies and when it is of public and social interest. All mangrove areas in Brazil have been declared APPs under the Forest Code (4.771/1965).

16. The second and most extensively used instrument is the Conservation Unit (UC), which is a protected area defined as "*territorial spaces that together with their natural resources have been legally recognized by the Public Authority and have defined limits and conservation objectives and that are brought under a management regime to guarantee adequate protection*". These Conservation Units form the pillar of the National System of Conservation Units (SNUC) approved in 2000 through the Federal Law No. 9985, and later regulated in 2002, through Decree No. 4340. The SNUC provides the first ever framework under

¹³ For example in the agriculture sector, livestock rearing, crops, irrigation and settlements; in the energy sector, oil exploration (90% of the potential deposits are off shore); in the transport sector, linear structures such as roads and terminals for airports and seaports; basic sanitation related services such as water supply collection and treatment of domestic and industrial sewage. In terms of natural resources, permits are also required for exploration of timber and firewood, forestry sub-products, commercial rearing of exotic species and aspects related to use of genetic resources by biotechnology.

¹⁴ www.mma.gov.br/port/sbf/dap

which UCs at all levels of government and on private lands could be coordinated. At the national level, CONAMA is in charge of overseeing SNUC's implementation, the MMA its coordination¹⁵, and IBAMA the implementation of Federal UCs and upholding national related environmental policy¹⁶. OEMAs are responsible for the implementation of State UCs as well as any state environmental policies related to them. Municipal environmental agencies are responsible for the implementation of Municipal UCs and local environmental policies.

17. Under the SNUC law, Conservation Units are divided into two broad groups - those that afford strict protection and those that focus on sustainable use of biodiversity. These groups are further subdivided into the following management categories, each affording varying degrees of protection:

Strict Protection	Sustainable Use
Ecological Station (ESEC)	Environmental Protection Areas (EPA)
Biological Reserve (REBIO)	Areas of Relevant Ecological Interest (ARIE)
National Park (PARNAS)	National Forest (FLONA)
Natural Monument (MONA)	Fauna Reserves
Wildlife Refuge (RVS)	Sustainable Development Reserves (RDS)
	National Heritage Private Reserves (RPPN)
	Extractive Reserves (RESEX)

18. More recently, through the signature of a Protocol of Intentions between the MMA and 35 environmental and socio-environmental NGOs, the Brazilian Government committed at CoP7 in September 2004 to the elaboration and implementation of a National Protected Areas Plan (PNAP), whose goal is to consolidate a system of effectively managed and ecologically representative protected areas by 2015. The PNAP was recently approved by Presidential Decree n° 5.758/2006 and is in conformity with the CBD-CoP7 Work Program for Protected Areas. At the international level, Brazil is a signatory to the Convention on Biological Diversity (CBD) and the Ramsar Convention on Wetlands, which it ratified in 1994 and 1996, respectively. Both agreements commit signatories to biodiversity conservation and are directly relevant to mangrove conservation given the vast and important biodiversity in these wetlands.

BASELINE COURSE OF ACTION

Main Threats to Mangrove Biodiversity

19. Since the beginning of the twentieth century, an estimated 25% of Brazil's mangroves have been destroyed and many of Brazil's mangroves are now classified as vulnerable or endangered¹⁷. This is particularly the case in the Northeast and the Southeast where fragmentation is high and current estimates suggest that some 40% of the once continuous mangrove cover has been lost. Habitat transformation occurs through the loss and fragmentation of vegetation cover and the decreased quality of aquatic habitats, the latter mainly through pollution and changes in hydrodynamics. Both create an environment inhospitable for mangrove species, thereby causing species depletion and the loss of ecosystem services they provide. For example, in Brazil 80% of marine species of commercial value (fish, crustaceans, and

¹⁵ Within the MMA the Directorate for the Conservation of Biodiversity (DCBio) and the Directorate of Protected Areas (DAP), which coordinate programs and policies related to the conservation and sustainable use of biodiversity and to protected areas.

¹⁶ Within IBAMA the Directorate of Ecosystems (DIREC), is responsible for policies and programs related to the implementation of some Conservation Units; the Directorate of Fauna and Fisheries Resources (DIFAP), for policies and programs related to conservation of fauna and responsible exploitation of fisheries resources; and the Directorate of Socio-Environmental Development (DISAM) through its National Center of Traditional Populations and Sustainable Development (CNPT), is responsible for the creation and consolidation of Extractive Reserves (RESEX) and Sustainable Development Reserves (RDS), some UCs and the promotion of sustainable development of traditional communities.

¹⁷ Dinerstein, E, et al. 1995.

mollusks) depend on mangrove ecosystems at one or more stage in their life cycle, particularly in larval and juvenile phases¹⁸. On a global scale, the nutrient deficit in marine ecosystems caused by the degradation of mangroves results in annual losses of approximately 4.7 million tons of fish and 1.5 million tons of shrimp for the fishing industry¹⁹. In addition to species loss through habitat depletion, in Brazil some of the most important species, both for the ecosystem services they provide as well as their role in the local economy, are showing signs of overexploitation. This includes the *uçá* crab, which plays an important role in soil aeration and in the cycling of nutrients²⁰, as well as being the primary economic resource of many mangrove communities.

20. Current threats and their drivers and the relative importance in each of the Project intervention areas are described in detail in Annex 2 and summarized below:

- *Aquaculture* – particularly shrimp farming, is negatively affecting mangrove ecosystems through the construction of shrimp tanks and dykes that modify natural water bodies, change water flow and disrupt hydrological balances; the pollution of water from chemical spill-over; the increased competition between endemic and exotic fauna; the introduction of pathogens and parasites; and the genetic alteration in local fauna from exotic species. Displacement and exclusion of local communities from their traditional fishing territories is also occurring in some areas.
- *Fisheries* - Increasing fishing pressure on estuarine and associated mangrove ecosystems is posing a threat to some mangrove species. This also includes the *uçá* crab, which is included on IBAMA's list of overexploited species, plays a key role in mangrove functions, and when depleted, affects the nutrient balance, and consequently the number and types of species that are able to thrive in this altered ecosystem. Moreover, in some areas, dynamite and other forms of illegal fishing practices are leading to over-fishing and habitat destruction with the loss of coastal biodiversity. Bottom trawling is a widespread fishing practice that results in increased by-catch of juveniles and non-targeted species.
- *Agriculture* – Rice and sugar cane are the primary agricultural products that are grown along the coast in the microcatchments and impact negatively on mangrove areas. Those located immediately upstream to mangrove ecosystems are particularly responsible for reducing water quantity and quality, and inducing changes in the hydrological balances leading to increased sedimentation, erosion and silting up. Sugar cane production, particularly important in the Northeast, uses high levels of nitrates and fertilizers, and, along with the improper disposal of liquid waste produced from processing plants, is polluting water courses. Irrigation practices for rice cultivation reduce water flow and quality by the diversion of streams and the draining of lagoons, and through run-off with high levels of salinity, pesticides and fertilizers.
- *Construction for urban, industrial and tourism facilities* often leads to deforestation, the landfill of mangrove areas, erosion, sedimentation, eutrophication and unpredictable change of hydrological regimes in mangrove environments. Aquatic habitats have also been polluted, particularly from inappropriate sewage management, inadequately treated domestic and industrial pollutants, including bacteriological and viral pollutants, heavy metals, and other toxic products such as ammonia, nitrites and nitrates that seep or are dumped into waterways. While, these impacts are largely restricted to the urban areas, expansion of tourism-related construction to previously remote coastal areas has increased in recent years.
- *Timber* – especially the species *Rizophora mangle* and *Laguncularia*, is used to build bridges, fences, boats and houses, oftentimes because it is the only source of wood available. It also provides fuel for peri-urban areas in the North and Northeast, especially cottage industries such as ceramics and

¹⁸ Moberg, F. & Ronnback, P. Ecosystem services of the tropical seascape: interactions, substitutions, and restoration. *Ocean & Coastal Management* 46 (2003) 27-46.

¹⁹ Juma, C., 1997.

²⁰ Gutierrez, J. et al, 2006.

tanneries. Various other timber products are used for their astringent and antibiotic properties, and for sweeteners and traditional remedies. Despite existing legislation, wood extraction does not fully consider sustainable extraction levels or techniques, and rarely counts with forest management plans.

- *Climate change* – although this is not a present threat to Brazil’s mangroves, future climate variability predictions indicate it may become one. Increased storm surges and changing currents caused by climate change, along with rising sea levels, can result in the landward retreat of mangroves as species migrate inland in the search for their ideal environmental conditions. This migration is impeded where physical obstacles are built immediately inland from mangroves. The result is wide scale habitat loss as well as the loss of protection and regulatory services mangroves provide to inland ecosystems and coastal infrastructure, reducing the resilience to further climate change induced impacts. Whilst Brazil has been relatively free in the past, 2006 marked the first tropical depression to hit Brazil’s coast. The frequency of such extreme events is predicted to increase. This potential future threat is most significant from Ceará to Santa Catarina, where in many areas mangroves are prevented from moving inland by physical obstacles. Although these states house only about 15% of Brazil’s mangroves, they are representative of four of the seven distinct mangrove units. Thus, in terms of representativity, the loss of these areas would be quite significant. Hence, careful consideration of buffer zones in these areas is required.

Underlying Causes of Threats

21. The underlying causes of these threats are related to a number of policy, regulatory and capacity deficiencies. The most critical of these are outlined below.

22. System of Environmental Licensing through OEMAs. As APP’s, mangroves have strict restrictions on land use as well as specific licensing requirements. These indicate that extraction should be limited mainly to fisheries resources, as the removal of vegetation is not allowed, except in cases of social interest or public utility as defined by law. Although jurisdiction is ultimately determined by the geographic scope of impact, OEMAs are generally responsible for assessing for proposed extraction whenever applicable, and granting or denying extraction licenses and permits. This also applies in areas adjacent to mangroves that are not protected by APP but that fall under the more general requirements for EIA/RIMA as defined by CONAMA (see paragraphs 13-14 above). While this does provide a comprehensive system of environmental licensing, its effectiveness in terms of halting sectoral activities’ impacts on mangroves is limited by three main issues:

- Definition of mangrove ecosystems. CONAMA has defined the mangrove ecosystem, but does not provide a precise definition of their limits, nor does it specifically name the *tannes (apicuns)* and adjacent salt marshes that, from a scientific point of view, comprise a successive stage vital for the integrity and functioning of the mangrove ecosystem. Consequently, while these areas should enjoy all protections guaranteed to mangroves as APPs, each State is free to determine the composition of the mangrove ecosystems within its boundaries. Thus, across the 16 States that house mangrove ecosystems, there are varying interpretations of the extent of the mangrove ecosystem, translating into differences in land use restriction within and around them and, in turn, in the granting of environmental permits. Given that shrimp farming plays an important role in Brazil’s coastal economy and that *tannes* provide an optimal location for this activity, states have tended to treat those areas as outside the mangrove ecosystem.
- Scope of EIA/RIMA Mangroves are complex and fragile wetlands ecosystems that are particularly vulnerable to impacts from activities outside their immediate forest boundaries and are often more susceptible to impacts of a given development than other terrestrial ecosystems. The EIA system that underpins the licensing process is based on guidelines developed generically and focusing more on the

type of activity rather than the ecosystem in which it occurs. In many cases, those EIA and RIMA undertaken on activities upstream from mangroves or immediately around them do not take into account the complexities and sensitivities of mangroves. The result is that licenses can be issued without full analysis of the potential negative effects on the mangrove and the services it provides.

- Capacity for licensing and enforcement. Institutional capacity deficiencies hinder relevant agencies' ability to implement, enforce and monitor the granting of permits for sustainable extraction in mangrove APPs and across the broader land and sea scape in which mangroves lie and on which they depend. The capacity and resources of OEMAs vary widely across States and many do not have the staff or financial resources or appropriately trained technical staff to determine whether predicted impacts are accurate or if proposed mitigation actions are adequate. Nor do they have the resources to monitor or enforce compliance with mitigation actions or sustainable extraction levels even if these are set within technically sound standards. At the federal level, baseline funds are being channeled to IBAMA and MMA for capacity building on enforcement issues, but these are not expected to be sufficient to address the full scope of this issue. While there is an increasing community interest in enforcing compliance, there are no real mechanisms through which this can be achieved.

23. Sectoral involvement in permit processes. As indicated in paragraphs 12-14, sectoral productive practices are subject to their own legislative framework. These processes often require the input of a range of different institutions, with different levels of capacities and understandings of potential responses in different ecosystem settings. For example, as part of the process for aquaculture in coastal waters, the request for a permit is first sent to the Special Secretariat for Aquaculture and Fisheries (SEAP) at the State level to determine if it fulfills the requirements of relevant laws. It then goes to the National Water Agency (ANA) for the water use permit, then on to the OEMA for the environmental permit, and then to the Marine Authority for a permit to allow for development in waters under national jurisdiction. Finally, it passes to the Secretariat for National Patrimony in the Ministry of Planning for authorization to build in specific areas. Many of these stages apply different levels of rigor or are unaware of the requirements of the other phases. Furthermore, they do not include a full assessment of impacts that could be experienced within their own realm of operations, for example the potential negative effect on marine operations from increased sedimentation due to loss of mangroves due, in turn, to shrimp farming. Several valuation studies on mangroves have been undertaken in Brazil over the last few years but these are not well known or disseminated, and have not been tied to planning processes and permit decision making processes. Ironically, it is often the very sectors seeking permits that could stand to lose the benefits they receive from mangroves. For example, demonstrations in the Mekong Delta of Vietnam showed shrimp ponds with 30-50% mangrove cover gave the highest annual economic returns²¹.

24. Landscape level and development planning. A similar situation occurs at the higher levels of planning. Regional, municipal and sectoral plans rarely integrate into their analysis and definition of strategies and targets the potential negative impacts that loss of mangroves will have on production. Again, this is in part due to the scarcity of clear and user friendly information on values of services provided by mangroves. It is also because mangrove ecosystems, to a large extent, are viewed as unproductive and unattractive areas where poor communities scratch out subsistence livings. The considerable media attention afforded to Brazil's environment tends to focus on the more charismatic, well-known ecosystems such as Amazonia, Pantanal and Atlantic Forest, all of which have received substantial global attention.

25. Not only do productive sectors overlook the role of mangroves as producers of services for their actions, but, as a rule, the water resources sector has not considered mangrove ecosystems to be users of its resources despite their complex hydrological balances and sensitivity to water quantity and quality

²¹ Binh et al. 1997

inflows. Rather, water authorities have historically focused on the management of freshwater and see coastal management as an environmental issue beyond its scope. As a result, micro-catchment planning and water use permits are developed without taking into account the impacts on the quantity and quality of water flows in downstream mangroves in PAs, or the quantity of water necessary to maintain these downstream ecosystems. In 1997, Brazil passed a new national water resources policy which outlined a number of instruments designed to promote more rational water use and improved procedures for issuing use permits. These include development of micro-catchment management plans, the classification of water bodies, determination of acceptable uses based on that classification and the subsequent issuing of use permits. The latter is done by the National Water Agency or by state water agencies depending on the jurisdiction under which the particular body of water falls. This is a delicate process which must weigh carefully the demands from multiple parties and the long-term sustainability of the water source. A 2003 survey of Brazil's state secretariats for water resources showed that use of these instruments is still unclear in terms of procedures on their application, as well as training of water resource authorities on how to employ them on the ground.

Rationale for Selected Response

26. Since the coastal zone is also home to a significant part of Brazil's population, a number of highly profitable economic activities, and strong sectoral players, conflict is often rife over the best use of mangroves and associated coastal and estuarine vegetation. Clearly, addressing these conflicts in such a long coastline is a complex task. However, in addition to its existing sectoral policy frameworks, the GoB has made significant advances to mediate these conflicts through a coastal zoning process through the GERCO program, and through the recent establishment of a Coastal and Marine Zones Division (NZCM) to integrate the coastal and marine environment policies and programs of different MMA departments and other stakeholders. In addition, GoB is actively pursuing a protected area approach to the conservation and sustainable use of its biodiversity, and the current Project will contribute to consolidating that approach with regard to its mangrove endowment. There are a number of reasons for selecting this approach amongst which are the following:

- i) In addition to the protected areas status as APP that all mangroves have, over half²² of Brazil's mangroves have been provided *supplementary protection* within a second type of protected area known as Conservation Units (UC). The UC status confers yet another level of rigor to the environmental permit process to reduce negative impacts from many of the threats currently affecting mangroves.
- ii) The 132 UCs that contain mangroves include the great majority of the country's mangroves classified as having high biological importance among national biodiversity²³ and thus represent the areas in which the most global benefits could be leveraged alongside national development goals.
- iii) All UCs have been brought under the National System of Conservation (SNUC), which provides a regulatory framework through which to coordinate actions of all levels of government as well as on private lands for mangrove conservation. This would facilitate the establishment of minimal standards and procedures for mangrove conservation throughout the country, while recognizing that each mangrove unit may require different mixes of management approaches to address specificities of each region. Baseline activities are strengthening this recently developed system and the timing is

²² While information is only available on the precise areas of 81 of Brazil's 132 mangrove UCs, these alone comprise 56% of the total estimated mangrove cover in the country.

²³ Probio workshop report, 1999. More recent, unpublished data shows that all of Brazil's mangroves have high national biological importance.

opportune to incorporate specific procedures and processes tailored to the characteristics of mangroves in a cost-effective manner.

iv) The SNUC framework establishes a number of management requirements that provide useful instruments to address some of the underlying causes of threats to mangroves. Amongst these are the establishment of different management categories that would enable a range of protection levels to be delivered to mangroves whilst recognizing that these are vital to productive sectors and to the livelihoods of some of the poorest sectors of society. Indeed a full 67% of all mangrove UCs fall within the sustainable use categories. Amongst these are two categories of great significance:

- *Extractive Reserves (RESEX)* are established on public lands and upon request from the traditional populations that live there. These populations depend primarily on the extractive use of available natural resources for subsistence farming, small animal husbandry, and limited commercialization. Use rights to resources in the RESEX are regulated by a contract, or management plan, signed with the relevant state government. Additionally, agreements are made with these communities to allow them to continue their traditional activities and give them a role in the management of the UC through its advisory committee. In this way, RESEX are both productive and conservation areas, making them ideal sites to test innovative approaches to the rational and sustainable use and management of their resources, while respecting the livelihoods of the communities within them.
- *Environmental Protection Areas (APA)* are generally large public and private lands with specific biotic attributes important to the well-being or quality of life of the human populations occupying them. The basic objectives of an APA are to protect biological diversity, manage the process of human occupation, and ensure the sustainable use of the natural resources within its boundaries. The APA categorization is fundamentally linked to land use planning and should restrict the development of activities that are potentially damaging to the environment through zoning of its territory. This zoning is determined by the APA management plan, establishes use guidelines and should include wildlife zones designated for conservation and preservation where the use of natural resources is restricted or prohibited. As these are usually large areas (indeed one APA in a Project pilot extends some 2.7 million ha) and require a zoning process, they provide particularly good testing grounds for addressing the consideration of mangrove conservation in both the broader planning context and the control of upstream activities.

v) The SNUC also provides a second instrument which will facilitate the complex task of coordinating the disparate interests and opinions on mangrove conservation. This is the Management Council required for all UCs, and provides a forum at the local level for bringing together sectoral and community representatives for consensus-building on conservation goals and exploring management alternatives.

27. In light of the above, the GoB has determined that building on the foundation provided by SNUC, and better tailoring this to address the specificities required for effective mangrove conservation, is the selected strategy to strengthen protection of this endowment in the short term. It offers a feasible response that can be undertaken within the time and financial boundaries of a single project, builds cost-effectively on an existing system and would secure the protection of the most highly bio-diverse mangrove areas in Brazil. In addition to the delivery of direct positive impacts to mangrove biodiversity in UC in the short term, this choice would set the scene for future advances, through national initiatives, for conservation of mangroves outside UCs. This would be due to the increased capacities to improve functioning of the APP status that all mangroves enjoy, and also the increased levels of sectoral understanding of mangrove services, thus providing a strong basis for further mainstreaming work. The fact that 14% of SNUC's

mangrove UCs are Extractive Reserves also provides the opportunity to maximize empowerment of and positive impacts on some of the poorest segments of Brazilian society - a principle that underlies the GoB policy for the environment. Details on other alternative designs considered can be found in paras 66-68.

28. Whilst the protected area approach is the most feasible single approach to mangrove conservation at present in Brazil, the GoB also recognizes that the SNUC requires strengthening to ensure that it functions to its fullest potential and thus provides the level of protection necessary to deliver significant global benefits. This would require tailoring specific operational aspects of the SNUC to be more closely aligned with the specificities required for mangrove ecosystem management, and also working within the UC context to address some of the issues of underlying causes to current mangroves threats, such as improving licensing processes under the added requirements conferred to mangroves by the UC status. The following sections outline specific issues that would require alignment, along with an analysis of deficiencies that currently undermine the full operation of UCs, with particular relevance to mangrove UCs.

Deficiencies Analysis: Deficiencies in UC management that reduce efficiencies of mangrove conservation

29. A full 132 UCs have mangroves within their boundaries. In the majority of cases these UCs are larger areas protecting a mix of ecosystems associated to one degree or another with mangroves. Thus the mangroves within them are already being addressed from a larger landscape level through the internal zoning process of the UC. Whilst these are not entirely mangroves areas, these UC will be referred to henceforth in this document as mangrove UCs.

30. An assessment of UC management effectiveness was conducted on 26 mangrove UCs during the project preparation using the WB/WWF Management Effectiveness Tracking Tool (METT)²⁴. These sample UCs were selected within the different mangrove units as part of the process for defining potential site based interventions (see paragraphs 60-63 and Annex 1 for selection criteria). One (4%) of the 26 UCs ranked as having excellent management effectiveness, 62% fair, 23% as good and three UCs ranked as poor. Despite these overall positive scores, a closer analysis of each of the six METT elements revealed a number of deficiencies that would seem to contradict this picture. However, bearing in mind that the METT tool weights each question evenly, a score of 'excellent' in one category given for the mere existence of boundary demarcation would balance out a 'poor' received for complete lack of budget.

31. Nonetheless, some common deficiencies can be determined if individual elements of the METT score are considered and these substantiate other Project assessments of UC strengths and weaknesses. The sample UCs' strengths were in areas such as legal status and definition of UC boundaries, objectives and existing biodiversity bringing up the final METT score and providing a crucial basis for even modest management effectiveness. Much lower scores were seen in the existence and implementation of management plans and monitoring and evaluation as well as availability of budget, staff and equipment. For example, scarce budgetary resources were a significant obstacle across the board for effective UC management with at least half the UCs in each cluster lacking adequate resources, confirming the overall figures obtained through work at the national level (see paragraphs 43-47). Some 66% of the sample UCs had major deficiencies in staff capacity and resources to enforce SNUC legislation and regulations. Additionally, while high marks were received overall for the existence of regular work plans, only 15% of UCs sampled have regular work plans *and* are also able to complete most of the actions in those plans. Even more worrisome is the fact that 77% of the UCs have not completed their management plan although to a large extent this is because many are newly formed particularly the RESEXs.

²⁴ Annex 11 provides the complete METT.

Table 1: Average percentages²⁵ obtained for each cluster of Project UCs according to the different components of the management cycle

METT category ²⁶	Context	Planning	Inputs	Processes	Outputs	Outcome
Pará	64	52	35	40	2	49
Maranhão	55	40	37	18	0	56
MA/PI/CE	57	40	40	32	17	39
Paraíba	83	70	53	68	8	67
São Paulo/Paraná	63	46	45	35	17	43
AVERAGE	63	50	42	39	9	51

32. In sum, the METT analysis demonstrates that the agencies responsible for UC implementation are understaffed and have limited capacities for the development of management plans for individual UCs and for the management of ecosystems as complex as mangroves. While budgets are also weak, additional analyses revealed that the funding gap for mangrove UCs was less than that for UCs as a whole. Thus, while, to some extent, these issues are common throughout the SNUC, the following analysis focuses on those issues that are most relevant to mangrove UCs and which the proposed GEF alternative will address.

The Regulatory Framework

33. The MMA has recently begun to work on regulating all UC management categories and defining requirements for each category. This includes the set of management tools that SNUC establishes for all UCs, including the establishment of buffer zones, management plans and councils. Regulation for these and other operational aspects within each management category is based to a large extent on requirements for and knowledge of terrestrial conservation areas - an area on which Brazil has placed strong emphasis in recent decades. While this is a strong foundation on which to build marine and coastal ecosystem management, tools need to address the specificities of complex hydrodynamics, temporal and spatial characteristics that make aquatic-terrestrial transition ecosystems such as mangroves distinct from terrestrial systems. For example, in regards to buffer zones, methodologies in the past have been based on a standard approach set at 10km around UC boundaries. The SNUC provides for a more flexible approach and now determines that buffer zones can be defined through the legal act creating the UC or in the management plan based on the influence adjacent areas play on the UC. However, it does not provide guidance on how this can be undertaken in mangrove areas that may require specific consideration of upstream issues and temporal considerations that provide increased protection during closed seasons for key species.

34. In terms of sustainable use categories and their specific contribution to conservation, baseline initiatives are advancing on clearer definition of extraction levels for RESEX. Nonetheless, this is almost exclusively in forested ecosystem where they were originally conceived. RESEX have only recently been set up in coastal areas and as yet there are no specific limits set for ensuring that extraction rates fall within the levels that contribute to conservation, nor are there specific recommended practices for

²⁵ Poor: < 25% (0 – 22.5 points); Fair: 25–50% (23 - 45 pts.); Good: 51–75% (46-67.5 pts.); Excellent: 76–100% (68-90 pts.).

²⁶ These categories are aggregates of the following METT questions: **Context:** 1) Legal status; 2) Protected area regulations; 3) Law enforcement; 6) Protected area boundary demarcation; 9) Resource inventory; **Planning:** 4) Protected area objectives; 5) Protected area design; 7) Management plan; 8) Regular work plan; 30) Monitoring and evaluation; **Inputs:** 10) Research; 12) Staff numbers; 14) Staff training; 15) Current budget; 16) Security of budget; **Processes:** 11) Resource management; 13) Personnel management; 17) Management of budget; 18) Equipment; 19) Maintenance of equipment; 20) Education and awareness programme; 21) State and commercial neighbours; 22) Indigenous people; 23) Local communities; 25) Commercial tourism; **Outputs:** 24) Visitor facilities; 26) Fees; and **Outcomes:** 27) Condition assessment; 28) Access assessment; 29) Economic benefit assessment.

extraction in mangrove ecosystems. Some advances have been made in isolated RESEX, yet this is insufficient for developing regulatory procedures and effective conservation strategies. Furthermore these advances have been made in isolated UCs. While established extraction levels may appear sustainable for that particular until, they fail to recognize the overall impact if replicated in nearby RESEX. Nor do they consider the potential effects over larger landscapes that may be incurred, given the fact that many of the species being harvested spend parts of their lifecycles outside the boundaries of the UC. Similarly, while APAs do take this landscape approach, zoning experiences that impart land use restrictions in fragile areas have largely been undertaken in terrestrial environments. Whilst this category does offer a good potential for mangrove conservation, field testing is required to develop clearer guidelines that can help tailor the regulatory framework of SNUC.

35. The development of management plans serves as the means to determine buffer zones and to establish sustainable levels of extraction, including species-specific use plans and overall UC and ecosystem resource management plans with clear zoning. However, even in UCs where such mechanisms exist, their implementation remains low due to a combination of weak enforcement and still incipient processes of stakeholder involvement, thus increasing enforcement needs. In the case of mangrove RESEXs, their establishment is still new and communities within them have little experience in participatory planning processes. IBAMA is advancing the management plan process, but progress is limited due to the enormous extension of the country and its very high biodiversity targets. Without additional support, the key processes will be delayed and exposure to growing threats will lead to increased biodiversity loss. Similarly, in APAs stakeholder composition is different but potential clashes with highly powerful economic sectors are more likely. In the baseline, several States are advancing the economic and ecological zoning (EEZ) processes across their territories, looking at a broader level of different trade offs between development strategies. The timely zoning of mangrove APAs, in coordination with these processes, would present an opportunity to avoid future threats to mangroves and achieve global benefits from their conservation.

Institutional Processes and Capacities.

36. Clear SNUC mandates for mangrove UCs and institutional responsibilities are defined for environmental licensing. However, when activities that require EIA/RIMA processes occur within UCs, division of responsibility can become confused, leading to flawed processes. For example, IBAMA is responsible for emitting permits and oversight if the area in question falls under the jurisdiction of multiple states, or if it is for a resource that falls under federal jurisdiction, such as petroleum. Some State UCs fall under this category. In addition, mangrove UCs still technically fall under the APP categorization as well, meaning that a federal level sustainable-use UC would be under federal management as a UC, but the process of licensing potentially harmful economic activities which involve removing vegetation, such as shrimp farming, would be the responsibility of the relevant OEMA or municipality. Meanwhile, other licensing functions, e.g. those related to tourism, would fall under municipal jurisdiction. This is especially relevant in federal mangrove APAs, where the licensing of economic activities plays a crucial role in the conservation of mangrove resources.

37. This is further complicated by differing interpretations of the legislation that regulates which agencies are responsible for environmental licensing of economic activities, especially those in federal UCs which encompass private lands. In practice, the system of environmental licensing allows the relevant State to grant those licenses, thereby allowing the State to define both the composition of mangrove ecosystems within its borders as well as to license activities in mangrove forests in accordance with its own interests and guidelines.

38. As mentioned earlier, under the SNUC law's regulatory framework, and depending on the management category of the particular UC, an advisory or consultative committee must be established in

each UC and comprised of a wide range of stakeholders from different institutions and organizations with different mandates and objectives. Oftentimes, a number of capacity deficiencies complicate their full and effective participation in mangrove UC committees. These include the communities' general unfamiliarity with formal management concepts, and insufficient capacity to translate their needs and knowledge into the formal structures that govern mangrove UCs, as well as little experience in successfully negotiating the complex power relationships between authorities and communities involved in the committees. There is also inadequate understanding, on the part of stakeholders, of the overlapping and/or complementary relationships between agency mandates, which is an incredibly complex subject that must often be determined on a case-by-case basis.

39. National level coordination mechanisms have been created as spaces for dialogue between the three levels of government and include National and State Technical Tripartite Commissions as well as the Ecological-Economic Zoning Coordination Commission (CCZEE), which orients the process and implementation of EEZs in Brazil.

40. Within the environment sector, capacities are disparate with regards to participation in these processes, assisting communities in accessing resources, and in the actual delivery of the management actions in the UCs. While, under the baseline scenario, government funds have been allotted for competitive bidding through the MMA-administered National Environmental Fund (FNMA) for, *inter alia*, the structuring of management systems, including capacity-building activities among protected area managers and regional environmental authorities, such resources have been limited to date to only a few coastal states and municipal agencies. Other capacity building programs include DAI's (Directorate of Institutional Cooperation) existing National Environmental Managers Capacity Building Program (PNC) and the aforementioned DISAM/CGEAM. However, the former is still quite limited in geographic reach and neither addresses the specificities of mangrove ecosystems.

The Planning Framework

41. At the individual level, the management plan is the basic planning unit for UCs. However, at the systemic level there is a broader tool in the National Protected Area plan, signed in 2006, whose goal it is to consolidate a system of effectively managed and ecologically representative protected areas by 2015. Moreover, MMA will be preparing Wetlands Strategies to orient the conservation of that set of ecosystems. Within this overall planning context, the set of mangrove UCs is made up of sustainable use and strict conservation management categories, with 67% of them categorized for sustainable use. While sustainable use categories present certain opportunities as described above, the current balance may deliver insufficient conservation to core areas. Creating new UCs or changing existing categories presents challenges and can involve complex institutional and political processes. Baseline initiatives in the MMA have started exploring alternatives that would enable better balances to be established in key areas. This is linked to the use of supplementary legal measures, including no-take areas, to deliver additional protection either within larger sustainable use areas or in strategic locations outside the boundaries of existing UCs. While this presents a feasible instrument, there are important information gaps that hinder the determination of best approaches, locations, and sizes for these supplementary measures. Given the different mangrove units in the country, efforts to protect the diversity of mangroves would require careful planning across the entire coastline to determine best mixes of protection instruments to be implemented in the long term.

42. Such a strategy would also provide a mechanism through which to coordinate the wealth of small and dispersed initiatives aimed at the conservation and sustainable use of Brazil's mangroves. At present these initiatives tend to be *ad hoc*, and are not set in the broader conservation and development context. As such there are substantial lost opportunities to collaborate with relevant ongoing and proposed activities to make the best use of financial and human resources and capacities for effective mangrove protection.

Financial Constraints

43. The METT assessment indicates that mangrove UCs, alongside many others in the SNUC, have deficient funding levels. Currently, resources for UC management come primarily from the overall IBAMA budget and from the budget of the relevant State. In some instances, temporary funding comes from other national and foreign partners. In accordance with the needs detected for that particular year, UC authorities prepare annual financing plans that assist the Government in determining the budgetary allocation to award to each UC. These financing plans reflect the complexity of each UC, including such factors as size and necessary actions, equipment, and staff.

44. A preliminary appraisal of funding gaps was undertaken in the preparatory phase. Based on the analysis, operating costs of mangrove-related UCs were estimated on average 20% lower than those for all equivalent UCs. This is the case with or without inclusion of personnel costs. The lowest costs are estimated for state-operated UCs, while the highest are those associated with national parks, but even here the two mangrove-related parks included in the sample are estimated to have lower operating costs than the majority of the national park system. This is true despite the fact that the marine and coastal parks in general have larger average perimeters (89 km) than their land-based equivalents (59 km). One factor that explains this is that it may be easier to manage and control marine areas, accessible by boat, than densely vegetated areas²⁷.

45. Nonetheless, there does exist a funding gap for mangrove UCs. An average annual expenditure of \$47,000 excluding personnel, and \$180,000 inclusive of personnel costs was estimated necessary to meet target annual operating costs of mangrove UCs in Brazil. However, information from IBAMA suggests actual operational expenses (without personnel) in the Project's pilot UCs average some \$24,000. At this level of current financing, the overall average funding requirements associated with mangrove-related UCs (US\$ 47,000), suggest the existence of a funding shortfall of some \$23,000 or over 50%. It is expected that this funding gap can be sufficiently reduced to facilitate effective management of the pilot UCs through baseline and GEF Alternative financial mechanisms. Baseline initiatives to improve UC funding at a national level include potential financing from environmental compensation, water use charges and other environmental services (\$106,818, including co-financing by TNC and other NGOs); FUNBIO efforts to support business planning and financial sustainability in protected areas within the GEF-supported ARPA; and the national Environmental Compensation Fund which is financed from a share (at least 0.5%) of public and private infrastructure investment and directed specifically at protected areas as regulated by the SNUC.

46. More detailed budgetary and operating expense levels for each individual UC in the Project intervention areas are needed to estimate individual funding gaps. However, the principal difficulties faced in organizing information on budgetary gaps in UC management relate to the absence of uniform data collection regarding non-budgetary revenues, such as concessions, compensations and third-party contracting. DIREC has compiled fairly complete data on federal compensations under Article 36 of the SNUC, but the state level data is incomplete.

47. A series of actions along the coast and across the country comprise the baseline to begin addressing the financial constraints of protected areas. Unfortunately, most are still at the study phase and have not yet been translated into concrete actions or incentives. These include:

- A recent MMA analysis of options for ensuring UC sustainability throughout Brazil, including potential financing from environmental compensation, water use charges and other environmental

²⁷ For additional information on this issue, including methodology used, see Annex 6.

- services, none of which has been tested or tailored for mangroves;
- FUNBIO efforts to support business planning and financial sustainability in PAs within the GEF-supported ARPA program in Amazonia, which is expected to increase levels in the UC of that biome. This UC mainly protects tropical rainforest although some mangrove areas are included in the State of Amapá;
 - Valuation studies of mangrove ecosystems in several segments of the Brazilian coastline in the eastern Amazon and São Paulo coast which indicate the benefits generated by these ecosystems to local consumption and income, regional environmental and recreational services provision and existence value. However these are not linked to specific decision making tools or sectors;
 - The Environmental Compensation Fund created within the Caixa Econômica Federal, financed from a share of public and private infrastructure investment, and directed specifically at protected areas as regulated by the SNUC. However, these funds are restricted primarily to strict protection areas which are the minority of mangrove areas and run into fewer management issues based on their highly restricted use designation.

Knowledge deficiencies

48. Despite efforts made over the last few years, given the length of the coast, and the different types and administrative levels of mangroves UC and the fact that not all of the UC territory encompasses mangroves ecosystems, data on the exact extension of mangrove ecosystems, and more importantly of connectivity, are not available. This hinders a full appreciation of rates of loss of vegetation cover and associated biodiversity, and hence the effectiveness of UCs in achieving management conservation. Related to this is the dispersed nature of the sparse, but growing, body of work on Brazilian mangrove functions, ecology, populations, hydrodynamics, relationships with other coastal ecosystems, and the actual economic and ecological value of mangroves' goods and services. This not only hinders clearer definition of achievement of management goals in UCs but seriously affects the determination of impacts of activities on mangroves, thus undermining EIA/RIMA processes and often making decisions regarding permits and mitigation measure incomplete.

49. While MMA has laid the groundwork for structuring a national system of biodiversity information, there is still significant need to gather and analyze raw data as well as mechanisms through which to do so. Monitoring programs are not yet developed and in place to inform and update the knowledge base on levels of sustainable use, current resource use levels and their ecological impact on mangrove ecosystems for improved management of their resources. Nor is there any mechanism established to measure the impacts of nearby developments on mangrove ecosystems and how this links to land planning guidelines. As such, decision makers have insufficient information to implement any sort of adaptive management or planning instrument when dealing with mangrove UCs.

50. There are also knowledge gaps related to best practices for sustainable use. This is not only related to the definition of overextraction levels in UCs, but also in terms of alternative economic activities and more sustainable forms of exploitation by resource users. While there are some potentially interesting experiences, they are neither at the scale required nor readily available. At present, methods employed are often damaging both to the resource and the environment. For example, crabs are often pulled from dens using a metal rod with a hook on the end, a technique which increases mortality rates. Nets are also used to catch many species of fish and have the corollary effect of capturing many unintended species as well as non-mature specimens. In addition, nets are often left in the mangrove areas. On top of inappropriate capture methods, communities have little knowledge of appropriate methods of handling, storage or transport. Without this information being systematized and readily available, it is difficult to develop and institute effective sustainable use techniques and alternatives and extractive management systems, especially across large areas. While an option to relieve some of the pressure on traditional resources

would be value-added processing of certain mangrove products, at present there is insufficient knowledge of the types and potential value-added products and processes that could improve the returns.

51. As an important first step in addressing knowledge barriers, MMA, through the GEF-funded PROBIO program, has laid the groundwork for structuring a national system of information regarding biodiversity, including information on mangroves. This facility has recently been merged into a national Environmental Information System, providing on-line access to subordinate geographical, coastal zone management and licensing databases. While information has been generated and will be available during the course of the project to guide investment and protection decisions, the ability of responsible authorities to appropriately apply available information for management remains weak. There is still significant need to analyze the raw data that has been made available, test management guidelines, develop sectoral conservation policies, as well as generate more specific information related to mangrove ecosystems.

Awareness

52. Compounding many of the deficiencies facing UC mangrove management and also the underlying causes of threats to them is the low level of awareness on the importance of mangrove ecosystems. This is due, in part, to the above-mentioned knowledge gaps of mangrove's ecological, socio-economic and cultural functions, as well as to subjective perceptions of mangroves as being unhealthy areas for human dwelling. The low levels of awareness have contributed to funding deficiencies, low levels of compliance with sustainable extraction standards, and limited community input to enforcement and monitoring efforts. Recently, substantial efforts have been made by the government to establish "Green Rooms" (*Salas Verdes*) in state and municipal agencies, NGOs, and educational institutions in coastal states so as to promote environmental education and cultural events to improve knowledge and awareness of environmental issues. A total of 111 such facilities have been installed in the country with 20 in states where mangroves occur. These will be available for project-related events and will serve as a tool to make practices, regulations and outreach material developed by the Project available to a wider public. Despite the awareness raising mission of these facilities, without the GEF Alternative, they will not be directed toward capacity building with the aim of improving management of protected areas.

Stakeholder Analysis *Further details on stakeholders and their involvement are in the Prodoc Annex 3.*

53. In addition to the key government agencies mentioned above (MMA, IBAMA and OEMAs), a variety of different actors play important roles in the conservation and sustainable use of Brazil's mangroves:

- Universities and their research centers carry out and analyze research related to mangroves and their biodiversity, sustainable use techniques, community-based economic activities and capacity needs.
- Nongovernmental organizations (NGOs) help fund and implement projects designed to conserve mangrove areas and their biodiversity and to improve the livelihoods of local communities.
- Civil society organizations (CSOs)²⁸ represent groups that exploit mangrove resources for their livelihoods and can prove to be incredibly important partners in protecting these areas when involved in initiatives promoting sustainable use activities.
- The private sector exploits mangrove resources causing significant pressure on these areas. However, in some instances it is also gradually beginning to engage in conservation of these areas through funding of conservation initiatives and research and participation in ecotourism.

²⁸ Relevant CSOs include associations, colonies and unions of those who earn their living by exploiting mangrove resources through activities such as fishing, crab collecting, beekeeping, agricultural work and the production and sale of mangrove products.

- Municipalities participate in a variety of ways ranging from being partners in projects funded by national and international agencies, to implementing and monitoring conservation initiatives.
- Sectoral Government Agencies responsible for water management, shrimp farming, fisheries and tourism play an important role in exploiting natural resources that are based and/or depend on mangroves, contributing to pressures on biodiversity and degradation of the ecosystem.
- Finally, mangrove UC governance structures are key stakeholders and each of the Project's pilots will work to strengthen their ability to manage these areas.

54. The stakeholder analysis assessed the stakeholder groups in terms of their influence on decision-making processes and importance to the Project, given the BD 1 approach. The analysis permits the division of stakeholders into four groups: (i) those with high importance and high influence, (ii) those with high importance and low influence, (iii) those with low importance and high influence, and (iv) those with low importance and low influence. While some groups that are usually important to the success of a project have relatively low influence, those with a lesser importance may have significant influence because of their institutional mandates or actions at the local level. The Project's strategy is to involve stakeholders from groups (i), (ii) and (iii) at different levels of project implementation. Those in groups (i) and (ii) will be directly involved in the implementation of the Project's activities and management decisions, while those in group (iii) will participate in more indirect ways (such as meetings and consultations). The stakeholder analysis did not identify actors in group (iv) in this intervention.

55. Project stakeholders in category (i) are mostly governmental institutions, including MMA, IBAMA and Mangrove UC governance structures at local levels, state environmental agencies (OEMAs), municipalities and sectoral government and regulatory agencies, such as SEAP, Ministry of Tourism and ANA. Category (ii) comprise local communities and CSOs, such as the National Fishermen's Movement (MONAPE) and Pastoral Fishermen's Council (CPP), research institutes and universities, such as Brazilian Agricultural Research Corporation (EMBRAPA), University of Para, University of Maranhão, and NGOs such as Conservation International, Mangrove Action Project and Wetlands International. Category (iii) is a limited group of private sectors institutions, such as the Brazilian Small and Medium Enterprise Support Service (SEBRAE) and aquaculture, tourism and agriculture entrepreneurs acting at the local level. Table 1 of Annex 3 details the project's key stakeholders, their mandates and responsibilities, specific interest in the project, potential problems and their mitigation.

Part II: Project Strategy

56. Despite Government commitment, habitat transformation and species depletion linked to inadequate land planning and poorly managed resource use are endangering the country's mangrove ecosystems. An incremental intervention aimed at removing key barriers to conservation is required to build on and consolidate what has been achieved so far and bring about the measures, policies and practices that will protect mangrove biodiversity. Baseline efforts alone will neither be comprehensive nor timely enough to prevent further losses of globally significant biodiversity and vital ecosystems services. This, in turn, will result in negative effects on the well-being of traditional and local communities and erosion of the natural resource base of a number of productive sectors. MMA, in conjunction with the United Nations Development Programme (UNDP), is seeking a partnership with the Global Environment Facility (GEF) to develop this approach. The Project is consistent with GEF SP 1: Catalyzing the sustainability of protected areas and with GEF OP 2: Coastal, marine and freshwater ecosystems.

57. The GEF Alternative would develop and field-test a protected area management approach for the effective conservation of a representative sample of Brazil's mangroves. To overcome the main barriers to effective mangrove conservation and management that exist in the current PA approach, Outcome One would strengthen the enabling environment for the implementation, sustainability and replication of the Project strategy; Outcome Two would focus on environmental and pro-poor issues through working with

communities to improve the sustainability of their livelihoods; Outcome Three would tackle barriers from a sectoral perspective; and Outcome Four would focus on M&E and information generation for adaptive management of mangrove PAs and their resources. This would all be achieved through tailoring existing PA management tools to address the specific characteristics of mangrove ecosystems and thus facilitate minimum standards and improved approaches to mangrove conservation and sustainable use across the country. The intervention strategy developed adopts a two-pronged approach comprised of:

- a. Developing the framework to enable the adoption and replication of lessons learnt and the consolidation of a sub-system of mangrove PAs including both UCs and APPs. This enabling framework would include the development of policy, regulatory, institutional and operational elements that would govern PAs that house these critical ecosystems. It would also include the rationalization of existing mangrove PAs to ensure that this future sub-system is comprised of an effective mix of both sustainable use and strict conservation management categories within each physical-environmental unit;
- b. On-the-ground interventions in mangrove UCs to test innovative management approaches in both sustainable use and strict conservation categories, thus providing direct conservation and livelihood benefits, lessons learnt for replication at the national level, and a bottom-up approach to the abovementioned development of an enabling framework. This prong has two aspects (i) on-the-ground testing of different types of management responses to overcome the different challenges and threat scenarios in each UC cluster, and (ii) building management capacities in the UCs and working to scale them up throughout the mangrove UC sub-system. Direct on-the-ground interventions will be pursued in 34 UCs in five clusters across seven states. These include both sustainable use and strict conservation UCs, as well as UCs at each of the three levels of government jurisdiction.

58. Three key themes underpin this strategy. The first is the need to incorporate landscape conservation elements and sectoral concerns into the PA approach to address broader spatial planning concerns given that mangrove ecosystems are highly dependent on water flows for their integrity and ultimate survival. This is addressed in part by selecting intervention sites located within groups or clusters of mangrove UCs. These are comprised of multiple protected areas either in close proximity to one another or with overlapping boundaries, thus facilitating a broader landscape approach to their management. It is also addressed by piloting demonstrations which link mangrove UC management with other spatial and land planning processes including Municipal and State planning and water resource management.

59. The second underlying theme relates to building the relevant systemic, institutional and individual capacities to implement innovative pilots and develop and oversee the sub-system of mangrove PAs. Thus, capacity building has been addressed as a crosscutting issue rather than a stand-alone Outcome. In this regard, relevant capacity building elements have been incorporated in appropriate Outcomes to enable the successful implementation, sustainability and scaling up of the Project strategy. This (i) facilitates the delivery of capacity events customized for different groups of stakeholders and aimed at bringing about specific changes; (ii) provides a more practical approach to implementation across the vast range of stakeholders, territories and different levels of government; and (iii) pays particular attention to the livelihood needs and related capacity requirements of local communities. A component on adaptive management complements capacity building elements and focuses on information generation mechanisms and knowledge management instruments for improved management.

60. The third underlying theme is that Project pilots will be based on participatory management and will work closely with community, government and sectoral stakeholders to create consensus-building which will be an important tool in threat mitigation. These experiences will inform the guidelines and long-term capacity building program planned in Outcome 1 through a bottom-up approach in order to

internalize local knowledge and practices into national policy and systems. Pilots will be pursued in 34 UCs at each of the three levels of government jurisdiction in five UC clusters across seven states and 50 municipalities.

61. In adopting this strategy, several innovative aspects are included: the Project strategy will focus on a sub-system or network of ecosystem-specific UCs as an effective and cost-efficient approach to the conservation and management of mangroves; vulnerability to climatic change will be considered in mangrove UC management planning processes; an integrated approach to management of clusters of UCs will be tested as a means of increasing efficiencies across individual UCs; the integration of water resources and UC management is rather innovative for Brazil, which has traditionally treated coastal management to be beyond the scope of the water sector and under the purview of environmental management.

62. The following lines of action will be undertaken in the five Project intervention sites, which were selected²⁹ as a national priority for GEF support both for the immediate biodiversity benefits expected from the Project and by applying a longer-term vision of incremental and replicable results. Each cluster is named according to the states where it is located³⁰. Many of these mangroves UCs share the same threats albeit to different degrees. However each pilot will focus primarily on one particular threat or management challenge and provide an in depth demonstration of how this can be overcome effectively. This allows for viable demonstrations to be carried out within the Project’s timeframe and budget, and makes it possible to provide a greater number of potential management approaches and threat abatement strategies. Lessons learned can later be scaled up and replicated. The following table highlights the principal challenges to be overcome and the respective pilot.

Project Intervention Sites:

UC Cluster	Main Management Issues to be Addressed	Project Response
<p><i>São Paulo & Paraná</i></p> <p>7 Parks, 5 APAs, 2 EEs, 2 ESEC, 1 RESEX, 1 ARIE, 1 Forest</p>	<p>Significant funding gaps from a combination of poor resource generation and suboptimal financial planning hamper mangroves UC in fully achieving conservation goals.</p> <p>Long term conservation of an individual mangrove UC often depends on the effectiveness of nearby UC given the characteristics of mangrove ecosystems yet levels of resources and management is highly disparate in UC of these clusters</p>	<p><i>Output 1.3:</i> Work in the only formal coastal mosaic (cluster) of UCs in Brazil to improve cost effectiveness across nearby UCs through planning and implementing joint management strategies; including the testing of new resources generation mechanisms such as an improved system of ecological value-added tax (ICMS-E), based on mangrove valuation studies and cost effective UC management criteria</p> <p>A complementary pilot in Bahia will develop criteria for the valuation of potential damage to flows of mangrove derived ecological services as a basis for negotiating resource transfers to UCs through existing compensation mechanisms in the SNUC.</p>
<p><i>Pará</i></p> <p>9 RESEX</p>	<p>Fishing limits are established for individual RESEX but proximity of many RESEX results in overfishing at aggregated levels thus undermining the</p>	<p><i>Output 2.1:</i> Develop ecosystem approaches to the sustainable use of mangrove fisheries resources across 9 nearby RESEX and within this adjust targets of selected individual UC to ensure long</p>

²⁹ Project UCs and clusters were selected based on a set of criteria related to biological diversity, national and global biological significance, representativity and range of threats and biological resources, possibility and value for replication, level of human development, base level of information existing on the site, and likelihood of a viable intervention within the Project timeframe and budget. Further information on selection criteria is found in Annex 1.

³⁰ Maps of the intervention sites are found in Annex 1.

	contribution of RESEX UC to conservation of mangroves and threatening long term livelihoods of communities within them.	term integrity of the ecosystem and sustainability of local livelihoods
<i>Maranhão, Ceará & Piauí</i> 1 APA & 1 RESEX	Mangrove communities frequently depend on one species for their principal source of income and employ unsustainable harvesting levels and/or capture methods, undermining UC contribution to conservation of mangroves and threatening long term livelihoods of communities within them.	<i>Output 2.2:</i> Develop integrated resource management plans and economic alternatives for <i>uçá</i> crab collectors to ensure sufficient and stable levels of this species so important to mangrove functionality, and create knowledge for its sustainable management throughout Brazil.
<i>Maranhão</i> 1 APA & 1 RESEX	Mangrove ecosystem functionality is highly dependant sectoral activities in broader landscape yet land use planning instruments at this level rarely contemplate mangrove needs.	<i>Output 3.1:</i> Develop and test approaches to land planning and permitted uses coordinated with State and Municipal planning in large sustainable use UCs to mitigate a wide variety of sectoral threats and create lessons learned on stakeholder involvement.
<i>Paraíba</i> 1 APA & 1 ARIE	Water intensive and polluting economic activities such as rice and sugar cane cultivation, shrimp farming and urban, industrial and tourism development destroy mangrove integrity and reduce income stability for local communities.	<i>Output 3.2:</i> Integrate mangrove UC management with water resource management so as to increase biodiversity protection and conserve the long-term functionality of these wetlands and the ecosystem services they provide.

63. Project pilots share a number of commonalities. Each is based on a bottom-up approach to participatory management and will work closely with community, government and sectoral stakeholders to create consensus-building which will be an important tool in threat mitigation. Recognizing the variety and complexity of stakeholder interests, the inception phase would consist of the Inception Workshop (IW) followed by an individual workshop in each cluster to initiate preliminary steps of each pilot during which a bottom-up process of mobilization, capacity building and pilot management will be agreed to ensure full and meaningful participation of all stakeholders, and bring the specific needs and strengths of women and youth into play. During this phase, stakeholders would be brought together to clarify roles and responsibilities of each, finalize details of pilots, and leverage additional funding from government, private sector, NGO and university stakeholders. This will be a particularly crucial phase as it will set the basis for the Project's bottom-up approach and will promote cooperation and respect among the various stakeholders from the get-go. In line with the Project's focus on community empowerment, input and benefit, the potential for micro-credit possibilities will be explored during this phase.

64. As the Project progresses, periodic seminars will be held through UC management councils in each cluster to bring together all stakeholders and adapt as necessary pilot development and implementation procedures and processes. In recognition of the pressures mangroves are under from a variety of sectors, this will include sectoral stakeholders in each pilot which, along with communities and government agencies, will be incorporated into UC management councils, beginning in the inception phase. In addition to the participation forum provided by these councils, the development of UC management plans is another vehicle through which participation will occur and through which buy-in can be ensured and win-win solutions found for all stakeholders. Together, these workshops, councils and management plans form the basis of the participatory development and implementation of Project actions and longer-term UC management. A fourth element focuses on capacity building which will work with local government, environmental and UC authorities as well as sectors and local communities. These stakeholders will be mobilized through outreach to be undertaken immediately prior to the IW. Communities, in particular, will be mobilized for participation through existing fora, such as the *uçá* discussion fora in the Parnaíba

Delta, fishermen's associations, and rural and environmental extension agents. Sectoral representatives will be approached through relevant government instances.

65. To bring about effective conservation and resource management, which can only be achieved with the buy-in and expertise of local resource users, and to improve the sustainability of local livelihoods, communities in each pilot will be asked to identify community experts to act as information sharers and advisors to the Project team. Community input will strongly inform each step in pilot development. In addition to improving capacity for UC management by working with UC communities and authorities to develop, create capacity for, implement and enforce management tools tailored to mangrove PAs, pilots will (i) provide lessons learned to feed into the improved regulatory framework through development and testing of methodologies for mangrove management plans and buffer zones, validation of proposed amendments to existing legislation and testing of the practical implications of clarified institutional mandates; (ii) test replicable models of how best to integrate management across UCs and across sectors for improved planning and cost efficiencies, as well as models for effective resource management planning; (iii) create base knowledge and lessons learned related to mangrove PA financing mechanisms; (iv) make validated contributions to the knowledge base on mangrove resources and sustainable use practices; and (v) create awareness and capacity in communities for sustainable exploitation of resources, implementation of sustainable economic alternatives and participation in PA and resource management. Moreover, together their actions will deliver direct biodiversity benefits in the pilot UCs and build the ground-truthed basis for the nationwide mangrove management strategy.

Alternatives Considered

66. A number of alternative strategies were considered for strengthening Brazil's protected area approach to the conservation and sustainable use of mangroves. Since the Project's threat analysis detected pressures on mangrove ecosystems from a wide variety of sectors, the Project team initially considered a variety of mainstreaming options. These included:

- Mainstreaming biodiversity protection into all relevant sectors all along the coast, ranging from the water resources sector to the economic sphere, the latter including especially shrimp farming and tourism. This strategy was ultimately discarded given that such an endeavor would be beyond the scope of any single project in light of the vast length of Brazil's coastline, the number of sectors involved, the multiple resource conflicts between them and the complexity of reaching each sector and its numerous instances at the coastal, state and municipal levels.
- Mainstreaming mangrove concerns in one sector representing a principal threat. This, too, was discarded as it excludes the integrated approach that mangroves as transition, multi-use ecosystems require. Under this option, virtually all Project attention and resources would necessarily be given to one sectoral threat rather than focusing on a broader strategy that would address multiple threats and could later be scaled up so that all these threats could be dealt with all along the coast.
- Mainstreaming in all sectors in one coastal state was also considered but this alternative was ultimately not selected since it would limit itself to the threats and specificities of a single area and, thus, not necessarily be replicable along the entire coast. Moreover, it would imply reduced biodiversity benefits since mangrove and associated biodiversity are differential along the coast, with biodiversity levels decreasing slightly toward the South and different species dependent on different areas.

67. Rather, since all mangroves in Brazil fall under the PA mechanism of Areas of Permanent Preservation and at least 56% of them are included in the SNUC, the Project elected to pursue a more

targeted strategy of conservation of mangroves through a protected area approach, designed as incremental to ongoing efforts. Within this approach, a number of other options were also considered:

- Creating more strict protection UCs. Creating new UCs or changing the management category on an existing UC is an expensive and complicated process. Moreover, it creates disadvantages for poor communities by prohibiting their livelihood activities in these areas. In effect, this option would simply sidestep conflicts with sectors and would have overlooked the opportunity to create win-win situations for all stakeholders. Furthermore, the Project team decided against this option in light of the recognition that the most pressing threat to mangrove conservation was ineffective management of UCs, not necessarily insufficiently restrictive categories.
- Focusing only on Extractive Reserves (RESEX). While this option would have facilitated the chance to work with communities and sectoral stakeholders, it would have excluded the opportunity to work in APAs with a more landscape approach which, ultimately, allows mainstreaming to play a central role in the Project strategy, thereby creating opportunities for consensus-building with sectoral, government and community stakeholders. In addition, it would have vastly limited the Project's direct biodiversity benefits, since the majority of mangrove cover is found in APAs.
- Focusing on single PAs scattered about the country. The Project team chose not to pursue this approach as working in clusters was considered of utmost importance for an improved landscape level approach, to take advantage of cost efficiencies and to generate important lessons for the mosaic approach, hence advancing the entire SNUC.

68. Thus, the decision was made to focus on improving the management effectiveness of the UCs under their current categories and to define the ideal mix of management categories which, effectively implemented, would best contribute to the protection of mangroves nationwide. Furthermore, this protected area approach contributes a solid basis on which to reduce conflicts between high-economic-value sectoral activities and mangrove conservation. Recognizing that the expansion of activities such as shrimp farming along the coast necessitates, in the long-term, efforts designed to address productive practices in the broader landscape, the Project strategy includes (i) the more specific definition and regulation of activities in the *tannes* to better control extractive activities; (ii) pilots linking PA management with spatial planning policies to ensure actions such as water permits upstream from mangroves duly include conservation objectives; (iii) a Project M&E plan designed to register and adapt to increasing or emerging threats early on in order to adjust Project actions to respond to them as necessary; (iv) awareness components with sectoral stakeholders and using valuation studies to increase understanding of mangrove ecosystem services. and (v) developing a national mangrove strategy that defines future work at the broader landscape level once core areas have been secured.

Project Goal, Objective, Outcomes and Outputs

69. The proposed Project would improve Brazil's ability to deliver effective conservation to, and sustainable resource use of, key mangrove ecosystems through a protected area approach which would be based on strengthening the National System of Conservation Units (SNUC) and the status afforded to all of Brazil's mangroves as Areas of Permanent Preservation. In achieving this it would advance the maturation of Brazil's protected areas conservation strategy and increase the systemic, institutional and ecological sustainability of the SNUC.

70. The Development Objective or Goal of the project is the conservation and sustainable use of mangrove ecosystems in Brazil and their environmental services and functions important for national development and the well-being of traditional and coastal communities. The Purpose or Immediate

Objective is that a field tested protected area management strategy is adopted for the effective conservation of a representative sample of mangrove ecosystems in Brazil. The Project will achieve its Immediate Objective through the following four Outcomes and their related Outputs:

Outcome 1	Outcome 2	Outcome 3	Outcome 4
The enabling environment for a sub-system of mangrove ecosystem protected areas is in place, including policy, regulatory, and financial mechanisms.	Replicable models are in place for the management of mangrove resources in SNUC sustainable-use protected areas.	Conservation of mangroves improved by piloting the alignment of UC management with sectoral and spatial planning.	Mangrove-related outreach, dissemination and adaptive management increased.

Outcome 1: The enabling environment for a sub-system³¹ of mangrove ecosystem protected areas is in place, including policy, regulatory, and financial mechanisms. (Total cost: USD 3,203,900; GEF: USD 920,000; Co-financing: USD 2,283,900).

71. To achieve long-term sustainability of a mangrove PA network within the existing national system and a nationwide mangrove strategy, a supportive policy, regulatory and financing environment is necessary. To create this enabling environment, Outcome 1 will undertake the following tasks: develop a regulatory framework for the specific approaches needed to effectively manage mangrove protected areas and corresponding operational guidelines for their implementation; increase consistency in state laws relevant to mangrove PAs, clarify institutional procedures for mangrove management and strengthen capacities for implementing the new regulatory framework. It will also include designing a representative network of mangrove PAs with a rationalized balance of PA types and locations and UC management categories, exploring and testing financial strategies and mechanisms applicable to mangrove PAs when appropriately tailored for those purposes. Based on these actions and lessons learnt from the pilot intervention sites in Outcomes 2 and 3, an overall strategy for Brazil’s mangroves will be designed to guide and inform future initiatives which will build upon and, in some cases, replicate the Project’s actions and strategy.

72. As such, this Outcome will provide the broad framework at the policy level to address threats and allow all mangrove PAs to function better. The improved regulatory framework (Output 1.1) will include a series of norms and regulations which, in part through improved licensing and enforcement, will require broader spatial and sectoral planning to take into consideration the needs of mangrove ecosystems so as to mitigate any potential negative impacts regional or sectoral development would otherwise have on these delicate ecosystems. Coupled with these mechanisms, the Project’s nationwide mangrove strategy (Output 1.5) and the network of mangrove UCs it will design (Output 1.4), and the funding strategies it will test (Output 1.3) will create a space for mangrove conservation in Brazil’s environmental agenda, PA system and biodiversity funding. The five outputs in this outcome will develop and consolidate the necessary institutional, systemic and financial capacity to enable a long-term application of the Project’s strategy and those of other successful mangrove-related initiatives.

Output 1.1. Regulatory framework and corresponding operational guidelines developed for improved mangrove PA management

73. In conjunction with the MMA working group recently formed to elaborate regulations for the entire

³¹ To avoid complications related to certain implications of the word “system” in Brazilian PA terminology, this sub-system will be referred to as a “malha” or “rede” in Portuguese.

UC system, the Project will support the development of a sub-set of norms tailored to mangrove specificities. This will be developed within the framework of existing SNUC management categories and focus primarily on the RESEX and APA categories, as these are the most prevalent for mangrove protection and require the most adjustments as they were originally conceived for terrestrial areas.

74. This tailoring of management category norms would include those norms related to the development of management plans and zonings to address the diversity of stakeholders and the multi-use aspects of mangrove UCs under these categories. It will also include specific requirements for the definition of buffer zones in all mangrove UC categories. Although no specific methodologies exist for developing buffer zones for terrestrial UCs, the standard approach has been to set a rule of thumb limit of 10km around UC boundaries. However while this may be pertinent for terrestrial conservation areas, mangrove ecosystems are particularly complex and buffer zones must be treated differently to respond adequately to the conservation needs of these vulnerable transition areas. This includes the definition of buffer zone boundaries, which may involve the use of temporal definitions in which larger areas are included during different seasons of the year or under different fishing pressures, or it may involve buffer zones that encompass upstream watersheds so as to protect the quantity and quality of water flowing into mangrove PAs. Since imbalances caused by pollution, deforestation and the like in neighboring areas have a much more deleterious effect on the integrity of mangroves than on terrestrial ecosystems, it will also be necessary to take a differential approach to the types of activities permitted in mangrove UC buffer zones, such as restricting more closely actions that could lead to pollution of water sources. These guidelines and norms will be tested and adapted as necessary in the pilots under Outcomes 2 and 3.

75. A second line of action in this Output will seek to clarify the issue of unclear or overlapping mandates related to mangrove UCs. The first case, unclear mandates, can result in inaction in mangrove UC. For example, existing laws delegate licensing responsibilities in federal, state and municipal PAs on public land, but fail to clarify whether IBAMA or OEMAs are responsible for licensing in UCs that encompass private lands, as is the case with APAs. Overlapping mandates, on the other hand, are another serious problem. Since mangrove UCs still technically fall under the APP categorization as well, the process of licensing potentially harmful economic activities which involve removing vegetation, such as shrimp farming, would be the responsibility of the relevant OEMA or municipality, depending on the geographic reach of its impact. Thus, mandates will be clarified for mangrove UCs and APPs to determine clear jurisdiction of IBAMA, OEMAs and municipalities. Baseline work on regulation of Article 23 of the Federal Constitution related to responsibilities of the three levels of government will provide an important input to this process. Finally, the Project will develop proposals to amend existing mandates and will discuss them with these government instances.

76. As an input to the development of the regulatory framework, and to clarify the roles and responsibilities of each government agency under different PA scenarios, an evaluation of each State's policies and norms related to licensing activities in mangroves will be undertaken. This will include, as well, a review of the role of sectoral agencies and how they impact government decision-making when it impacts on biodiversity. This evaluation will be discussed at a national workshop to determine how to harmonize state norms to ensure effective minimum standards for mangrove protection as well as how to approach coordination with sectors. Proposals will be made to amend existing legislation as necessary.

77. As pilot interventions advance, and based on the input of actions under Output 1.4 (network of mangroves) and Outcome 4 (Adaptive learning) a third line of action in this Output will develop formal proposals of amendments to existing legislation orienting the licensing, financing and management of mangrove PAs. Specific legislation to which amendments will be suggested under this output include, amongst others, the following lines of action:

- IBAMA, SEAP and OEMA norms related to the co-management of fisheries resources to integrate criteria related to improved socio-environmental sustainability and an ecosystem vision especially in the design and implementation of sustainable fisheries practices.
- Amendments will also be suggested to State norms to achieve a more consistent approach to the definition of the mangrove ecosystem, and ensure that the licensing of economic activities in mangrove areas is consistent across states and in line with protection of the entire mangrove ecosystem.
- Water resources authorities will work with the Project to define criteria and guidelines for water resources management related to mangrove conservation, and a proposal will be made to amend the National Water Resources Policy and relevant state laws to require the process of water catchment planning to consider the water demands of downstream mangrove areas for purposes of classifying water bodies and issuing water use permits.
- Regulatory norms that govern financial mechanisms for PAs will need to be made more specific to mangrove areas to ensure that funds are awarded or collected in line with such criteria as the proportionate services provided by mangroves or level of impact of extractive activities in these ecosystems.

78. This Output will play a primary role in facilitating replication of the Project strategy. Lessons learned in Project pilots will inform the development and validation of amendments to be proposed to relevant laws and norms in order to strengthen the regulatory framework relating to mangrove PAs. By promoting the integration of these changes into the existing legal framework, the Project will contribute to building the regulatory basis for scaling-up the improved management and conservation of mangrove PAs.

Output 1.2. Institutional procedures and capacities aligned to new regulatory framework for mangrove management and coordinated with sectoral policies.

79. In order to ensure consistency and minimum standards in a nationwide approach to mangrove conservation, this output will update institutional procedures and processes regarding mangrove UCs and APPs in line with the clarified mandates and advances in the regulatory framework achieved through Output 1.1. It will also deliver capacity strengthening programs for the different institutions involved in mangrove management so as to better align procedures, staff profiles and capacities to the new regulatory framework. Furthermore, this Output will provide capacity building and awareness training on the value of mangroves to sectors that impact their conservation and sustainable use.

80. As part of the process to update procedures the Project will undertake a three-pronged capacity building program aimed at (i) OEMAs and municipal environmental agencies, (ii) managers of federal, state and municipal UCs and (iii) sectoral agencies.

81. OEMAs and municipal environmental agencies. This first prong of the capacity building program would aim at creating capacity in the state and local level SISNAMA agencies responsible for overall environmental policies throughout their jurisdiction. These agencies are responsible for all environmental polices in their administrative jurisdiction and are not limited to PA or mangrove-related activities. Rather, they must consider overall environmental integrity and impact.

82. This prong would consist of two phases, the first spearheaded by the Project itself, and the second spearheaded by OEMAs which are responsible for delivering capacity building programs to

municipalities in their states. In the first phase, the Project will prepare didactic materials related to the importance and value of mangroves for OEMAs. The eight Project states would receive training based on these materials to integrate such mangrove-specific elements into their capacity building programs for municipalities. The Project will also explore partnerships through other ongoing capacity building processes and initiatives for delivery of more formal capacity to OEMAs and will work through regular meetings of OEMAs, such as the Brazilian Association of State Environmental Agencies (ABEMA), to discuss new procedures, share lessons and build capacities.

83. Specific mangrove-relevant issues to be addressed in developing training programs and trainers to target municipalities would be modules on the effective use, and enforcement, of environmental management instruments for mangrove conservation. This would comprise, *inter alia*, procedures for licensing processes including guidelines for the development and review of EIAs tailored to mangrove characteristics; the processes for developing zoning in APAs; the consideration of mangrove PAs in coastal zone management processes; and the integration of mangrove functionality requirements in water resources instruments.

84. In the second, scaled-up phase, OEMAs would then deliver updated capacity building programs to municipalities based on the elements introduced to them through the Project. Additionally, the Project would deliver site-specific capacity building to target municipalities under Outcomes two and three to facilitate successful Project interventions. Lessons learned from those experiences will inform the final design of the final, scaled-up capacity building program for state and local environmental authorities.

85. This second phase would be operationalized through the existing National Environmental Managers Capacity Building Program (PNC) within the Directorate of Institutional Cooperation (DAI) which aims directly at training municipal level stakeholders ranging from environmental managers to civil society representatives. This program was launched in August 2005 and, to date, nine mangrove states, including four of the Project states, have begun or concluded the negotiation of agreements with DAI for its implementation. The Project will promote the expansion of the program to the remaining four Project states and, eventually, to the remaining three Brazilian states with mangroves so that the capacity building program, building on lessons learned from Project experiences, may be implemented along the coast.

86. Managers of federal, state and municipal UCs. This second prong would be targeted at those responsible for the management of mangrove UCs thereby creating immediate capacity for the implementation of the Project pilots. Initially, it would be implemented on a limited scale to an estimated 50 UCs managers (federal, state and municipal levels). In the second half of the Project, cost effective modalities of expanding training to all mangrove UCs would be explored. In that stage, training programs would include the National Mangrove Plan and the new regulatory and operational guidelines developed by the Project, thus acting as a vehicle for dissemination scaling-up. Beginning during Project implementation, this training program will be replicated on an ongoing basis by IBAMA as part of its EEC environmental education and capacity building activities. As part of the National Mangrove Plan, a longer-term capacity program would be developed to address the medium and long-term capacity needs of mangrove UC managers.

87. Short term goals would be the focus of a training program to be delivered in conjunction with baseline initiatives. Federal UC managers would attend training events immediately prior to regular national meetings at IBAMA thus ensuring cost efficiencies. State and municipal capacity building short term goals would be addressed primarily as part of capacity building in pilot areas.

88. Capacity strengthening will focus on tailoring competencies of UC practitioners for the improved management of mangrove UC. This will aim largely at mangrove UC managers and will build on baseline capacity initiatives for UC managers in general. IBAMA's General Coordination for Environmental

Education (CGEAM) will tailor its training courses for UC managers to include relevant technical and legal basis to mangroves conservation and management methodologies for management plans that include the definition of buffer zones that afford increased protection to critical upstream areas and trigger the additional rigor in EIA processes required for these areas. Potential affects of climate change on mangrove ecosystems would also be included along with the need to allow additional setback to permit future inland migration of mangroves in the face of increased storm surges and rising sea level. It will also include a component on identifying and mobilizing potential funding sources.

89. An initial step in delivering this capacity building will be to detail preliminary competency skills profiles for managers of UCs that encompass mangroves. This will include, *inter alia*, a knowledge base relating to mangroves since the clear comprehension of certain aspects of mangroves is necessary to manage these UCs effectively. *Inter alia* this will address the importance of mangroves as fragile coastal wetlands and the essential nature of all the ecological zones forming mangroves which requires an ecosystem approach to resource management and an understanding of the effects of climate change related phenomena, such as rising sea levels, on mangroves. The skills profiles would also include specialized conflict resolution techniques and coastal zone management processes given the highly diverse users of these ecosystems and the economic pressures prevalent in the coastal area.

90. As Project implementation progresses, the standard competency profiles required for all UC managers would be tailored to incorporate specificities of mangroves. They would build on the preliminary skills profiles mentioned above and incorporate elements of the new regulatory framework and operational guidelines to be developed under Output 1.1.

91. Sectoral agencies. The third and final prong of the capacity building program would target sectors that impact mangroves. This would include aquaculture, tourism, industry, infrastructure, fisheries and agriculture. Increased coordination with these sectors will be pursued at the national level created to enhance dialogue between the three levels of government. These include the National and State Technical Tripartite Commissions as well as the Ecological-Economic Zoning Coordination Commission (CCZEE) which orients the process and implementation of EEZs in Brazil. The Project would sponsor extraordinary meetings with the sectoral members of these commissions as fora for this awareness raising and dialogue on the value of mangroves to their respective activities, on lesson learnt through pilot projects regarding win win solutions of sectoral participation in mangrove conservation. Similarly, these would be used to advance the discussion of potential adjustments to sectoral policy to enhance mangrove protection in key areas.

Output 1.3. Financial strategies for mangrove PA management tested and supported by the regulatory framework

92. One of the barriers to the effective management of mangrove UCs is insufficient financial resources for operations. This is a barrier that is common throughout the SNUC; however, within the scope of this Project, a reduced set of strategies and mechanisms tailored specifically for mangrove PAs will be explored and tested. It is recognized that the Project will not resolve the entire funding gap of all PA financing. Nonetheless, it is expected that when the successful tests are adopted in the mangrove PA strategy, these, together with baseline actions in the SNUC, will provide an important advance. This Output will involve complementary and parallel levels of actions based on exploratory studies carried out in the PDF B phase³². The end result would be a validated set of funding approaches that would form part of the Mangrove Strategy and be incorporated in its regulatory framework. It would include potential resource generation mechanisms, improved cost efficiency strategies and assessments of the trade off

³² Additional information can be found in Annex 6.

value of services lost if mangroves are destroyed, versus the costs of management through PAs, versus the costs of mangrove restoration³³. Output activities are described below.

93. Valuation: Surveys will be undertaken of the flows of goods and services in UCs housing distinct mangrove types to be selected in Pará, Paraíba and Bahia. These will include the identification of direct and indirect users and beneficiaries of mangrove conservation services, and an assessment of their willingness-to-pay for such services using well accepted valuation tools, such as contingent valuation and (to the extent data is available) ecological-economic modeling of the links between onshore land use and fisheries productivity. These will be used in the testing of how existing PA financing mechanisms can be tailored to mangroves, recognizing the services they provide. Each valuation study will be linked to a specific set of services mangroves provide and will, thus, feed directly into a resource management decision in Project pilots. The Pará study will appraise the linkages between mangrove ecosystem protection and fisheries to feed into the pilot under Output 2.1; the Paraíba study will consider the links between mangroves and water resources they depend on to determine the costs incurred through loss of ecological services if water classifications do not take into account mangroves to feed into the pilot under Output 3.2; and the Bahia study will be concerned with establishing criteria for appraising the potential damage to mangroves and related water and land resources associated with major coastal investments. The results of these valuation studies will be used in awareness campaigns in Outcome 4 and all the capacity building strategies throughout the project. Close links will be established with the results of valuation studies in Output 1.3 as an input to determine the costs incurred through loss of ecological services if water classifications do not take mangroves into account.

94. Compensation mechanisms. In principle, under SNUC Article 36, compensation payments to UCs affected by development projects are provisionally derived from a 0.5% charge on the total volume of resources invested in those undertakings. However, a valuation approach to potential resource damage whose costs should be mitigated by compensation represents a more defensible approach.³⁴ In addition to deficiencies in estimating compensation levels, there are no clear guidelines to prioritize which UCs should be recipients. A pilot testing ecological services as a resource generation instrument for mangrove UCs through existing compensation mechanisms will be undertaken in Bahia. The project will design, cost and negotiate the use of compensation funds for mangrove conservation in established UCs. It will work to determine more accurately actual management costs in these UCs, and will cost potential impacts and identify processes and mechanisms for channeling resources to mangrove ecosystems within them, taking into account the valuation studies undertaken. This pilot will also consider relevant institutional and regulatory issues related to making existing compensation mechanisms and valuation tools applicable to mangrove PAs.

95. Ecological value-added tax (ICMS-E). This instrument rewards those municipalities which forego other sources of revenue due to creation of PAs in their territory, by allocating to them a greater share of the municipal revenue from value-added taxes on goods and services (ICMS). These resources do not necessarily have to be channeled specifically to UC management but rather could be used for other municipal works. However, the quality of this management is determined yearly as the basis of future disbursement and thus indirectly ensures that UC management is maintained. Currently each State has different sets of criteria for determining the quality of UC management or of the ecosystems within them. The project will test adaptation of the existing ecological value-added tax (ICMS-E) instrument as a means to increase the long-term financial sustainability of mangrove UCs in São Paulo and Paraná, where this instrument is already operational.

³³ UNEP-WCMC (2006) cites studies that show annual economic returns (some estimates are US\$200,000 to 900,00/ha) are higher than restoration costs (US\$225-216,000 per ha) or Marine Protected Area management (annual operations cost of US\$775 per km²).

³⁴ IBAMA adopted this approach in developing a methodology for valuing the potential damages associated with compensation negotiations for facilities installed within PAs, with a focus on communications infrastructure.

96. To make the instrument more effective as a means of transferring revenues toward PA management, local negotiation between municipal authorities and protected area managers will be required. This would include developing suitable criteria to enhance their management systems to ensure that mangroves within them are protected. In Paraná, a number of indicators reflecting management quality attributes contribute to the sums allocated through this instrument, while in São Paulo ICMS allocation is based only on the area of UCs as a proportion of the area of the municipality. To assure a continuing flow of ecosystem services from mangroves, cost effective management measures will be identified and environmental quality criteria will be developed and tested initially in the Guaraqueçaba APA in Paraná. The results will enable state authorities to direct additional resources from ICMS-E to priority mangrove PAs. Existing valuation studies conducted in São Paulo and Paraná³⁵, the former with specific reference to mangroves, will inform the negotiations with municipalities and State governments regarding this prioritization. Links will also be developed with project supported valuation studies in other mangrove areas. These approaches may then be transferred to São Paulo and other states which are in the process of adopting or improving upon existing ICMS-E instruments, with co-financing from a program initiated by the Alliance for the Atlantic Forest (SOS Mata Atlântica, Conservation International and The Nature Conservancy).

97. Cost efficiency through managing clusters of UCs referred to as Mosaics³⁶. The only formally recognized coastal mosaic in Brazil is the São Paulo/Paraná mosaic referred to in the above paragraph. It is home to 19 mangrove UCs falling under a variety of different management categories and administered by three different levels of government. As such, it represents a good opportunity to simultaneously address funding barriers for mangrove UCs and advance policy for the entire SNUC. The Project will thus work in this mosaic to develop an integrated management plan for increasing cost efficiencies by sharing operational costs across neighboring mangrove UCs. The challenge will be to determine how best to manage jointly these UCs for the effective conservation of their resources while ensuring cost-efficiency. The first step will be to assess the costs and revenues of each UC and determine minimal operational needs. Based on this, and through meetings, modeling and negotiations with UC managers, respective municipalities, and OEMAS, a set of potential joint actions will be proposed to reduce costs of individual UCs. For example, as various UCs are contiguous and enforcement involves coastal inspection by boat, efficiencies could be expected from joint campaigns. Similarly, inputs from communities and institutions other than the UC managers play a role in optimization of resources. Proposed joint actions and strategies will be discussed in a broader forum of stakeholders. It is anticipated that this would include strengthening capacities for the setting up and operation of a Mosaic Council for oversight as predicated in SNUC Law. The results of this cost-efficiency model will be integrated into the regulatory framework to orient future implementation of this approach in mangrove UC mosaics.

98. A second level of work would involve developing guidelines on alternative production practices in mangroves and working with various national level funds such as the National Environmental Compensation Fund to incorporate these guidelines into their existing operating procedures and to open new lines of credits for communities in sustainable use mangrove UC. These would include working closely with the GEF-funded PROBIO that is mainstreaming biodiversity friendly practices into agriculture.

99. The Project would also draw on the following sources of financing for micro-enterprise in selected intervention sites as a part of sustainable production promotion:

³⁵ Grasso, M. 1998; Grasso, M. & Schaeffer-Novelli, Y. 1999. Medeiros, C.P.S. 2000.

³⁶ This approach, predicated in the SNUC Law, seeks to integrate administrative, technical and financial management of neighboring and overlapping UCs to increase management effectiveness and cost-efficiency of individual UCs and to integrate biodiversity, socio-economic and development objectives on a regional scale.

- a. The Ministry of Agrarian Development's PRONAF Pesca program, which offers micro-credit to small-scale artisanal fishermen in Brazil to modernize fishing equipment and expand production.
- b. The Bank of Northeast Brazil's CrediAmigo program, the country's largest micro-credit program, which functions similar to the Grameen Bank, through solidarity groups of loan recipients. It has a primarily urban focus, however, targeting industry and services.
- c. The National Development Bank, which channels micro-credit resources through public and private banks and OSCIPs, and provides for institutional strengthening of OSCIPs engaged in micro-credit and entrepreneurship training.
- d. SEBRAE, the national support program for micro-enterprise, offers a range of services and helps to reduce bureaucracy and tax incidence for microcredit recipients. SEBRAE offers greater support to aquaculture than to artisanal fishermen, and is involved in supporting tourism linked with fisheries in wetland areas such as the Pantanal.

100. In addition to the above actions identified in the PDF B phase, as well as training foreseen under Output 1.2 for UC managers to identify and mobilize potential funding mechanisms, the Project will continue assessments of other potential mechanisms for funding mangrove PAs. Amongst these, potential partnerships with the private sector will be explored and procedures established for collaboration with selected enterprises that are willing to channel part of their revenues toward mangrove conservation, for example, hotels adopting mangroves, voluntary sports fishing payments or licensing fees, etc. This mechanism will be premised on the growing interest of the private sector in the environmental sustainability of their business endeavors and will allow them to increase their social value by using the "green seal of approval" as a marketing strategy. Such an endeavor has as a baseline the publication by the Brazilian tourism industry of criteria for certifying ecotourism products, as well as efforts to establish overall socio-environmental criteria for observance by the hospitality sector.

Output 1.4. A representative network of mangrove UCs is designed within the existing PA system.

101. Through this Output, a virtual network of UCs will be designed that is representative of the seven mangrove units found in the country and that has the ideal mix of UC management categories for the conservation and sustainable use of the mangrove sub-set of Brazil's overall PA system. While the Project will not implement this network, it will serve as an important tool to orient future mangrove PA initiatives and to scale-up the Project strategy. In essence, the network, together with the national mangrove plan outlined in Output 1.5, will be a blueprint for replication of the Project strategy, taking advantage of the broad policy framework strengthened and tested by the Project that will allow mangrove PAs, both UCs and APPs, to function better.

102. The network will seek to balance conservation and sustainable use with the maintenance of traditional communities' livelihoods and coastal development objectives. Thus, its design will be determined based on two primary elements. The first will be an analysis of the effectiveness of strict conservation and sustainable use categories for UCs, other types of protected areas, including indigenous lands and *quilombos*, and on the effectiveness of the APP designation for the conservation of a representative sample of Brazil's mangroves. Simultaneously, existing knowledge on social and economic issues will be compiled to ensure the integration of community needs into the analysis and to contribute to determining the balance between strict protection and sustainable use UCs. To achieve this, this Output will build on the mapping of the country's mangroves to be carried out under Output 4.1, and will undertake studies to identify which management categories most effectively ensure the conservation and sustainable use of mangroves, considering the different threats and uses along the length of the coast. The design of this network will be an important input for the construction of a mangrove strategy given that, at

the present time, it is not clear if the current management category and geographic distribution of UCs is ideal, nor, consequently is there sufficient empirical knowledge on what is needed to improve it. In addition, the network will be superimposed with maps of existing development and infrastructure programs for final consideration. This latter will have specific relevance in determining how the country should pursue adaptation. As this network of mangrove UCs is designed, it will take into account and promote specific instances of, for example, the need to keep certain areas behind mangroves free of buildings and other structures to allow inland migration of mangroves under changing sea levels.

103. To ensure the ideal mix of management categories and positioning of clusters of UCs to conserve a sample of Brazil's mangroves representative of its seven physical-environmental units, the network will undertake a variety of actions. These include indicating areas in existing UCs, mainly APAs and RESEX, which are ideal sites for no-take zones as well as working in locations adjacent to UCs to create similar "no-go" areas and biological corridors. In this way, a stepping stone approach will be pursued to ensure the right balance of management tools over broader landscapes. These newly defined areas may be permanent or temporal and, as such, are particularly appropriate for mangrove areas. These areas would be created using a basic legal instrument called a *portaria*. The design would also involve identifying clusters of UCs to be formally established as UC mosaics following lessons learned from the cost-efficiency model in the one, formally-established coastal mosaic in the SNUC, located in the São Paulo/Paraná target area. It is anticipated that each Project target area will form an integral part of these proposed mosaics. All such recommendations will be based on an analysis of the degree of protection offered to Brazil's full range of mangrove complexes under the current PA system and taking into consideration advances achieved by the Project and baseline activities, as well as their lessons learned.

Output 1.5. National Plan for the Conservation and Sustainable Use of Mangroves is designed and formalized.

104. The studies, pilots, proposed regulatory framework and lessons learned from the Project will be utilized to develop a nationwide strategy for an integrated, systems approach to the conservation and sustainable use of Brazil's mangroves. It will include specific strategies to mitigate the various threats facing mangrove PAs as well as concrete targets to be achieved within specific timeframes. The plan will be developed in three phases with short, medium and long-term objectives. The first version will be prepared during the first 18 months of Project implementation and will be based on secondary data, including case studies and lessons learned of existing or past initiatives, policies and guidelines from Brazil and from international treaties such as the Ramsar Convention on Biodiversity, the FAO Code of Conduct for Responsible Fishing, and many others. Consultations will be held within the Project intervention areas with federal, state and municipal agencies, UC councils, water resources authorities, NGOs, CSOs, universities and other research institutions, and relevant sectors to discuss this version of the plan and make preliminary commitments to implement the medium and long-term objectives of the plan, to be fleshed out in the subsequent version.

105. The second, medium-term phase for 2010 will compile lessons learned from the first few years of Project implementation, including those related to proposed changes to the regulatory framework, sustainable fisheries practices, buffer zone definition, enforcement, zoning, mangrove-friendly water resources management, and financial mechanisms for mangrove UCs and APPs. To ensure the plan is coordinated with broader PA planning and environmental conservation, and to ensure the replication of the Project strategy on a national level, the medium-term version of the plan will be formally legalized during the Project implementation period, and will form part of the Wetlands Strategies to be designed by MMA. Through the DAI capacity building program, this version of the plan will be discussed and agreed with all mangrove municipalities along the coast for scaling-up of the Project strategy. Additionally, through the National and state Tripartite Commissions, it will be discussed with the relevant sectors to ensure their buy-in for increased conservation and sustainability.

106. The final phase, to be prepared by 2015 and thereby coinciding with the target date for Brazil's National Protected Areas Plan, will build on lessons learned from the Project's 2007 – 2011 implementation, as well as lessons gathered in the years following Project end including instances of replication of the Project strategy, indicators of sustainability of Project actions and other relevant initiatives in Brazil and worldwide.

107. The SISNAMA agencies, and IBAMA in particular, will take responsibility for the implementation of the final version of the plan in partnership with NGOs, local universities and research centers and will pursue partnerships with relevant sectors including especially aquaculture, tourism and fisheries.

Outcome 2: Replicable models are in place for the management of mangrove resources in SNUC sustainable-use protected areas (Total cost: USD 8,551,720; GEF: USD 1,550,000; Co-financing: USD 7,001,720.)

108. Sixty-seven percent of the UCs that protect mangroves in Brazil fall under management categories that permit sustainable use of resources. Their effectiveness for biodiversity conservation depends on extraction levels keeping within limits that maintain ecosystem functionality. Whilst this is a common factor of all UCs under such management categories, those conserving mangroves face additional challenges given the complexity of these ecosystems and the disparate range of resource users who depend on them. This necessarily requires developing sustainable extractive practices collectively with the populations in these UCs and planning across clusters of UCs within an ecosystem approach. To ensure sustainable extraction levels, this Outcome will work with local resource users, primarily marginalized communities, to determine how sustainable use categories can be optimized to provide both conservation and livelihood benefits. Additionally, it will work with sectoral stakeholders through the participatory development of management plans and strengthening of UC councils. Specifically, this Outcome will develop and test approaches to establishing sustainable extraction levels through piloting resource management plans for fisheries resources, including crabs, with resource users and setting up mechanisms and capacities for their enforcement. It will also explore other possibilities for mangrove value-added products and will provide training to stakeholders on sustainable use approaches.

109. In doing so, it will provide a replicable model that orients management throughout the numerous sustainable-use UCs that conserve mangroves in Brazil's SNUC and provide inputs to improve the regulatory framework of Output 1. Moreover, as it will seek to establish best practice approaches to sustainable use of mangroves and their species assemblages, it will also provide input to the improved management of mangroves under the APP status. As it targets communities that have livelihoods based on extraction of resources related to mangroves, as well as RESEX and APA managers, it responds to national development goals addressing the needs and livelihoods of marginalized communities.

110. Lessons learned through this Outcome regarding sustainable use practices for mangrove resources, community participation, capacity needs of environmental and UC authorities and local communities, and the appropriateness of the existing regulatory framework will play an important role in the preparation of the National Plan for the Conservation and Sustainable Use of Mangroves, as well as the strengthening of the existing policy and regulatory framework governing mangrove PAs.

Output 2.1. Resource management plan for fisheries developed at the ecosystem level in the protected area cluster of Pará.

111. Currently, fishing plans and limits in mangrove RESEXs are developed based on information from within the specific borders of the individual UC. However, as these boundaries have no impact on the flow of water or the upstream travels of fish, management is often inadequately informed thereby risking overfishing in individual RESEX and in the broader ecosystem. Thus, to improve the effectiveness of

conservation through RESEX UCs, this Output will pilot the design and testing of management approaches to mangrove fisheries resources across clusters of Protected Areas in coordination with community and sectoral stakeholders. In this context, it will adopt the ecosystem approach to fisheries (EAF³⁷) and will follow guidelines set down by the National Protected Areas Plan (PNAP) which foresees the design and operationalization of networks of PAs and areas both of greater and less restriction within them. In doing so, it will contribute to reducing threats to the integrity of mangrove ecosystems, promoting methodologies of co-management of fisheries resources, disseminating experiences and strengthening local capacity for more effective management of the pilot RESEXs. Lessons learned through this pilot will feed into the regulatory framework and inform guidelines for sustainable use UC management plans and ecosystem level fisheries plans. Partnerships for the development of the ecosystem plan are being explored with Wetlands International.

112. The Pará UC cluster was selected for this pilot, as it is located in one of the best preserved and most productive mangrove ecosystems in Brazil and has nine nearly contiguous RESEX that represent well mangrove fisheries resources and the threats they face. Moreover, this cluster has available financial and social resources and counts on past and ongoing projects to provide the bases needed for the development of the pilot. Working in nine neighboring RESEX will allow for a comprehensive analysis of the mangrove environment as well as a broader vision of the resources and the various stages of their development. This, in turn, will enable the identification of, for example, nursery areas which could be designated as no-take zones where the recuperation and maintenance of fishery stocks would be the primary objective.

113. This pilot will be implemented in a participatory manner with local stakeholders serving both as decision-makers and as an important source of knowledge on the UCs and their resources. It will also work with sectoral stakeholders through the participatory development of management plans and strengthening of UC councils. As a first step in the preparation of the ecosystem plan, a specialist hired by the Project will compile the experiences of fishing communities in the UC cluster and analyze the number of families exploiting these resources, principal species³⁸, reproductive areas of principal species, extraction practices and the local economic and ecological impacts of extraction limits and practices. Based on this, a preliminary proposal for an integrated ecosystem approach to fisheries resources in the nine RESEX will be developed to serve as a primary input into the ecosystem level fisheries plan. This proposal will include the design of a network within these RESEX comprised of no-take zones, sustainable use areas, and other mechanisms for resource management. This proposal will be discussed and agreed with local stakeholders.

114. In parallel, work will be undertaken in three of the cluster's nine RESEXs to provide specific technical information for the development of the ecosystem fisheries plan and to test fishing practices that would be promoted in it. Through a potential partnership with the Ministry of Science and Technology's National Council for Scientific and Technological Development (MCT-CNPq), scholarships would be provided to fund these studies, all of which will be participatory and rely in part on information gathered directly from local communities and their involvement in the collecting of further information. These

³⁷ For more detailed information on the ecosystem approach see: FAO Fisheries Technical Paper n. 443. 2003. The Ecosystem Approach to Fisheries: Issues, Terminology, Principles, Institutional Framework Foundations, Implementations and Outlook.

³⁸ Although the final decision of which resources to work with and to monitor for purposes of the project's M&E will be made based on further analysis during Project implementation, initial research suggests the following as possible options, all of which are overexploited and are important economic resources which guarantees further overexploitation unless immediate mitigating measures are taken: King weakfish (*Macrodon ancylodon*), uçá crab (*Ucides cordatus*) and acoupa (*Cynoscion acoupa*), Southern red snapper (*Lutjanus purpureus*), Laulao catfish (*Brachyplatystoma vaillantii*), Gillbacker sea catfish (*Hexanematichthys parkeri*) and three types of lobster (*Panulirus argus*, *Panulirus laevicauda*, *Scyllarides delfos*).

three RESEX would also pilot how the individual UCs in the cluster can translate ecosystem-level resource plans to the specific UC level.

115. The Curuçá, Soure and Bragança RESEX were selected for this testing, as they house three types of fisheries resources which are dependent on mangroves - estuarine, coastal and marine fishes. They also experience resource-related conflicts between artisanal and industrial fishermen. Furthermore, within these RESEX, as in RESEX all along the coast, a number of unsustainable fishing practices are carried out. These include the use of fishing cages (*currais fixos*), which often result in mangrove deforestation as well as the capture of young specimens and by-catch of other species. Thus, a study to establish environmentally-friendly capture practices, including parameters for the sustainable use of fishing cages, will be undertaken. A potential partnership with the National Institute of Settlement and Agrarian Reform (INCRA) would provide, through its existing PRONAF program, credits to RESEX communities for the purchase of fishing equipment, including fishing cages, that meet the specified requirements. Developing such practices will contribute to addressing the information gap for sustainable approaches to mangrove resource management and deliver direct biodiversity benefits to these RESEX.

116. A partnership will be sought with the Federal University of Pará (UFPA) to undertake a second study on management of estuarine, coastal and marine fisheries resources, which will generate specific scientific knowledge for the development of collective resource management approaches, including dealing with resource conflicts. This will include information on the relationship between mangroves and the broader marine ecosystem, the spatial distribution of fisheries resources at different points in their development, the development of indicators to monitor the situation and conservation status of fishery stocks and the ecological interrelations between marine and estuarine species to inform an ecosystem vision. This information will help define appropriate fishing practices and levels and establish no-catch zones in the pilot RESEX.

117. In this context and within the overall ecosystem level plan, resource management practices will be implemented in the three pilot RESEX and will include, among other things, the establishment of sustainable fisheries limits and practices, such as bycatch reduction devices aimed at scaring away or releasing unintended catches, and no-take areas and closed seasons to be agreed with UC communities. To strengthen enforcement of these agreements, the Project will train community enforcement volunteers to carry out random screenings of capture levels. Additionally, the federal government is currently preparing a plan aimed at combating predatory fishing and recovering fisheries stocks. A primary element of this plan is a focus on increasing enforcement to improve compliance with permitted capture practices and limits of principal overexploited resources. The Project team will build on the methodologies outlined in the plan to orient its work with EMBRAPA, SEAP, IBAMA and OEMAs for their implementation. This will be further facilitated by the capacity building program through Outcome 1.2. It will also be complemented by incentives for compliance with closed seasons. As such, the Project will explore partnerships with the Ministry of Work and Employment's National Employment System program (MTE-SINE) for channeling the payment of temporary unemployment insurance during agreed no-catch periods. Under Brazilian law, this payment is provided to registered artisan fishers during closed seasons of thirty days or more.

118. To improve UC management and sustainability over the long-term, the pilot will strengthen the UC management councils and, under the capacity building program in Output 2.4, work to improve sectoral, community and UC authority capacities for participation in these councils.

Output 2.2. Resource management plan for the Uçá Crab developed and tested in the Parnaíba Delta

119. The Uçá crab is important for the functionality of mangrove ecosystems as it has a key role in soil aeration and biomass degradation. It is also of considerable economic value as it represents one of the

main sources of income for a large number of marginalized communities. Low capture per unit effort rates³⁹ (CPUE) indicates that this resource is experiencing increasing levels of exploitation, although the degree varies along the coast. This is in part due to high levels of mortality from the moment of capture to point of sale which necessitates increased capture levels to ensure a base income. High mortality stems from harmful capture practices; precarious storage, processing, and transport conditions. This is further compounded by extraction occurring at times and in places that are critical for the life cycle.

120. The Project will pilot new approaches to the management of this resource to be outlined in a resource management plan developed by UC authorities and stakeholders. Resource management plans will be developed in one APA and a RESEX located within the Parnaíba Delta in the project intervention cluster of Piauí, Maranhão and Ceará. Uçá crab collection is one the principal commercial mangrove resources in this area. While, at present the resource is not considered overexploited in this area, there are indications that this status could soon change. As such, this is a timely intervention which will contribute to avoiding overexploitation and provide lessons to other areas for the sustainable management of this resource.

121. There is a high level of unregistered *catadores* (crab collectors⁴⁰), particularly youth, attracted by higher income than that gained through agricultural work, the other main income generating activity in the area. However CPUE levels provide an indication of increasing exploitation levels⁴¹. Crab collecting communities expressed concerns regarding these levels during consultation in the PDF B and those to be integrated into this pilot will be those who express interest and willingness to form a critical part of this demonstration.

122. Three parallel but complementary levels of actions are envisaged in this Output. The first level will focus on the development of the resource management plan to orient crab exploitation by local communities and provide an agreed upon enforcement structure for its compliance. As part of the resource plan, crucial areas, such as those used for reproduction, will be identified through technical studies, consultations and ground-truthing. This will orient the zoning of no-take areas within the APA and RESEX. The project will support meetings and workshops to reach agreement on no-take zones and review of closed seasons. Diverse enforcement approaches will form part of the management plan and will include the development of community monitoring and the improved planning and collaboration between relevant institutions that work in this intervention area. The Project will build on the methodologies currently being outlined by the federal government in its plan for combating predatory fishing and recovering fisheries stocks to orient its work on enforcement.

123. To complement this enforcement the Project will also explore possibilities of updating existing legislation to address better exploitation and management practices for *uçá* crabs and provide an incentive for compliance. This would include strengthening crab collectors associations and bringing them to participate into the adoption of management measures, among those the investigation and implementations of new market initiatives through improved access to micro-credit and capacity-building programs.

124. In addition, this output will take steps to improve the situation of *catadores*, large numbers of whom do not possess official documents, such as birth certificates and who are not accepted as professional artisan fishers by formal fishing colonies resulting in ineligibility for social service health or retirement benefits. Emission of registration is the responsibility of SEAP but in the case of RESEX is

³⁹ CPUE = capture per unit of effort- widely acknowledged in fisheries research as an indicator of relative stock abundance.

⁴⁰ Legat & Puchnick, 2003.

⁴¹ Approximately 80% of the Delta's 4,500 fishermen fish five to seven hours per day and, of these, 72% collect five to seven days per week. (IBAMA/Piauí official data).The catch is estimated at 21 million crabs per year, which generates monthly family income ranging from US\$40 to US\$60. (Legat *et al* 2005).

also the responsibility of IBAMA. In the last five years, some fishing colonies have been working with SEAP to document *catadores*. The Project will work with IBAMA and these fishing colonies to develop new approaches for registration of *catadores* to facilitate access to benefits such as insurance as well as access to social service health and retirement.

125. To expand consensus building on the resource management plan at the broader landscape level of the Parnaíba Delta, the Project will strengthen the local discussion forum that was established some four years ago to address issues related to the capture of the *uçá* crab. The forum meets annually to discuss relevant programs being implemented in the area and problems to be resolved as well as to make decisions related to fisheries management and to submit proposals related to the development of the activity. In considering issues related to the social, environmental and economic aspects and impacts of crab collecting, it relies on both empirical evidence gathered by the *catadores* and on scientific evidence presented by researchers and experts who are invited to its yearly meeting. Topics of discussion include such issues as commercialization, closed seasons and balancing species sustainability with stable livelihoods. Once a decision has been made on how to proceed regarding the issue at hand, a proposal is submitted to the relevant government agency. To ensure the continuity of the involvement of resource users in the development of policy, the Project will initially facilitate the participation of speakers at the yearly meetings, the lack of resources for this being noted as the main obstacle to the effectiveness of the forum. It will also promote discussions related to rotating no-take areas and other management methods to improve sustainability of the resources. Drawing from lessons learnt under Output 1.3, the Project will also work closely with the *catadores* and other forum participants to develop sustainable financial mechanisms to ensure the long-term self-sufficiency of the forum.

126. A second level will seek to reduce high mortality rates of crabs through a capacity building program for crab *catadores* with specific modules focusing on improved methods of capture, cleaning and packaging. This will complement EMBRAPA's ongoing work on exploring ways to decrease mortality rates during transport⁴². It is recognized that improved yields of economic return delivered through reduced mortalities could motivate many *catadores* to increase capture particularly as the demand for crab in Brazil will increase indefinitely in line with the supply. This will be addressed through three approaches. The first is strengthened enforcement as part of the resource management plan to ensure compliance with capture levels and seasons and developing a mechanism in the Project's M&E plan to monitor closely and regularly pressure on the *uçá* crab. The second is to link compliance with capture levels and seasons to access to training and Project support for diversified economic alternatives as described in the following paragraph.

127. This third level will explore potential economic alternatives for income-generating measures as alternative to crab collecting during closed seasons and to offset the risk of communities' natural inclination to increase capture upon seeing higher returns through the reduced mortality rates. It would also contribute to more income stability for local families that currently rely on the exploitation of the *uçá* crab as the single largest source of income. The most promising options will be tested through small-scale interventions and scaled-up through capacity building programs in Output 2.4. Training for *catadores* and involvement in these economic alternatives will be contingent on signing voluntary agreements to abide by crab capture levels, no-take zones and closed seasons established in the resource management plan which will have been agreed between UC authorities and representatives of communities and fishermen associations prior to the initiation of economic alternatives. These agreements will serve as a community-level reminder of their commitment to abide by established practices and limits although once the broader level UC management plan is approved its compliance is required by law. Continued involvement in the

⁴² Preliminary findings from EMBRAPA have shown that the use of simple methods, such as washing crabs in salt rather than fresh water in ports, could be easily adopted by the crab collectors and would reduce mangrove crab mortality rates from capture to distribution to below 5% from the current high of 40% to 60%.

economic alternatives will be contingent on compliance with these agreements as determined through community monitoring schemes and the training of community enforcement volunteers to carry out random screenings of capture levels.

128. During the PDF B phase, the following alternatives were identified as both feasible and promising based on the resources, needs and ongoing initiatives in the communities in this Project Intervention Area: community-based ecotourism focused on local attractions and honey production with native stingless bee species. While other possibilities will be identified during the Project, the pilot will demonstrate these two options at small scales to provide specific examples that can be up-scaled at the UC level through the management plan and at the Cluster level through Output 2.4. Other potential economic activities will be discussed with the APA and RESEX communities as possible alternatives for income generation. These would be grounded on feasibility and market studies and more in-depth analysis of community demands, aptitudes and available resources⁴³.

129. *Community-based ecotourism.* Recent studies show that the Parnaíba River Delta holds enormous potential for tourism due to its flora, fauna, dunes, beaches, colonial towns, cultural traditions and craftwork. The exploration of ecotourism as economic alternative will be pursued in the APA municipalities of *Ilha das Canárias* and *Cajueiro da Praia* through partnerships with local organizations, communities and government and environmental agencies and building on ongoing ecotourism initiatives in neighboring municipalities. The Project would support a capacity building program for the local population and visitors. It will include a survey of possible tourist activities or venues including interviews with tourists in similar areas and assessment of the expectations and needs of the local community; capacity building for communities related to specific eco-tourism ventures, more general tourism management and business administration; development of marketing plans and local and regional marketing strategies; and integration of other economic sectors (agriculture, civil construction, cabinetmaking, souvenir production, crafts, etc). To ensure that conservation of mangroves is not threatened by tourism, land zoning will be carried out and will designate areas of strict conservation areas and those that would be more flexible for tourist activities. This sustainable use model is premised on two basic tenets: local communities as protagonists of tourism rather than simply part of the landscape, and tourism as a catalyst to increase awareness and conservation of mangroves and their biodiversity. Partnerships with IBAMA and its departments, such as PROECOTUR within the MMA, area already being established for these activities. Additionally, SEBRAE is a potential partner to support the Project and final agreements will be signed once the GEF project is approved.

130. *Honey production.* Honey from native bee species is a high value-added product compared to honey from Africanized bees and, as such, has enormous potential to generate family income. Moreover, cultivation is done near communities, which would enable women and youth in the pilot UC communities to play a key role in this activity and to receive direct economic and social benefits. The project will build on recent studies done by EMBRAPA with eight producers in traditional communities in the RESEX municipality of Arraioses. It will expand the number of producers to 50 and further adapt methodologies for the sustainable management of native bee species to the area's conditions. The local EMBRAPA office, which has an experienced group of native beekeeping researchers in addition to several labs for analyzing and studying honey, will provide technical assistance in ways to increase productivity, appropriate woods for boxes, hygiene standards and how to meet them in production and packaging. Based on EMBRAPA research, each family with 10 hives can harvest an estimated five liters per hive per

⁴³ One possible alternative is oyster farming. Oyster farming, an environmentally responsible economic activity involving the exploitation of a commercial resource which also performs important filtering services, is a generally profitable venture with the potential to improve the economic situation of innumerable fishing communities in the pilot area. It allows fishing communities to remain close to their original locations creating an income alternative complementary to ongoing economic strategies.

year, which is already a significant level of production that would enable an estimated 40% rise in family income over that gained by crab collecting, since one liter can be sold for US\$15 to US\$20 in the region. In partnership with EMBRAPA and IBAMA, the Project will undertake capacity building for the 50 families in the management and marketing of honey, facilitation of its marketing through the purchase of packaging and labels and, through partnerships with IBAMA, EMBRAPA and community organizations, provide material for the construction of beekeeping boxes and undertake discussion of possible changes to legislation to facilitate the production and marketing of honey produced from native bee species.

Output 2.3 Value-added mangrove products are identified and potential market opportunities are explored.

131. The Project will support the exploration of value-added mangrove products as sustainable economic alternatives for local communities. Through this output, market opportunities will be identified and business plans developed for these products with the collaboration of the private sector. In addition, events will be organized to showcase and market these products to serve as publicity events where information regarding their development will be disseminated to set the stage for the replication of these experiences. This output will work with the communities in Outputs 2.1 and 2.2 to consolidate their experiences and translate them into concrete income-generating activities.

132. The selection of specific mangrove-related products to be included in business planning will be determined in consultation with the communities engaged in the project. A facilitated entrepreneurship training and business planning workshop will be conducted with each involved community. The workshop will aim to (i) clarify conceptions related to local communities' insertion in the market and its relationship to socio-environmental sustainability; (ii) identify opportunities for product development informed by local knowledge of sustainable resource use potential, (iii) investigate existing market conditions and scope for increased production and (iv) project the financial returns associated with additional product development and promotion. The principle products of the workshops will be draft business plans with local ownership. These initial business plans will be reviewed and enriched with further information obtained by the Project team which will also refer the proponents to potential sources of seed financing for their implementation.

133. Besides the potential strengthening of community enterprises based on mangrove products in the Parnaíba Delta intervention area, the Project will further investigate opportunities associated with crafts and production using mangrove materials, already marketed in small volumes in coastal communities. Such products are sold in tourism facilities, and could be certified as derived from mangrove related PAs, to offer value added and serve as an informational device to boost societal awareness of the importance of mangroves. Certification of products and services of mangroves according to principles of fair and ethical trade would ensure more equitable distribution of benefits from mangrove biodiversity, as well as sustainable supplies of mangrove related products. This approach will be informed by the recently adopted principles for certification adopted by the Marine Stewardship Council, which establishes criteria for sustainable fisheries activities. A potential partnership will be developed with Wetlands International for certification of mangrove products.

Output 2.4. Capacity building program delivered to facilitate implementation and replication of sustainable use approaches to mangrove PA resources.

134. This output will build capacity within the pilot UCs and clusters for the implementation of the sustainable use approaches to mangrove PA resources carried out in Outputs 2.1, 2.2 and 2.3 and to facilitate the replication within the clusters. As such, capacity building activities will underpin these Outputs but at the same time draw on the knowledge gained from them. Capacity building will include amongst others:

- *Capacity building for ecosystem approaches to fisheries resource management:* preparing cluster level and UC level management councils for UC co-management; individual and institutional training events on the development of partnerships and the skills necessary to liaise with other institutions as well as in conflict resolution methods, training of rural and environmental extension agents in the principles, mechanisms and methodologies of the conservation and sustainable use of biodiversity.
- *Capacity building for sustainable economic alternatives:* in conjunction with EMBRAPA and IBAMA training will be delivered in small business management, improved methods of transport of the *uçá* crab, sustainable methods of capture of fisheries resources, tourism management, etc. Special attention will be given to incorporating women and youth to ensure economic benefits are fairly distributed since they form the majority of underemployed or unemployed and since fishing activities generally involve the entire family, not just one male. The Project will also work with stakeholders to help them develop business plans and market strategies for value-added mangrove products. This will begin with the selection of mangrove products and will be followed by a workshop dedicated to entrepreneurship training and business planning which will assist stakeholders in the development of their business plans from the identification of market opportunities and funding options.
- *Capacity building for identifying and accessing funding sources:* UC managers in the pilots will be trained to identify and mobilize additional funding sources through existing credits and grants (see Output 1.3 for examples) and to work closely with municipalities and the private sector to that end. They would work as facilitators to communities for increased resource mobilization. In addition, where possible, community representatives would also be trained in resource mobilization and reporting required by many of these financial instruments.
- *Capacity building for community, government and sectoral stakeholders and UC authorities for effective participation in protected area management councils of pilot UCs:* including legal political and institutional aspects of respective UC category, training in conflict resolution, participation of municipalities in UC management; liaison with other institutions, including those outside UC boundaries; socio-economic and environmental importance of mangroves, the role of traditional activities and sustainable alternatives in the conservation and use of mangrove areas.

135. In addition to the UC and cluster specific capacity building programs, this output will also seek to advance across Brazil and in other countries housing mangroves. For this, an international seminar will be held to exchange experiences and provide a forum where lessons learned on the ground in Outputs 2.1, 2.2 and 2.3 can be shared and enriched from experiences elsewhere. These would include lessons learned on sustainable use practices of mangrove resources, experiences in social participation and the experiences of technicians and authorities in these pilots. Creating transferable knowledge and capacity will provide the basis for future replication of these sustainable use approaches. This seminar will contribute to the elaboration of technical guidelines for the sustainable use of mangrove resources which will form an important part of the National Plan for the Conservation and Sustainable Use of Mangroves. The project will also participate in other national and international meetings, workshops and seminars, as appropriate and available, in addition to electronic fora and discussion groups.

Outcome 3: Conservation of mangroves is improved by piloting the alignment of UC management with sectoral and spatial planning. (Total cost: USD 4,908,972; GEF: USD 1,332,500; Co-financing: USD 3,576,472.)

136. As wetlands, the functionality of mangrove forests is highly dependent on the quantity and quality of water flowing into them. Effective management of mangrove UCs thus requires closer links to the authorities, institutions and sectors that plan, govern and undertake both development and water management in the surrounding areas. In the context of Brazil, with the complexities of its socio-economic and environmentally diverse coastline, achieving this presents challenges. However, there are a

number of planning instruments that provide an opportunity to advance the integration of mangrove ecosystem requirements into this broader context and as such could set the stage for improved conservation. These are: (i) Coastal zoning exercises that are being completed at the State level and advanced at the municipal level; (ii) State level planning; (iii) Watershed planning; and (iv) the UC management category of APA for large geographical areas that by law calls for zoning of the UC territory as a spatial planning tool to orient land-use. Whilst these instruments exist, there are no specific experiences of how mangrove specificities can be incorporated to increase the effectiveness of mangrove UCs.

137. In addition to government level planning processes, sectoral planning also plays an integral role in the sustainable use of mangrove PAs by undertaking activities whose implementation locations and methods may have significant impact on the quality of water flowing into mangroves, levels of deforestation in and along their borders and the like. Thus, a consideration of sectoral activities will be mainstreamed into this Outcome by coordinating with sectors whose activities impact on the PAs in the states and municipalities in this pilot, to include the water, tourism, fisheries, agriculture, transport and aquaculture sectors. Coordination will be pursued through existing national commissions including National and State Technical Tripartite Commissions and the Ecological-Economic Zoning Coordination Commission (CCZEE).

138. This Outcome will explore these opportunities and support specific pilots to increase the effectiveness of mangrove UCs through linking their management to these broader spatial planning practices. One pilot will focus on the participatory zoning of a large APA taking into account State and coastal zone management (CZM) planning processes, so as to feed into the management plan that defines land-use in the APA territory with particular focus on sustainability of its mangrove ecosystems. Another will focus on water resource planning processes at the watershed level seeking to include in watershed management plans the needs of the mangrove areas in terms of quality and quantity of fresh water. These pilots will provide ground-proofed approaches that will be incorporated into the policy framework being defined in Outcome one. In addition to the specific pilots and inputs to the enabling framework, this Outcome will also include capacity-building components for pilot level institutions as well as those involved in broader planning in the clusters. This will include awareness raising, advice and support to State planning, CZM bodies and water authorities to include the needs, in terms of quality and quantity of fresh water, of the mangrove ecosystem and the people who depend on it for their livelihoods.

Output 3.1. Land planning guidelines tailored to mangrove conservation are developed and tested in a large APA and coordinated with state and regional planning processes.

139. This Output seeks to increase the effectiveness of mangrove APAs for conservation through developing a replicable model of spatial planning tailored to mangroves and in the context of State, municipal, and coastal planning. State-level plans generally are prepared from a regional perspective and, thus, do not undertake micro-level zoning or address the needs of specific areas. Moreover, in coastal states, zoning often permits environmentally destructive economic activities along the limits of mangrove without considering that mangrove ecosystems depend on the surrounding areas for overall ecological integrity and survival. Destruction of aquatic habitats and vegetation along the limits of mangroves poses a serious risk to the entire ecosystem.

140. On the other hand, there are large APAs along the coast whose management, by virtue of their size and links to regional development, must necessarily be considered in broader regional planning. These APAs, which are established on private and public lands, are open areas that are subject to many uses. As well as priority areas for biodiversity conservation these uses include ecotourism, shrimp farming, economic activities of extractivist communities, and activities foreseen in state development plans ranging from the construction of hotels, homes and in many cases industries and infrastructures.

However, as protected areas, the uses within the APA must be planned in such a way as to ensure the integrity of the entire UC and its resources. The initial instrument that orients land use is the land use zoning that is used to guide environmental impact assessments (EIAs). The development of this zoning, and its later oversight, requires participation from representatives of the arena of stakeholders within the APA. Generic guidelines for zoning do exist but do not address specificities of mangroves as aquatic-terrestrial transition wetlands.

141. Thus, building on the existing economic-ecological zoning for the state, the pilot will develop specific guidelines for zoning in mangrove APAs and apply them to a vast APA through a participatory process and coordinated with other spatial planning instruments and processes. The result will be the zoning of an APA that takes into consideration the variability, biodiversity, threats to and conservation of mangroves as well as the importance of each of its associated ecological zones. A secondary result will be lessons learnt from the development and testing of these guidelines and the process of formulating zoning using EEZ as a basis. These will provide a model of land-use planning in large, multi-use sustainable use UCs and will guide licensing activities of other states to ensure that APA zoning is consistent with the integrity of mangrove ecosystems. As APA is the management category under which most mangrove UCs fall, these lessons can be replicated along the entire coast for the protection of mangroves under each physical-environmental unit. They will also provide nationwide guidelines and inputs to the regulatory framework for the mangrove PA sub-system.

142. The *Reentrâncias Maranhenses* APA in the state of Maranhão was chosen for this pilot for a number of reasons. First, it is a relatively well-conserved area of globally significant biodiversity that is designated as a Ramsar site and houses 200,000 hectares of mangroves. This makes it the largest mangrove area in any of Brazil's UCs and double the size of the second-largest mangrove area in a UC. Second, although it is one APA, its size, at 2.7 million hectares and 16 municipalities within its borders, means that zoning requires coordination with State, municipal and CZ zoning and planning. Furthermore, since the mangrove area is located within such a vast APA, zoning is required for the entire APA, it is the ideal environment in which to test the integration of a variety of planning processes and determining which steps must be taken to ensure dynamics outside the mangrove area do not have a negative impact on this ecosystem. Finally, a UC under a more restrictive management category – the *Cururupu* RESEX – exists within the APA boundaries and there are a number of proposals for the creation of additional RESEX⁴⁴ also within the APA. Thus, addressing the needs of the smaller area of mangroves within this much larger protected area constitutes a good model for aligning spatial planning and existing planning processes with mangrove UC management.

143. Despite the size and complexities, a number of processes related to the planning and use of the APA and the RESEX are already underway as part of the baseline, thus providing the feasibility for this pilot. These include socio-environmental and economic diagnostics by municipality, an EEZ for the coast of Maranhão conducted by the State Secretariat of the Environment and aimed at determining areas appropriate for shrimp farming, a development plan for the state that includes macro-level zoning; and a land use plan designed for the spatial planning of the *Cururupu* RESEX. In addition to this, there is relatively strong demand from fishing communities for the creation of additional RESEX within the APA. Thus, it is important that these various processes be carefully considered and discussed with stakeholders so as to minimize conflicts between the private sector, local public authorities and extractivist communities.

144. With the participation of local stakeholders and municipal environmental authorities from the UCs' 16 municipalities, guidelines for spatial planning in large mangrove UCs will first be developed within a context of broader regional planning and used to develop and build consensus on the area's zoning. These

⁴⁴ RESEX are only established on public lands and upon demand from the traditional populations that live there.

guidelines and the ensuing zoning will serve to orient states' licensing activities to make APA land-uses more compatible with maintaining the equilibrium of the mangrove ecosystem. An APA management council will be established as a mechanism for the full participation of municipalities and other stakeholders, including sectoral stakeholders, and to contribute to the long-term sustainability of the APA. The Project will work to identify partners and implementation strategies developed through Project activities, which the APA Council will use to develop its APA Management Plan. Advice and training will be provided to GEPLAN, the organization responsible for economic-ecological zoning at the State level, to include mangrove concerns into zoning and planning.

145. To initiate the participatory planning of the APA, the Project will invest significant effort in mobilizing local community, government and UC actors through promoting increased articulation between the APA municipalities through existing social organizations and representatives of local government, establishing the APA management council and creating or strengthening, as necessary, municipal environmental councils. Consultations will be held to disseminate the objectives of the pilot and identify specific demands of stakeholders. In parallel, and to gather the necessary information for participatory and effective planning of the APA, the Project will undertake surveys of existing studies on zoning and the methodologies used and of stakeholders and their roles in the APA including municipal environmental councils, NGOs working in the area and organized community movements. Based on these surveys, obstacles and potentials for effective stakeholder participation will be identified and the process for zoning finalized. Capacity building to increase participation will be delivered through Output 3.3.

146. The actual process of developing zoning will draw on inputs from the abovementioned surveys, the Maranhão EEZ as well as technical studies, forums and meetings to develop and discuss successive drafts of zoning proposals with representatives of key user groups. As part of the official process of responding to demands for the creation of RESEX, very early on in the pilot this will include meetings organized by IBAMA's Directorate of Socio-Environmental Development (DISAM) with local communities to identify and discuss existing demands for the creation of new RESEX in the APA. Finally, workshops will be held to present, discuss and validate the results of the zoning with local stakeholders at a broader level.

Output 3.2. Water resources management processes in Paraíba developed and tested to include mangrove conservation needs.

147. Water quantity and quality in mangrove areas are often compromised as upstream watershed planning and water use permits are undertaken without considering the impacts on water flows to downstream mangroves. Brazil's national water resources policy (Law 9.433/97) outlines procedures for classifying bodies of water according to permissible uses. This process evaluates water bodies and demands on them and then determines how they may be used and for what ends. This has a significant impact on quantity and quality of the sources that flow into mangroves. However, authorities that govern water resources neither have knowledge of mangroves requirements nor are they aware of the values of the services that might be lost when mangroves are destroyed by severe change in their hydrology. Thus, this classification of water bodies poorly addresses mangrove needs. Furthermore, many times permits are issued prior to classifying the bodies of water.

148. This Output will pilot the development of water resource planning processes at the watershed level seeking to include in the management plans of this key sector the needs of the mangrove areas in terms of quality and quantity of fresh water. The Paraíba intervention site was chosen for this pilot for several reasons. It has extensive mangroves areas and strong baseline programs and activities on which to build. This includes a Watershed Committee for the Northern Coast of Paraíba established by State Water Authorities that provides a forum for the consultation and deliberation of water body classification and permits. The Committee covers the watersheds of three rivers one of which is the River Mamanguape that will be the focus of the pilot. Furthermore, dumping of inadequately treated industrial and domestic

pollutants is already having detrimental impacts on the quality of water in watersheds and mangrove ecosystems in this area. Action is urgently required before this reaches levels that significantly damage the mangroves and associated ecosystems and create a subsequent decline in income stability for local communities.

149. Within the Mamanguape watershed there are two Project UCs – the *Barra do Rio Mamanguape* APA and the *Foz do Rio Mamanguape* ARIE (Area of Ecological Interest). These UCs have the basic infrastructure and local support necessary to make the pilot feasible given the time constraints of the Project's implementation period⁴⁵.

150. To set the stage in the Mamanguape watershed to integrate mangrove concerns into water resource management and watershed planning, the pilot will work to integrate institutions that govern water resources and UC councils. Capacity building will be provided under Output 3.3 to water resource authorities on the use and application of water management instruments including the classification of water bodies, determination of acceptable uses based on that classification and the issuing of use permits. Integration between UC authorities and water resource agencies will be promoted by developing protocols of agreement between these entities, harmonizing management practices of mangrove resources and water resources through, initially, negotiating the participation of UC authorities and management councils in the development of local watershed management plans. Technical meetings will be held with the relevant water agencies, the Watershed Committee and the UC Councils to negotiate and agree the specifics of this integration.

151. To implement this integration as a replicable demonstration, the Project will work with UC and water resource authorities to develop jointly the watershed management plan, classify the water bodies which impact the pilot UCs and establish a target water quality to be reached or maintained over the long-term in a finite segment of each. The objective of this classification will be to ensure that when it comes time to issue permits, only those uses consistent with mangrove conservation will be permissible under the classifications determined. The pilot will also define mechanisms to regulate the use of water resource instruments, especially those related to water permits. Close links will be established with the results of valuation studies in Output 1.3 as an input to determine the costs incurred through loss of ecological services if water classifications do not take into account mangroves.

152. To provide technical inputs, the pilot will undertake an evaluation of relevant norms, procedures and practices employed by other Brazilian states which could provide insight on how best to undertake this integration. In addition, indicators will be developed to measure environmental quality of interstitial areas of marine and terrestrial ecosystems particularly those with influence on the UCs. Guidelines and priority actions to improve environmental quality will also be established. Levels of pollution and their sources will be discussed as part of the process to define the application of water resource instruments which will result in the development of basic parameters of water quality to ensure the maintenance of the integrity of mangroves.

153. Lessons learned through this demonstration will be used to propose changes to regulations governing the development of watershed plans to make them more consistent with the water needs of downstream mangrove ecosystems.

Output 3.3. Capacity building program designed and under implementation for relevant planning institutions, sectoral stakeholders and UC management

⁴⁵ Paraíba also has a coastal zone management program that includes a comprehensive coastal zoning component and within this the identification and analysis of mangrove areas. It has a management plan for the two coastal zones (north and south) and a commission on coastal management (COMEG) that was created in 1989 and later absorbed by the State Environment Agency.

154. This Output is designed to improve the competence of relevant authorities related to the conservation and management of mangrove PAs at the landscape level, including UC, water resource and municipal authorities. It has both short-term and medium-term objectives. The former is to create immediate capacity in these authorities to ensure the successful implementation of the pilots in Outcome 3. The latter is to facilitate the replication and scaling-up of the Project's strategy and lessons related to inserting the mangrove strategy into broader spatial and sectoral planning through transferring knowledge into government and other stakeholder entities. To a great degree, this will focus on behavioral changes of water resource institutions, UC and municipal councils and other stakeholders.

155. This program will provide capacity building in issues related to the socio-economic and environmental importance of mangroves, sustainable use of mangrove resources, conflict resolution, and participation of the municipalities in UC management and the legal, political and institutional aspects of the APA. Specific capacity building will be provided to: water resource authorities on the classification of water bodies, the subsequent issuing of water use permits and the use of water management instruments; to spatial planning institutions related to specificities of zoning in mangrove APAs; and to sectoral stakeholders to integrate them better into the APA council in Output 3.1 to address horizontal planning concerns. It will provide capacity building to UC and municipal councils regarding how to liaise with other institutions including those outside UC boundaries and in administrative and conflict resolution techniques, coastal zone management and mangrove management in particular. The latter is particularly important since the clear comprehension of certain aspects of mangroves is necessary to manage these UCs effectively. *Inter alia* this will include an understanding of the effects of rising sea levels on mangroves, the importance of an ecosystem vision in resource management and the essential nature of all the ecological zones forming mangroves.

Outcome 4: Mangrove-related outreach, dissemination and adaptive management increased. (Total cost: USD 3,681,100; GEF: USD 1,197,500; Co-financing: USD 2,483,600.)

156. This Outcome will focus on Project management and on knowledge management instruments and mechanisms for the generation of information necessary for the effective management of Brazil's mangrove PAs. Direct beneficiaries of this outcome will be mangrove communities and sectoral stakeholders, environmental authorities in central government institutions including MMA and IBAMA and UC authorities as well as the Project team and other GEF projects dealing with related issues. The Project will forge partnerships with NGOs to promote campaigns and other awareness mechanisms.

Output 4.1. Mangrove Biodiversity Monitoring and Project M&E Programs developed and functioning.

157. This output will have two lines of action. Through the first, the Project will establish a Monitoring and Evaluation plan to serve as first instance of adaptive management of Brazil's mangroves. It will support responsive project planning and management and accommodate lessons learned emerging within and outside the Project. It is an adaptive system that will track progress towards the Project objectives and make changes to Project activities as necessary during implementation, thereby allowing for the identification of successful activities and providing the basis for replication. It will also gather feedback from stakeholders and generate inputs for the dissemination of project results and lessons learned.

158. An M&E Specialist will be hired to oversee Project M&E. In addition, in each pilot area, UC councils will be involved in Project M&E to ensure that local stakeholders play a role in the monitoring of Project results and impacts and that their direct input informs the Project's adaptive management. These councils, which include NGO, community and sectoral stakeholders, will review Project operational plans and reports and will make formal recommendations to feed into responsive, adaptive management.

159. A baseline for mangrove UC effectiveness has already been established through the application of the METT and numerous preparation studies. Further baseline work on effectiveness will be undertaken early in Project Year 01 including application of the RAPPAM tool. The M&E Plan can be found in Annex 7.

160. The second line of action in this output relates to the monitoring of mangrove biodiversity. At present, there is a significant knowledge gap relating to the conditions and exact extension of Brazil's mangroves which prevents effective adaptive management and sustainable use of mangrove PAs and their resources. In addition, monitoring is generally *ad hoc* and pursued inconsistently across Brazil's states. To address this and building on preliminary mapping carried out to define the strategy and selection of Project Intervention Areas, this Output will complete the mapping of all of Brazil's mangroves to consolidate knowledge on the exact location, extension and conservation level of these areas. Additionally, a nationwide program will be designed and implemented to monitor existing UC management effectiveness and related capacity as well as vegetation coverage and species protection status in Brazil's mangroves. Through this program, mangrove monitoring activities throughout Brazil's states will be harmonized. Information gathered through this mapping exercise and monitoring program will then be used to guide the adaptive management and sustainable use of these ecosystems and will serve as the technical basis for lobbying for improved policies relating to mangroves.

161. Specific activities of the monitoring program will include the monitoring of certain species as a measure of the integrity of the ecosystem and hence the effectiveness of the UC in meeting their conservation goals. Species to be designated as indicators include those that depend on mangroves and associated habitats and, more specifically, are: threatened with extinction either globally or regionally, overexploited economic resources, congregational species (shorebirds and terns) as well as indicators related to the sustainable use of species used for economic purposes and indicators to monitor the extension and quality of mangrove terrestrial habitat cover. Results of such monitoring will be used as part of the dissemination program to be implemented under Output 4.3 for means of publicizing the importance of mangrove areas as well as their current conservation status. The monitoring program will also contribute to analyzing the effects of rising sea levels on mangrove habitats, an issue to be further addressed under the capacity building program in Output 1.2.

162. The Project will build on the existing Mangrove Atlas published by the FAO as well as a survey of existing maps and mapping needs which was carried out during the PDF-B phase.

Output 4.2. Adaptive Project Management implemented

163. This Output will finance management staff, office equipment, and all administrative and operational expenditures necessary to ensure the effective implementation of project activities and management of resources. It will establish and operate the Project Management Unit (PMU) to facilitate effective project implementation. The PMU will include a Project Director, Coordinator and an Assistant and will be responsible for operational planning, supervision, administrative and financial management and the adaptive management of the Project based on inputs from the Project M&E plan under Output 4.1. All project reports will be submitted through the PMU, including Periodic Status Reports, the Mid-term Evaluation and the Final Evaluation.

Output 4.3. Dissemination, outreach and research on Mangrove Ecosystems Management delivered to community and sectoral stakeholders and the broad public.

164. To mainstream an awareness of the ecological and economic values and functions of mangroves throughout relevant sectors and to the broad public, the Project will design and implement a

dissemination and outreach program on the importance of mangroves and on the Project strategy to be implemented on a national scale. This program will include a nationwide mangrove awareness campaign, publications on the Project's activities and objectives as well as the importance of mangroves, a campaign for "mangrove friendly" hotels and the marketing of "mangrove friendly" products. These and other initiatives will be explored during the Project and will be pursued in close collaboration with organizations working in the area such as Wetlands International. The program will also undertake specific consultation and outreach to key sectors that impact mangroves, including especially fisheries, aquaculture and tourism, on the environmental and economic importance of mangroves including the roles they play in sustaining sectoral economic activities. This will serve as a first instance for consensus-building and as an opportunity to work with sectors to devise mangrove-friendly economic practices.

165. To facilitate community access to information on mangroves, sustainable use practices and other knowledge generated as well as the Project strategy, this dissemination and outreach program would target local fishermen and agricultural organizations, environmental and rural extension agents.

166. Furthermore, to integrate the diverse instances of mangrove-related research, training, information dissemination and management, a National Coordination Center for Mangrove Ecosystems will be established within IBAMA to help consolidate the conservation and sustainable use of mangroves in Brazil and contribute to the overall mangrove strategy. It will be a base for coordination and replication of mangrove-relevant projects, research and dissemination. Technical meetings, cultural and dissemination events as well as specific environmental education and awareness activities will be undertaken here. Additionally, the Center will provide support to IBAMA's research and fauna monitoring teams in their field work in the state of Maranhão as well as to universities and other research groups and will work in cooperation with other specialized conservation centers in the country to plan and integrate actions on a regional and national scale and would assist IBAMA in the analysis of documents, development of partnerships, training for IBAMA technical staff and in the environmental licensing process.

167. The center will be established within an existing IBAMA structure with counterpart funds. IBAMA will be responsible for maintenance and recurrent costs, including provision of personnel to operate it on a continuous basis. GEF funds will outfit the Center with the equipment necessary for it to function.

Project Indicators, Assumptions and Risks

168. The Project has developed a set of impact indicators which are presented in the Logical Framework along with specific verifiers, baseline and target values. These include:

- At the Purpose level: Management effectiveness (METT) of pilot mangrove PAs; Populations of keys species selected as indicators of biodiversity conservation status; % of other PAs that have adopted one or more of the financing strategies tested; % of mangrove UCs in the sub-system under sustainable use and strict conservation instruments; % of Environmental agencies that have agreed to Mangrove Plan;
- On the enabling framework. % of "Mangrove" States with a set of norms and guidelines on mangrove management agreed and coordinated between federal, state and municipal agencies; Existence of a core group of trained staff capable of implementing and using those norms and regulations; the # of regulations tailored to mangroves on issues tested in pilots; the composition of financing in pilot UCs;
- On the increased effectiveness of extractive reserves the # hectares under integrated fisheries resource plan; # no-take areas in the 3 pilot UCs; % mortality rates and harvesting levels of *Uca* crabs; # of UC and cluster management councils reaching agreement on harvesting levels and enforcement in Pilot areas;
- On increased conservation through UC management aligned to spatial and sectoral planning # water catchments with specific reference to mangroves; # municipalities and hectares with agreed on zoning

in a large APA, % of the key actors in APA have signed a formal document of adherence to zoning regulations;

- On increased dissemination and adaptive management; increased stakeholder awareness on mangrove UC management and their ecosystem services; consistency and quality of mangrove monitoring across the 8 Project states.

169. In addition to Outcome indicators each Output will have specific indicators. Examples of these are provided below. These will be further defined in the inception workshop and during operations. In line with adaptive management principles, output indicators will be reviewed on a yearly basis based on evaluation of progress being made towards achievement of Outcomes and confirmation that Output strategies are still valid. Examples of Output indicators and their baseline and target values are

- Pilots of Extractive Reserves. (Output 2.1, 2.2 and 2.3) # of Parnaíba Delta crab fishermen involved in the sustainable management plans for *uçá* resources sustainable management of the *uçá* crab, % community members trained in production marketing of economic alternatives [Baseline 0%, Target 30%]; # of local community leaders trained in co-management and the monitoring and enforcement responsibilities and targets as laid out in the management plans [Pará Baseline 0 and Target_30 community leaders perform voluntary monitoring and enforcement to ensure that community members abide by the agreed management plan and interns involved in collection of fishery, Paraíba: Baseline 0 and Target 20 community leaders trained for respective *uçá* crab enforcement roles and responsibilities]
- Pilots on aligned of UC management with spatial planning: (Output 3.1 and 3.2) % staff members of AESA and river basin management committees are trained to integrate mangrove concerns in their water instruments [Baseline 0% and Target 50%], % OEMA staff trained for integration of land-use planning and mangrove [Baseline <2 %trained; Target staff 20% staff trained]

170. The achievement of Project objectives is based on a number of assumptions which rest on maintaining at least the status quo in regard to government commitments, levels of threats and funding. The major assumptions on which the project strategy is based are listed below, along with the level of risk they carry and the mitigation measures to be undertaken to preempt that risk. A more complete list of assumptions can be found in the Logical Framework.

Assumption	Risk Rating	Risk Mitigation Measures
Strong Federal and State government commitments related to improving conservation of mangrove biodiversity is sustained thereby facilitating the integration of improved institutional procedures and regulations into the existing framework.	L	Broad political support for biodiversity conservation and improved PA management has been confirmed at all levels of government and in a variety of relevant sectors as shown through participation in project development and pledges of co-funding. Moreover, the Project will work closely with Government stakeholders on issues that are relevant to linking mangrove conservation with local development and as such commitment is expected to be maintained. In addition, the Project will include valuation studies of the economic significance of mangrove ecosystems to increase understanding of the relationships between the maintenance of mangrove PAs and revenues from tourism and coastal development and reduced vulnerability to climate change- driven changes along the coastline.
Sustainable use categories PAs deliver mangrove conservation benefits at the national level.	M	A high percentage of Brazil’s mangrove PAs fall under IUCN Category VI. The Project thus recognizes that part of the solution should include developing sustainable extractive practices in these PAs and planning across clusters of PAs so that over-exploitation does not occur. Outcome 2 will focus on this approach. However it also recognizes that category VI PAs alone may not be sufficient to conserve mangrove biodiversity in the long-term at the national level. As such, the

Assumption	Risk Rating	Risk Mitigation Measures
		Project will include work at the systemic level to define the best mix of management categories and develop a plan for the rationalization of mangroves PA categories over time.
The sub-optimal funding for effective management of Protected Areas will not prove an insurmountable obstacle to the sustainability of improvements in PA effectiveness.	M	The Project recognizes that one of the barriers to effective PA management in Brazil is sub-optimal funding levels. However, this is a barrier that is common across PAs in all ecosystems of the country and requires actions that go beyond the scope of an intervention of this scale. As a result, the Project will focus specifically on overcoming barriers to strengthening the systems capacity to deliver conservation to PA mangroves but will monitor and work closely with baseline actions and other initiatives that are addressing the financial sustainability of the SNUC at a broader level. Notwithstanding this focus, the Project will explore approaches to PA financing that are of particular relevance for mangroves, for example the possibility of payment for ecological services, compensation mechanisms and increased cost-efficiencies through the management of clusters of PAs.
Key baseline UC management and mangrove conservation programs and actions are successfully implemented.	L	This is a safe assumption given that the Project has a very strong baseline of projects and programs that are progressing successfully coupled with the fact that the Project was designed within the context of Federal Government commitments to and programs consistent with the overall objectives of this and related projects. Nonetheless, should a weakened baseline scenario emerge, the Project's adaptive management will ensure responsiveness to the broader implementation context so that Project activities may be adjusted as necessary in order to mitigate any negative repercussions on its objective.
It is feasible to integrate improved institutional procedures and regulations into the existing framework.	L	Suggested amendments to the existing framework will only be formally submitted to the appropriate authorities once their feasibility and utility have been validated on the ground in the Project pilots and following consultations with the relevant government agencies and citizen groups. In this way, only those procedures and regulations that have been technically validated and approved by government and community stakeholders will be submitted ensuring empirical and political support for them.
Key stakeholders maintain at least current levels of interest and willingness to work with Project actions.	L	Project stakeholders include the private sector and local communities as well as the three levels of government. To ensure successful and participatory project implementation, the Project will work closely with these key stakeholders through their involvement on UC councils and through consultations to determine the needs and contributions of communities for the participatory development of pilot demonstrations and monitoring programs. It will also carry out capacity building and training programs for relevant agencies and UC authorities. Moreover, a focus on financial sustainability through working for sustainable economic alternatives for local communities as well as the more cost-efficient use of limited PA resources will serve as a significant incentive for stakeholders.
Pressure on <i>uçá</i> resources does not increase once capture methods are made more efficient.	L	The Project will strengthen institutions and their capacity to regulate and enforce capture levels and methods. It will also promote economic alternatives to diversify income generation and reduce dependence on the <i>uçá</i> crab. As part of those initiatives, the Project will promote community level enforcement of agreed fisheries limits and practices and will tie access to its alternatives to compliance with such limits and practices.
Overall Rating: L/M		

Rating: L = Low Risk; M = Medium Risk; H= High Risk

Expected Global, National and Local Benefits

171. *Global benefits:* By improving systemic, institutional and individual capacities for the strengthening of the SNUC and the APP status, the Project will contribute to Program Element One of the CBD-CoP 7

Work Program for Protected Areas whose goal is to establish “by 2010, terrestrially and 2012 in the marine area, a global network of comprehensive, representative and effectively managed national and regional protected area systems” as a contribution to globally agreed goals related to reducing the rate of biodiversity loss and ensuring environmental sustainability⁴⁶. Through improved management of mangrove PAs and the development of a nationwide mangrove strategy, the Project will contribute to the protection of globally important biodiversity including mangroves and mangrove fauna species as well as ecosystems associated to mangroves. Additionally, conservation of this forest ecosystem mangrove is important given their role as a carbon sink. Moreover, direct biodiversity benefits will be delivered to 568,000 ha of globally important mangrove ecosystems through the Project’s on the ground pilots. Furthermore, the Project will provide valuable lessons to the international community on the design and implementation of a broad strategy for the conservation and sustainable use of mangroves in multi-use areas with a focus on regional and spatial planning, cost-efficiencies, knowledge-transfer and replicability.

172. *National benefits*: Through contributing to the long-term conservation of Brazil’s mangrove endowment, the Project will provide important national benefits. Mangroves are not only vital for healthy ecosystems, rather they also play a crucial role in maintaining fisheries stocks, clean water supplies and the integrity of coastlines and beaches. These, in turn, are important for the maintenance of Brazil’s cultural heritage as a beach destination, the economic role played by both beaches and fisheries resources and the employment and income-generating capacity of both tourism and fishing. The Project components on sustainable extraction practices and levels will help ensure the long-term sustainability of mangrove resources and, consequently, of related employment and income. It is important to note that large portions of the populations in mangrove areas, and especially in the Project’s target areas, are traditional populations with particular cultural and ethnic characteristics. Thus, by promoting the sustainability of their livelihoods and homes, the Project is indirectly contributing to the protection of Brazil’s cultural diversity. Finally, maintaining areas of mangroves in Brazil may help minimize damages to property and losses of life from hurricanes and other coastal storms.

173. *Local benefits*: The Project will work on the ground with a variety of different stakeholders, including traditional populations and fishing communities, women and youth. Direct biodiversity and socio-economic benefits are expected in Project UCs and communities. Mangrove ecosystems have traditionally been sustainably managed by local populations for the production of food, medicines, tannins, fuel sources and construction materials. Moreover, mangrove forests offer basic livelihoods options and sustain the cultures of large traditional and indigenous populations. By promoting the sustainable management of mangrove areas through the PA approach, the Project will contribute to the poverty alleviation of local communities which, in many parts of the coast, are currently faced with the rapid decline of the resources upon which their livelihoods depend.

Country Ownership: Country Eligibility and Drivenness

174. *Country Eligibility*. Brazil ratified the Convention on Biological Diversity in 1994, and the Ramsar Convention on Wetlands in 1996. Furthermore, the proposed Project meets the Brazilian eligibility criteria for GEF funding according to guidelines set by the National Commission on Biodiversity (CONABIO) in August 2002. The Project is fully consistent with the national vision, policies and strategies to protect biodiversity and wetland ecosystems. Additionally, the Project responds to each of the four elements of the CBD-CoP 7 Work Program for Protected Areas and the Work Program for Marine and Coastal Biodiversity. Specifically, the Project’s Outputs, Outcomes and activities will contribute to the objectives of the Work Program for Protected Areas in the following ways:

⁴⁶ <http://www.biodiv.org/programmes/>

Program Element 1	<ul style="list-style-type: none"> - Establishing and strengthening national and regional systems of protected areas integrated into a global network as a contribution to globally agreed goals - Integrating protected areas into broader land- and seascapes and sectors so as to maintain ecological structure and function - Substantially improving site-based protected area planning and management - Preventing and mitigating the negative impacts of key threats to protected areas
Program Element 2	<ul style="list-style-type: none"> - Enhancing and securing involvement of local communities and relevant stakeholders
Program Element 3	<ul style="list-style-type: none"> - Providing an enabling policy, institutional and legal environment for protected areas - Building capacity for the planning, establishment and management of protected areas - Contributing to the financial sustainability of protected areas - Strengthening communication, education and public awareness
Program Element 4	<ul style="list-style-type: none"> - Developing and adopting minimum standards and best practices for a representative network of mangrove UCs - Evaluating and improving the effectiveness of PA management at the site and systems levels - Establishing a national system to enable effective monitoring of PA coverage, status and trends - Promoting research to improve understanding of the ecological social and economic aspects of protected areas, including methods and techniques for valuation of goods and services from PAs

175. Country Drivenness. Brazil has long been committed to protecting its vast natural resources and this commitment has grown stronger in recent years. In 2003, the Government created the National Committee on Wetlands (CNZU) to support MMA's Ramsar National Administrative Authority in the design and implementation of its policies regarding wetlands. Within CNZU, a Mangrove Technical Committee (CTM) will be established to monitor the Project and promote exchange of information. In addition, Brazil has developed and is implementing a National Biodiversity Strategy (NBS), under which a countrywide policy and legal framework for biodiversity protection and management were developed. In 2006 the Action Plan for the Implementation of this National Biodiversity Policy (PAN-Bio) was approved by CONABIO and outlines priorities and actions for *in situ* biodiversity conservation, sustainable use of biodiversity resources, recovery of overexploited or threatened species, economic valuation of biodiversity in mangrove areas, and management of protected areas. By improving the effectiveness of the protected areas to conserve mangroves, this project will directly contribute to all of these objectives. In addition, in 2006 CONABIO Resolution No. 3 was passed and determines the national targets for biodiversity conservation in accordance with COP-07.

176. Brazil has adopted a biome approach as part of its strategy for biodiversity conservation. Six main biomes are recognized in Brazil each divided into ecosystems. Mangroves form part of the marine and coastal biome. Brazil has committed to bringing 10% of each of its biomes under effective conservation through a variety of protected areas categories. An even more ambitious goal is intended for the marine and coastal biome with the Government committed to bringing 20-30% of coastal and marine ecosystems under effective conservation by 2015. Brazil's further commitment to biodiversity conservation through the protected area approach was recently underlined in CoP 7 in September 2004 through the signature of a Protocol of Intentions between MMA and NGOs to consolidate by 2015 a system of effectively managed and ecologically representative marine and terrestrial protected areas. The Project will contribute to these targets by developing specific guidelines for legal provisions governing protected area operations in mangrove ecosystem, such as specific approaches to management plans, buffer zone definition and the strengthening of multi-stakeholder advisory councils increasing the effectiveness of these areas in conserving mangrove ecosystems.

177. Furthermore, Brazil recognizes mangroves as an ecological transition ecosystem that fulfill an important function in linking genetic exchanges between terrestrial and marine ecosystems. It further classified mangroves as a complex and diverse environment, with extremely high importance in supporting sea life in coastal waters. In 2006, the Government updated the assessment of priority areas

and actions for the conservation of biodiversity of the coastal and marine zones with the most recent scientific data available. Brazil's interest and effort to conserve coastal areas is also indicated by its investment in other projects including: the Amazon Region Protected Areas program (ARPA) funded by GEF and implemented by the World Bank; phase II of the World Bank-funded National Environment Program (PNMA II); the Ecological Corridors Project financed by the Rain Forest Trust Fund and international donors; the Inter-American Development Bank-funded PROECOTUR; and the MMA's REVIZEE initiative.

178. Project development to date has been prepared in a participatory manner in compliance with the CBD and GEF guidance. GEF resources will be used to cover the incremental cost of removing barriers that currently hinder the sustainable and effective conservation of mangroves through protected areas and falls under the GEF Operational Strategy and Operational Programme 2: Coastal, Marine and Freshwater Ecosystems, supporting conservation and sustainable use activities in threatened coastal ecosystems.

Sustainability

179. The Project will strengthen the mangrove sub-set of Brazil's protected area system to ensure institutional, ecological, social and financial sustainability through initiatives that can be replicated to the country's PA system as a whole. It will focus particularly on capacity building and the creation of innovative financial mechanisms to ensure the long-term sustainability of Project UCs.

- Capacity building: The project will build *systemic capacity* by, *inter alia*, developing regulatory frameworks for the specific approaches needed to effectively manage mangrove protected areas, increasing consistency in laws relevant to mangrove PAs among Brazil's coastal states, and designing a representative network of mangrove UCs and APPs with a rationalized balance of management categories and PA locations. It will build *institutional capacity* for those institutions responsible for federal and state mangrove conservation units, those responsible for the enforcement of other mangrove protected area mechanisms such as APPs, and those responsible for spatial and resource use planning linked with mangrove PA management to facilitate their long term functionality as key wetland and transition ecosystems. It will upgrade *individual capacities* of SNUC practitioners in competencies specific to mangrove PA management such as increasing understandings of their role in adaptation to climate change.
- Implementation of Innovative Financial Mechanisms at the System Level: The Project will explore financial mechanisms that would be particularly applicable for mangrove PAs such as payment for ecosystem services and compensation mechanisms. In this context it will also address individual skills needed in mangrove UCs for financing planning and business planning particularly in the high percentage of mangrove UCs that fall under the sustainable use management categories of the SNUC.

180. As a basis for this long-term sustainability, project design pays particular attention to ensuring sustainability in the following areas:

181. Institutional and systemic sustainability will be ensured through the Project's focus on increasing inter-institutional and sectoral coordination and providing capacity building to relevant agencies in different sectors and different levels of government. In addition, by strengthening and improving the regulatory and policy framework governing mangrove areas, the Project will create an enabling environment for the development and implementation of public policies for coastal and marine zones, as well as PAs, thereby increasing sustainability of Project impacts by improving Brazil's ability to address threats to conservation areas. Institutional and systemic sustainability will be addressed through:

- Establishing a National Center for the Conservation and Sustainable Use of Mangrove Resources to undertake capacity building of UC authorities, monitor fauna, and strengthen institutional presence.
- Strengthening management councils in pilot areas to integrate a wide range of stakeholders as a mechanism for cost-effective UC management, public-private collaboration and community participation.
- Improving inter-institutional coordination through the integration of water resources management and UC management; the integration of federal and state mangrove databases; and the identification and implementation of mechanisms and structures to ensure improved coordination and communication.
- Capacity building of relevant government agencies across sectors and at all levels of government in participatory monitoring and planning, integrated UC management, co-management of fisheries resources and in the conservation and sustainable use of mangroves
- Developing a National Mangrove Plan to strengthen the regulatory and policy framework governing mangrove areas.
- Developing and testing approaches to management, threat alleviation and sustainable use in mangrove areas to improve the existing PA system.

182. Ecological sustainability underpins the design of the project in its on-site interventions and the mechanisms it will design to ensure replication of these throughout the SNUC system. These include the incorporation of specific mechanisms for conservation and sustainable use practices for mangrove resources in the existing framework to improve the regulation of mangroves management and foster inter-sectoral coordination. These mechanisms will, in turn, contribute to the sustainability of impacts achieved in Project demonstrations. The integrated management and harmonization of sectoral policies for mangroves sought within the Project will create an enabling environment for the development and implementation of public policies for coastal and marine zones, as well as PAs, increasing sustainability of Project impacts by reducing threat levels to conservation areas. Ecological sustainability will be sought through the following measures:

- By improving management, pilot demonstrations will deliver on-the-ground biodiversity benefits to UCs where they are implemented.
- Improving monitoring of UC management through the METT and RAPPAM tools to allow for more consistent and rapid responses to threats and infractions.
- Identifying financial mechanisms and developing a regulatory framework proposal to ensure sustainability of mangrove areas based on the ecological and economic value of the goods and services these areas render.
- Evaluating and strengthening frameworks and policies governing water resources and mangrove ecosystems.
- Elaborating a National Mangrove Plan as part of the National Wetlands Strategies and promoting of its integration into the existing regulatory and policy framework.
- Integrating management of UCs to enable them to take advantage of important synergies and cost-efficiency mechanisms for conservation and PA management.
- Developing a representative and effective network of UCs that contain mangroves, including the definition of institutional mechanisms necessary to support it, to contribute to the conservation of an ecologically representative sample of Brazil's mangrove biodiversity and to serve as a replicable model.

- Overlapping maps of mangrove areas with those of economic development plans to indicate areas where sustainable development options exist and to pinpoint vulnerable areas.
- Developing a GIS system for monitoring biodiversity and management in mangrove areas.

183. Social sustainability will involve specific actions for strengthening participatory management processes through mobilizing local stakeholders to play key roles in the management of UCs and clusters of UCs. Moreover, as the majority of UCs containing mangroves fall under sustainable use categories, the project will work closely with local resource users seeking to define specific approaches and practices that will provide sustainability of resources use over the long-term, thereby further contributing to the ecological and social sustainability of project impacts. Specific actions include:

- Capacity building of resource users and local government authorities for monitoring, control and decision-making actions.
- Testing integrated management arrangements to involve local stakeholders through UC councils.
- Training local leaders for participation in management, planning and monitoring activities and structures.
- Developing partnerships with the private sector for mangrove conservation and UC management.
- Developing sustainable economic alternatives to alleviate pressure on principal resources while simultaneously ensuring livelihoods of local communities and reducing resource use conflicts.
- Training resource users in mangrove conservation measures.
- Working with women and youth to develop sustainable economic alternatives.

184. Financial sustainability. To contribute to the effectiveness and long-term sustainability of Project UCs and the broader system of mangrove PAs in the country, the Project will:

- Identify and test innovative mechanisms to ensure the financial sustainability of UCs such as payments for environmental services.
- Develop valuation studies to help understand the role of mangroves in livelihood, cultural, provisioning and sustaining activities.
- Provide parameters for compensation and charges of goods and services rendered by mangroves.
- Elaborate identification and feasibility studies for products based on mangrove resources and pursue public sector partnerships to develop them.
- Forge partnerships with the private sector and NGOs to improve management of mangrove PAs through increased social and financial capital.
- Strengthen capacities in pilot UCs and promote transfer of capacity to the next generation of PA and environmental authorities to improve UC management and resource use.
- Build on synergies and take advantage of existing capacity and resources by employing an integrated approach to UC management.
- Utilize the ecosystem approach to the management of mangrove resources to coordinate planning and activities that would otherwise be pursued in isolation.

Replicability (*For further information, see the Replication Strategy in Annex 4*)

185. Replication is an issue transversal to the entire Project. Pilots in Outcomes two and three are designed as replicable demonstrations which will test and validate guidelines and management and sustainable use practices which will then feed into Outcome one's regulatory framework and mangrove network and strategy. Through the capacity building program in Outputs 1.2, management capabilities and knowledge will be instilled in mangrove UC managers all along the coast. Specifically, the Project's replication strategy is built around three primary elements:

(i) *targeted capacity building to relevant institutions, authorities and resource users.* This will include capacity building at the systemic, institutional and individual levels to improve the capacity and operations of relevant institutions for the sustainable use and conservation of mangroves within the PA approach, strengthen the existing regulatory framework to make it more applicable to mangrove PAs, increase the management abilities of UC authorities and stimulate the involvement of community stakeholders in more effective management of mangrove UC resources. This will enable the replication of the Project strategy, and its sustainable use and management approaches, to other mangrove PAs, Brazil's wider PA system and to other countries with similar resources and barriers. Many of the Project's capacity building modules will be built into existing capacity building programs to ensure this knowledge is transferred to the next generation of PA and environmental authorities.

(ii) *an improved regulatory framework and implementation environment.* Pilot demonstrations will be implemented in mangrove UC clusters in coordination with local communities and will deliver direct biodiversity benefits to the individual sites as well as serve as testing grounds for the validation and adaptation of management and sustainable use techniques and guidelines. The results achieved will feed into the National Plan for the Conservation and Sustainable Use of Mangroves which will include a range of specific policies, regulatory mechanisms, management approaches, tools and guidelines to orient the planning and implementation of mangrove conservation and sustainable use and to ensure replication of lessons learned and best practices for mangrove PAs as well as PAs with other coastal ecosystems. To ensure replication, an essential element of Project implementation will be the integration of experiences collected in this plan into relevant existing policies and approaches thereby strengthening the regulatory framework for the conservation of mangrove PAs. In concert with the plan and the strengthened regulatory framework, a Mangrove Technical will be created within the existing National Wetlands Committee to orient actions and approaches to mangrove conservation, as well as to promote exchange of experiences among stakeholders. A particularly important element of the plan will be the design of the mangrove network which, in essence, will set the stage to replicate the Project strategy and will indicate where and how this can be done.

(iii) *a National Coordination Center for Mangrove Ecosystems.* The Center will serve as a focal point for the scaling-up of the Project strategy. It will act as a national forum for the coordination of mangrove-related conservation activities in Brazil under the guidance of National Plan for the Conservation and Sustainable Use of Mangroves and will be the base for a national mangrove awareness campaign and for dissemination of both the Project approach and lessons learned.

Lessons Learnt

186. The Project design has incorporated a number of experiences gleaned from other UNDP/GEF initiatives that promote environmental sustainability and poverty alleviation by working directly with communities to develop local capacities for the sustainable use of natural resources. Two projects in particular, Promoting Biodiversity Conservation and Sustainable Use in the Frontier Forests of Northwest Mato Grosso (GEF/PNUD/SEMA MT) and Demonstrations of Integrated Ecosystem and Watershed Management in the Caatinga (GEF/PNUD/MMA), have provided invaluable lessons related to experiences in commercialization of non-wood forest products and handicrafts. These lessons will serve as a basis for the identification and exploration of potential markets for mangroves products. The main lesson learnt from these project are as follows:

- **Sustainable use practices need the involvement of communities, and women in particular.** Demonstration experiences on the sustainable use of natural resources show that three aspects are fundamental to their success: (i) the strong participation of local communities in the planning, implementation and evaluation of those activities; (ii) experiences are tailor made to the social, environmental, cultural and economic conditions of the local communities; and (iii) there is a strong

social capital involved, therefore strengthening of community organizations that participate in the implementation of those activities and also in dissemination of knowledge and capacity building is necessary.

- **Commercialization of biodiversity products is successful when market needs and standards are also observed.** Projects that succeeded in not only improving the supply chain, but also on responding to the demands of the market have been more successful in commercialization. The standards of markets for specific sustainable use products need to be observed such as products' design, labeling, packaging, appeal to consumers, to mention a few. Communities need to be trained and oriented on those. An output targeting such aspects has been included in the project design.
- **Decentralized management is a good practice to reach local communities.** The empowerment of local organizations in direct project implementation and management facilitates activities' sustainability and helps local understanding of the importance of natural resources in the productive systems.

187. Lessons learned and incorporated to project design from other experiences include:

- **The importance of establishing buffer zones for mangrove PAs.** Buffer zones are especially important tools for mangrove protection for two reasons. First, as noted previously, mangroves are particularly vulnerable to activities near, but beyond, their limits and protection from human activities in this area can be afforded by having effective buffer zones. Second, climate change is leading to increased landward migration of mangroves in certain areas. To ensure these areas have somewhere to migrate, buffer zones must be established bordering the landward margins of mangrove PAs. The land-use practices surrounding buffer-zones should be "biodiversity-friendly" wherever possible (such as pesticide-free farming, sustainable forestry, and well-drained roadways and bridges) as reducing androgenic stress is one way to increase mangrove resilience (Barber et al. 2004). In addition lesson sharing will be sought with the GEF/UNEP MSP Coastal Resilience to Climate Change: Developing a Generalizable Method for Assessing Vulnerability and Adaptation of Mangroves and Associated Ecosystems that is working Tanzania Cameroon and Fiji, and will address amongst other the hypothesis that Mangrove areas that are protected or restored will show greater resistance/resilience to global climate change relative to sites that are degraded; The results and lessons learnt in that project will guide capacity training of UC and buffer zone planning within the Brazil project particularly in terms of how protected areas can be designed to better allow for species, population and ecosystem preservation in light of mounting climate change related pressures.
- **Sustainable alternative livelihoods for mangrove communities are a vital component to any management strategy.** Although sustainable extraction of mangrove resources can be successful (Hussain and Ahmed 1994) and must be considered in sustainable use PAs, to avoid ultimate overexploitation, it is essential that less destructive livelihood options also be developed to reduce overall pressure. Activities, such as honey production, which can also promote conservation of exiting mangrove timber resources are ideal
- **Involve a broad range of stakeholders, including sectors.** While the private sector (especially aquaculture, agriculture, industry and tourism) is generally viewed as threats to mangroves, without their involvement, these threats cannot be mitigated. Moreover, large-scale threats, including private sector and climate change-related ones, will prove expensive to address and private funds will prove invaluable tool in responding to them (Shea et al. 2001).

Stakeholder Involvement

188. Stakeholders include, but are not limited to: UC authorities, local leadership structures, local resource users, the private sector, NGOs and other civil society organizations, universities and relevant government agencies at the national, state and local levels (MMA, DCBio, DAP, NZCM, IBAMA, CNPT, DIREC, DIFAP, CGEAM, SEAP, MCT and OEMAs). Specific details of the individual stakeholders and the roles they will play in project implementation can be found in the Stakeholder Involvement Plan in Annex 3, which was developed during project preparation through consultations with key stakeholders. Essential elements include: participatory management and monitoring with local government and UC authorities and resource users; establishment of management councils for participatory management of UCs; development of private sector partnerships for the financial and environmental sustainability of UCs housing mangroves; and consultation with stakeholders for the validation of the project's National Mangrove Plan. In addition, associations of resource users, especially associations of fishermen, will play an important role in the participatory implementation of the Project.

189. It should be mentioned that Pilot sites were selected as representing different scenarios of sector pressure, stakeholders' composition, management challenges and protected areas categories. It is expected that the Pilot interventions will feed Project implementation, not only through lessons learned, but also through participation of local communities on monitoring processes, implementation and management of the project. In addition, key stakeholders will take part in the Project Steering Committee and communication channels will be established between stakeholders and the Project Management Unit (PMU). Therefore, throughout project's implementation full participation of key stakeholders is expected. More details on stakeholders' involvement per output is provided in Annex 3.

190. The Project's Stakeholder Involvement Plan is based on a strategy initiated during the PDF-B phase which rests on the following pillars:

- IBAMA and state governments play important roles in the development and implementation of activities relative to individual PAs.
- Implementation supported by agreements with public institutions, NGOs and other social organizations.
- Participatory meetings as one of the fundamental methodological instruments to develop most of the Project activities and for consensus-building.
- Strong emphasis on the active participation of resource users and local communities in UC management for integration of their traditional knowledge.
- Provisions for conflict resolution in multi-use, multi-stakeholder UCs.

Financial Modality and Cost-Effectiveness

191. The total cost of the project is US\$ 20,345,692. The total GEF funding requested is US\$ 5.0 million, excluding PDF-B activities, for the five year implementation of the project. Significant co-financing has been leveraged totalling some US\$15.3 million from the following government agencies: MMA, IBAMA, SEAP as well as OEMAs and one NGO, Conservation International.

192. The GEF to co-financing ratio for the entire Project is 1:3. The table below presents project co-financing including source, type and amount. A detailed budget can be found in Section III.

Table. Co-financing Sources

Co-financing in US\$				
Name of Co-financier (source)	Classification	Type	Amount (US\$)	
			Confirmed at current stage of FSP development	Unconfirmed
Ministry of Environment	National Government	In kind	480,000	
Ministry of Environment	National Government	Cash	1,636,000	
IBAMA	National Government	In kind	5,000,000	
IBAMA	National Government	Cash	4,000,000	
OEMAS	State Governments	In kind	1,690,041	
OEMAS	State Governments	Cash	337,931	
SEAP	National Government	In kind	1,205,200	
SEAP	National Government	Cash	516,520	
CI/Brazil	NGO	In kind	405,000	
CI/Brazil	NGO	Cash	75,000	
Total Co-financing			15,345,692	

Exchange rate used of US\$1 = R\$2.2

Table. Project Budget by Sources, Outcomes and Outputs

OUTCOMES AND OUTPUTS	TOTAL (US\$)	GEF (US\$)	CO-FUNDING (US\$)	
<i>Outcome 1. The enabling environment for a sub-system of mangrove ecosystem protected areas is in place, including policy, regulatory, and financial mechanisms</i>	3,203,900	920,000	2,283,900	
<u>Output 1.1</u> Regulatory framework and corresponding operational guidelines developed for improved mangrove PA management	504,600	98,000	77,000	MMA
			110,000	IBAMA
			173,000	CE
			36,600	PB
			10,000	SP
			406,600	TOTAL
<u>Output 1.2</u> Institutional procedures and capacities aligned to new regulatory framework for mangrove management and coordinated with sectoral policies	597,300	212,000	116,000	MMA
			60,000	IBAMA
			151,000	CE
			48,300	PB
			10,000	SP
			385,300	TOTAL
<u>Output 1.3</u> Financial strategies for mangrove PA management tested and supported by the regulatory framework	1,024,000	320,000	78,000	MMA
			67,000	IBAMA
			44,000	SEAP
			20,000	CE
			225,000	SP
			270,000	CI
<u>Output 1.4</u> A representative network of mangrove UCs designed within the existing PA system	709,000	195,000	119,000	MMA
			153,000	IBAMA
			32,000	CE
			210,000	CI
<u>Output 1.5</u> National Plan for the Conservation and Sustainable Use of Mangroves designed and formalized	369,000	95,000	95,000	MMA

OUTCOMES AND OUTPUTS	TOTAL (US\$)	GEF (US\$)	CO-FUNDING (US\$)	
			49,000	CE
			20,000	PB
			274,000	TOTAL
<i>Outcome 2. Replicable models are in place for the management of mangrove resources in SNUC sustainable-use protected areas</i>	8,551,720	1,550,000	7,001,720	
<u>Output 2.1</u> Resource management plan for fisheries developed at the ecosystem level in the protected area cluster of Pará	2,911,720	463,000	106,000	MMA
			1,625,000	IBAMA
			717,720	SEAP
			2,448,720	TOTAL
<u>Output 2.2</u> Resource management plan for the Uçá Crab developed and tested in the Parnaíba Delta	2,402,000	425,000	136,000	MMA
			1,125,000	IBAMA
			716,000	SEAP
			1,977,000	TOTAL
<u>Output 2.3</u> Value-added mangrove products are identified and potential market opportunities are explored.	1,421,000	267,000	156,000	MMA
			675,000	IBAMA
			113,000	SEAP
			210,000	CE
			1,154,000	TOTAL
<u>Output 2.4</u> Capacity building program delivered to facilitate implementation and replication of sustainable use approaches to mangrove PA resources	1,817,000	395,000	166,000	MMA
			975,000	IBAMA
			91,000	SEAP
			190,000	CE
			1,422,000	TOTAL
<i>Outcome 3. Conservation of mangroves is improved by piloting the alignment of UC management with sector and spatial planning</i>	4,908,972	1,332,500	3,576,472	
<u>Output 3.1.</u> Land planning guidelines tailored to mangrove conservation developed and tested in a large APA and coordinated with state and regional planning processes.	1,535,000	550,000	185,000	MMA
			800,000	IBAMA
			985,000	TOTAL
<u>Output 3.2</u> Water resources management processes in Paraiba developed and tested to include mangrove conservation needs	1,855,472	340,000	154,000	MMA
			920,000	IBAMA
			441,472	PB
			1,515,472	TOTAL
<u>Output 3.3</u> Capacity building program designed and under implementation for relevant planning institutions, sectoral stakeholders and UC management	1,518,500	442,500	96,000	MMA
			980,000	IBAMA
			1,076,000	TOTAL
<i>Outcome 4. Mangrove-related outreach, dissemination and adaptive management increased.</i>	3,681,100	1,197,500	2,483,600	
<u>Output 4.1</u> A Mangrove Biodiversity Monitoring Program developed and functioning.	1,028,000	340,000	123,000	MMA
			455,000	IBAMA
			110,000	CE
			688,000	TOTAL
<u>Output 4.2.</u> Project Management and Monitoring developed and implemented	1,506,600	500,000	329,000	MMA
			541,000	IBAMA
			136,600	PB

OUTCOMES AND OUTPUTS	TOTAL (US\$)	GEF (US\$)	CO-FUNDING (US\$)	
			1,006,600	TOTAL
Output 4.3 Dissemination, outreach and research on Mangrove Ecosystems Management delivered to community and sectoral stakeholders and the broad public.	1,146,500	357,500	180,000	MMA
			404,000	IBAMA
			40,000	SEAP
			65,000	CE
			100,000	SP
			789,000	TOTAL
Total Cost (M US\$)	20,345,692	5,000,000	15,345,692	

Name of Institution	State	Letters of Support for Project
Secretariat of Environment and Water Resources (SEMARH-BA)	Bahia	Confirmation letter
State Environmental Agency (SEMACE- CE)	Ceará	Confirmation letter*
Secretariat of Environment and Natural Resources (SEMA-MA)	Maranhão	Confirmation letter
Secretariat of Science and Technology and Environment (SECTAM-PA)	Pará	Confirmation letter
State Environmental Agency of the Secretariat of Science and Technology and Environment (SECTMA/SUDEMA – PB)	Paraíba	Confirmation letter*
Environmental Institute of the Secretariat of Environment and Water Resources (SEMA/IAP- PR)	Paraná	Confirmation letter
Secretariat of Environment and Natural Resources (SEMAR- PI)	Piauí	Confirmation letter
Forestry Institute of the Secretariat of Environment (SEMA/IF- SP)	São Paulo	Confirmation letter*

* Indicated through co-funding letter

Cost-Effectiveness

193. The Project has been designed to ensure that outcomes are achieved in a cost-effective manner. The design includes specific on-the-ground actions in strategically selected locations to develop and demonstrate mechanisms and approaches that will increase the effectiveness of existing conservation units for providing conservation to mangroves. The Project will also work at the institutional and systemic levels to strengthen the SNUC regulatory framework for replication of these experiences along the entire coastline. This combination ensures that the effect of limited site action will be replicated over larger areas in a cost effective manner. Moreover, one of the approaches to be tested is the mosaic approach which is essentially one of cost-effectiveness by grouping mixes of conservation units under a single management scheme to maximize synergies, reduce overall costs and increase long-term sustainability.

194. The Project's application of the formal mosaic approach, as well as taking similar steps in clusters of UCs, is ultimately a cost-efficiency model. By working on integrated management of UCs and their resources, the Project is seeking to make the most rational use of limited financial and human resources. Thus, the Project pilots will contribute to testing cost-efficiency models from a variety of different angles including ones focused on water resources, fisheries management and productive uses.

195. Cost efficiencies would also be achieved as existing institutional and infrastructural resources will be used in such a way to maximize gains and minimize costs to the GEF. First, the proposed project will strengthen SNUC, which is a structure that already exists within the Government and has legal status. Second, the Project's implementation structure involves a number of implementing partners already under

MMA coordination that will facilitate local level involvement without the need to create new structures and institutional arrangements. Simple mechanisms for Project implementation and replication are being negotiated in which existing mechanisms will be reinforced. For example, the participation of local communities will be strengthened through councils that are foreseen within SNUC, and IBAMA's regional and local offices will participate in project execution on the ground. Third, coordination with ongoing activities and projects will further maximize the use of existing resources.

196. In addition, consistent exchange of lessons learned and good practices will enhance not only the cost-effectiveness of this Project, but create an enabling environment for the dissemination of information that will strengthen the SNUC system, beyond the specific goals of this project delivering increased protection to ecosystems other than mangroves.

197. Finally, working to conserve mangroves in any way is part of a cost-efficient approach to protecting coastlines. By protecting these ecosystems, natural coastal protection is maintained. This is less expensive than erecting seawalls or other structures designed to mitigate or prevent erosion. Moreover, such structures often result in further erosion in front or adjacent to them⁴⁷.

Linkages with the UNDP Country Program

198. The project strategy is consistent with the Country Programme (CP) outcomes and the United Nations Development Assistance Framework (UNDAF) and meshes solidly with the UNDP mandate and the multi-year funding framework (MYFF) goals for Brazil.

199. The Project will contribute to four of the five UNDAF and CP outcomes through working to promote: access to environmental goods by marginalized populations; development opportunities through specific capacity building and economic alternatives for women and youth; greater participation of and dialogue between resource users, civil society, government and the private sector in policies and management related to basic environmental resources; and environmentally sustainable economic development.

200. In addition, the Project will contribute directly to MYFF goal three on Energy and Environment for Sustainable Development, service line 3.5: the Conservation and Sustainable Use of Biodiversity, through contributing to its two core results which correspond to Country Programme outcomes 13 and 14: national priorities on sustainable use of biodiversity revised to reflect concerns based on studies and lessons learned from implementation of pilot programs, and improved capacity of local authorities, community based groups and CSOs in sustainable environmental management.

Linkages with, Consultation, Coordination and Collaboration between IAs and IAs and ExAs

201. The Project will coordinate with the following projects in Brazil through their involvement with the National Wetlands Committee (CNZU) which will provide technical and political support to the project coordination.

202. AquaBio (MMA/World Bank/UNESCO). This will contribute to the conservation of aquatic biodiversity of global significance in the Amazon basin through integrated management of aquatic biodiversity and water resources. Coordination will be sought to ensure that relevant lessons on integrated water resources management are incorporated into the Project. Similarly, the Project will generate results that can be adopted in the area of AquaBio action particularly in terms of the role of stakeholders in the

⁴⁷ Pacific Island Mangroves in a Changing Climate and Rising Sea. UNEP Regional Seas Reports and Studies No. 179. United Nations Environment Programme, Regional Seas Programme, Nairobi, Kenya. 2006.

management of conservation and sustainable use of mangrove biodiversity. Coordination between these initiatives will be facilitated by the fact that both projects will be coordinated by MMA's Secretariat of Biodiversity and Forests.

203. The Protected Areas in Amazonia project (ARPA) (GEF/World Bank). This aims at the creation of 18 million hectares of new protected areas in the Legal Amazon during its first phase. ARPA's experiences of protect PA management will be integrated into the implementation of the Project with regard to developing approaches to planning and management of protected area for mangroves where traditional communities play a key role. The Project will also draw on ARPA's experiences in the use of environmental monitoring indicators and financing mechanisms for PA sustainability. During preparation, the Project team held consultations with the World Bank/GEF-funded ARPA project. Based on ARPA's work to strengthen UCs in the Amazon, including in the state of Amapá, where mangroves in physical-environmental unit one are found, the Mangrove Project elected not to work in that state. However, while both projects will work to improve UC management, the current Project focuses much more on working with mangrove communities to improve resource management and exploitation practices and to develop and implement sustainable alternative livelihoods. Thus, the activities of the two projects will not overlap. Rather they will complement each other by strengthening the SNUC in two different ecosystems and with separate strategies which will create lessons learned to enrich each other. Continued coordination will be facilitated by the involvement of MMA, through its Directorate of Protected Areas, in both Projects.

204. Conservation and Management of Pollinators for Sustainable Agriculture through an Ecosystem Approach (GEF/UNEP/FAO). This is a global project involving Brazil, China, Ghana, India, Kenya, Nepal, Pakistan and South Africa. The Brazilian Government has already endorsed it for GEF 4. In Brazil, the project will promote innovative experiences in native beekeeping with environmentally friendly practices, to be tested in 20 site pilots throughout the country. Experience exchanges between that project and the beekeeping initiative under Output 2.2 are foreseen and are expected to relate to such things as production and marketing and the importance of protecting buffer zones to ensure better pollination results.

205. The National Biodiversity Mainstreaming and Institutional Consolidation Project (Probio II) (GEF/World Bank/MMA/FUNBIO). The objective of this Project, whose implementation is expected to begin in 2007, is to promote the mainstreaming of biodiversity and institutional consolidation on a national level. This will include involving the private sector in the conservation and sustainable use of biodiversity and providing critical biodiversity information for policymaking through the monitoring of trends in biodiversity components and the assessment of the sustainability of production and consumption of biodiversity goods and services. The current Project will also address these issues, although with a specific focus on mangrove areas, which will permit the exchange of lessons learned regarding institutional strengthening and improved institutional capacity.

206. The Project also builds on experiences gleaned from other UNDP/GEF initiatives that promote environmental sustainability and poverty alleviation by working directly with communities to develop local capacities for the sustainable use of natural resources. Two projects in particular, Promoting Biodiversity Conservation and Sustainable Use in the Frontier Forests of Northwest Mato Grosso (GEF/PNUD/SEMA MT) and Demonstrations of Integrated Ecosystem and Watershed Management in the Caatinga (GEF/PNUD/MMA), have provided invaluable lessons related to experiences in commercialization of non-wood forest products and handicrafts. These lessons will serve as a basis for the identification and exploration of potential markets for mangroves products. (see Lesson Learnt Section)

207. In addition, the project for the Protection, Conservation, Recuperation and Sustainable Use of Biodiversity in Indigenous Lands of Brazil (GEF/UNDP/MMA/FUNAI/Indigenous Groups), currently under preparation, will also deal with the removal of technical, legal and financial barriers to sustainable

use and biodiversity conservation in Brazil and the two projects will exchange experiences and best practices in dealing with marginalized groups.

PART III: Management Arrangements

208. The Project will be executed by Brazil's Ministry of the Environment (MMA), in cooperation with IBAMA, with UNDP acting as the GEF implementing agency. The MMA Secretariat of Biodiversity and Forests (SBF) will be at the center of the project coordination through its directorates: the Directorate for the Conservation of Biodiversity (DCBio), the Directorate of Protected Areas, Directorate of Protected Areas (DAP) the Coastal and Marine Zones Division (NZCM). IBAMA will also cooperate in the technical coordination of the project. The IBAMA divisions include: the Directorate of Ecosystems (DIREC) which is responsible for the execution of protected area policies; the Directorate of Socio-Environmental Development (DISAM), which is responsible for the 'Extractive Reserve' and 'Sustainable Development Reserve' categories of sustainable use UCs (RESEX) and for environmental education through DISAM's General Coordination for Environmental Education (CGEAM); the Directorate of Fauna and Fisheries Resources (DIFAP), which is responsible for policies and programs related to the conservation of fauna and responsible exploitation of fish; the Directorate of Environmental Licensing (DILIC); and the Remote Sensing Center. In addition, several research centers of IBAMA for fauna and fisheries resources will collaborate on project activities at specific sites.

209. A Project Steering Committee (SC) will provide political and strategic support to the project and will be formed by technical council to be created within the Brazil's National Wetlands Committee (CNZU). The SC will have representatives from MMA, IBAMA, SEAP and project stakeholders from each of the Project intervention areas, such as OEMAS, universities, local communities, NGOs and the private sector, and will meet biannually to exchange experiences with regard to Project activities; and analyze the process and results of implementation to guide execution of the remaining Project actions.

210. A Project Management Unit (PMU) will be responsible for the overall coordination of the Project including operational planning, supervision, administrative and financial management and the adaptive management of the Project based on inputs from the Project M&E plan under Output 4.1. The SBF will assign people from their existing technical divisions (DCBio, DAP, NZCM) and additional technical expertise will be secured through short term consultancies and the hiring of NGOs as needed. The PMU will be responsible for the day-to-day implementation of Project activities, including the direct supervision of activities that are sub-contracted or carried out by other institutions under this agreement. The PMU will comprise a Project Director, Technical Coordinator, Technical Manager, Technical Assistants, Financial Officer and Project Assistant.

211. As it is a project financed by the Global Environmental Facility (GEF), oversight of the activities necessary for the achievement of the Project objectives will be carried out by a UNDP team directly and exclusively linked to this project, and which will work in close cooperation with MMA and IBAMA.

212. The Project Director will be a senior staff member of the Government executing agency and will be responsible at the highest level for ensuring that the project implementation follows national policy and standards. Key tasks will be to supervise the Project Coordinator through meetings at regular intervals to receive project progress reports and provide guidance on policy issues; chair the Steering Committee and represent the project at annual tripartite meetings. He or she will also take the lead in developing linkages with the relevant baseline programs under the authority of the Ministry of the Environment maximizing complementarities. He or she will also represent the project at high-level national and international meetings and will keep the Minister of the Environment updated on project advances and challenges as needed. This is a part time position continuing for the duration of the project reporting directly to the SC and with an estimated 20% of his/her time dedicated to the project.

213. The Project Technical Coordinator will be responsible for the overall management and coordination of the project activities. He/she will manage and provide supervision of project implementation liaising directly with the Project Director, Members of the Project Steering Committee, the Implementing Agency, and co-financiers. Together with the Monitoring specialist he/she will undertake yearly operational planning and provide guidance on its day-to-day implementation. In doing this he/she shall be responsible for the effective and efficient implementation of the project activities to achieve stated objectives and for all substantive and managerial reports from the Project; supervise the project technical managers; prepare and oversee the development of Terms of Reference for consultants and contractors partnerships hired for specific technical assignments, ensure consistency between the various project elements and activities provided or funded by other donor organizations; develop reports on project progress on the project for Steering Committee and technical meetings, and other appropriate fora. He/she shall report to the National Director. This is a full-time position for the duration of the project.

214. The Technical Managers will assist the project technical coordinator and be responsible for the overall supervision of the project team technical personnel that consists of technical staff allocated to the project from the relevant Government institutions (MMA and IBAMA).

215. The Technical Assistants will prepare project reports under the technical manager's supervision; collaborate in all aspects of project implementation, monitoring daily progress of project's activities.

216. The Financial Officer will prepare project financial reports on the use of GEF resources and co-financing. He/she will supervise implementation of agreements and sub-contracts and will also supervise the project assistant.

217. The Project Assistants will have the responsibility for the financial and administrative activities of the Project and the tracking and disbursement of project funds ensuring that the rules and procedures of UNDP are followed. Critical tasks include executing financial activities as required for acquisitions, contracts, recruitment, events once approved by the Project Coordinator or the Project Director; organise administrative activities for contracts: management of data bases, letters of invitations for bidding, selection committees; the preparation of financial information for monitoring and evaluation reports, preparation of direct payment requests for the UNDP and making opportune financial recommendations for the best usage of resources and execution of budgets. He or she will report to the Project Coordinator.

218. The Monitoring Specialist: will also be involved and will be responsible for guiding the overall M&E strategy under Output 4.1 and implementation of related activities within the project and vis à vis partners, plus providing timely and relevant information to project manager and project stakeholders. This includes the overall responsibility for monitoring advances towards the achievement of results and impacts to provide a basis for decision making on necessary amendments and improvements; to promote accountability for resource use; and to document, provide feedback on, and disseminate lessons learned. The work requires close coordination and communication with: project manager, steering committee representatives, and representatives from primary stakeholder groups, external consultants and field staff when appropriate, as well as members of external M&E-related missions. Critical tasks include developing the overall framework for project M&E in accordance with the project document M&E plan and based on the Project LogFrame, oversee and execute M&E activities included in the Annual Work Plan, with particular focus on results and impacts as well as in lesson learning; design and implement a system to identify, analyze, document and disseminate lessons learned. The M&E specialist will report directly to the Project Director. This is a part time position estimated at 25% for the duration of the project.

PART IV: Monitoring and Evaluation *Further information on the Project M&E Plan, including a detailed budget and workplan, can be found in Annex 7.*

219. Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures and will be provided by the Project team and the UNDP Country Office (UNDP-CO) with support from UNDP/GEF. The logical framework matrix in Section II Part II provides M&E indicators along with their corresponding means of verification. These will form the basis on which the project's Monitoring and Evaluation system will be built.

220. Monitoring will include regular feed back to the CTM. Annual Project Performance Review (PIR/APR) will be completed yearly followed by an annual Tripartite Review (TPR). Responsibilities for monitoring the specific indicators in the Logical Framework will be undertaken by the PMU. Adaptive management will play an important role in PA and cluster management as well as the project M&E system. The M&E Plan will track the Project's progress toward its outcomes and objectives and will allow for adjustments to be made to Project activities as necessary during implementation thereby providing the basis for participatory project execution and informed decision-making. This will increase the chance of M&E results feeding into the planning and implementation of actions on the ground. Two independent external evaluations will be undertaken, one at mid-term to measure progress being made towards the objective and identify strengths and weaknesses to reinforce aspects working well and to make and make adjustments as needed. The final evaluation will assess, among other issues, the achievement of outcomes, sustainability of results and identify lesson learning for other projects. The Management Effectiveness Tracking Tool (METT) will be conducted for the Project UCs at mid-term and at project end. Baseline METT values can be found in Annex 11.

PART V: Legal Context

221. This Project Document shall be the instrument referred to as such in Article I of the Standard Basic Assistance Agreement between the Government of Brazil and the United Nations Development Programme, signed on 29 December 1964. The host country implementing agency shall, for the purpose of the Standard Basic Assistance Agreement, refer to the government co-operating agency described in that Agreement.

222. The UNDP Resident Representative in Brazil is authorized to effect in writing the following types of revision to this Project Document, provided that he/she has verified the agreement thereto by the UNDP-GEF Unit and is assured that the other signatories to the Project Document have no objection to the proposed changes:

- a) Revision of, or addition to, any of the annexes to the Project Document;
- b) Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the rearrangement of the inputs already agreed to or by cost increases due to inflation;
- c) Mandatory annual revisions which re-phase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility; and
- d) Inclusion of additional annexes and attachments only as set out here in this Project Document.

SECTION II: STRATEGIC RESULTS FRAMEWORK AND GEF INCREMENT

PART I : Incremental Cost Analysis

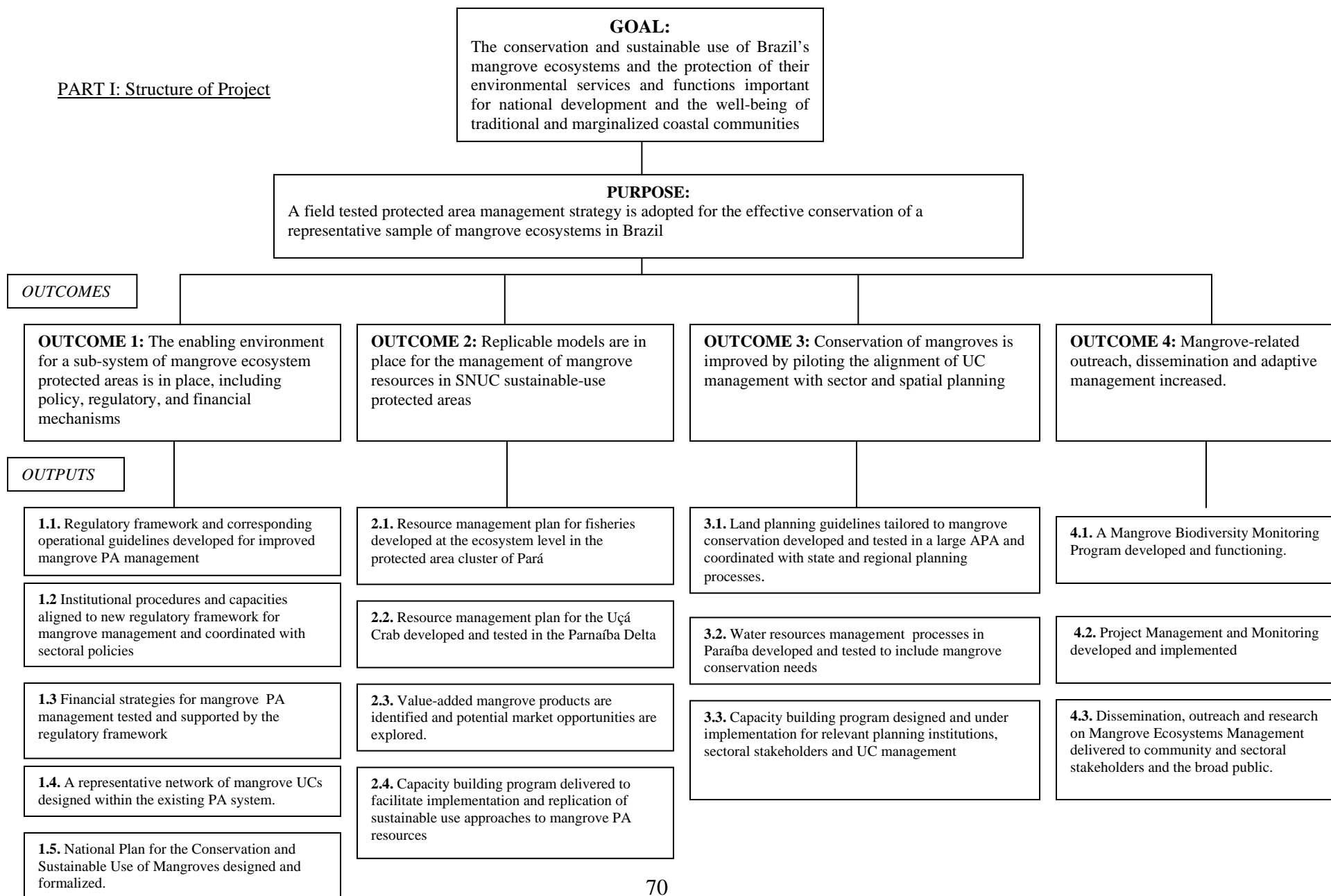
Benefits	Baseline (B)	Alternative (A)
<p>Domestic Benefits</p>	<p>All mangroves in Brazil are protected as Areas of Permanent Protection with strict land-use limitations. Local uses of mangrove ecosystems are limited to fish and crustaceans extraction, and fuel wood for charcoal, supporting a poverty-stricken population. In addition many sector activities require environmental licensing. However, deficiencies in licensing processes and different interpretations of conformation of mangrove ecosystems result in increasing loss of mangrove habitat and services these provide.</p> <p>Valuation of mangrove income generation and local environmental services exist for some locations but are not linked to sectoral planning and decision making with the result that sectors continue unaware of mangrove services and the impact of their activities on these.</p> <p>Large areas of mangroves are under additional protection through the SNUC as UC. These afford some protection but have deficiencies, including capacity deficiencies and funding gaps, which undermine effectiveness.</p> <p>Payments for environmental services schemes and legal parameters under discussion at national level but these do not incorporate specificities of mangroves that are highly dependant on upstream water quality and quantity.</p> <p>National Environmental Compensation Fund created, establishing the institutional basis for allocation of a share of domestic investments toward biodiversity conservation but yet to establish criteria regarding potential compensation for loss of environmental services from sector activities resulting in continued impact on mangroves and UC funding gap.</p> <p>An increasing number of areas are being formed as RESEX upon request of local communities that depend on mangrove livelihoods but weak experience in establishing extraction levels comprises sustainability of livelihoods.</p>	<p>Regulatory and operational framework of SNUC is tailored to better address mangroves so that existing UC provide increased protection advancing national conservation goals.</p> <p>Additional sector specific valuation studies through the range of mangrove occurrence conducted and disseminated and linked to planning processes, permitting prioritization of protection activities and identification of potentials for ecosystem service payments by domestic beneficiaries.</p> <p>Pilot adoption of new funding mechanisms for UC including ecosystem service payments for sustainable mangrove protection, based on recognition of domestic ecosystem services, value added tax, mosaic approaches for cost effectiveness and compensation mechanisms reduce funding gaps and provide models for SNUC in general.</p> <p>National Compensation Fund devotes additional and previously unbudgeted resources toward mangrove conservation and sustainable use.</p> <p>Management plans and alternative livelihoods provide additional and new sources of revenue for coastal populations; sustain the cultures of large traditional and indigenous populations, and stimulate them to contribute toward protection of mangrove resources.</p> <p>Increased mangrove conservation increases the protection of fisheries stocks, clean water supplies and the integrity of coastlines and beaches and thus indirectly employment and income-generating capacity of related sectors.</p>

Benefits	Baseline (B)	Alternative (A)
Global Benefits	<p>Approximately 25% of mangrove habitat has been lost with concomitant loss in biodiversity of global significance; mangroves in some areas are classified as endangered due to high levels of fragmentation particularly in the unit where mangroves are less extensive.</p> <p>There is unequal protection provided through the SNUC to the different representations of the mangrove ecosystems along the coast with the result of some mangrove biodiversity of global significance is increasingly under threat. Increasing high percentage of sustainable use UC categories without clearly established extractive rates may not provide expected conservation goals thus undermining progress towards BD conservation.</p> <p>Global recognition of mangrove services and threats have grown, through debate over creation of a code of conduct for payments for ecosystem services in wetlands, and Marine Stewardship Council certification criteria however this needs to be applied in Brazil where awareness is still low and enormous pressures exist along the coast for advancing national development objectives in terms of sectoral economic and infrastructure targets with increasing threat to mangrove BD.</p> <p>Knowledge of conservation gaps in the national protected area system, as well as assessment of biodiversity conservation priorities for globally important coastal and marine resources enhanced by PROBIO however the challenges in this mega diverse and vast country are enormous and existing resources are not enough to deliver protection to levels required for capturing global benefits; national priorities and international support are more channeled towards more charismatic ecosystems. Advances in innovative approaches to mangrove conservation are scattered along coastline and in the absence of a framework to support up-take and replication the contribution to conservation of the full range of mangrove BD in Brazil is limited.</p>	<p>Improved management effectiveness of mangrove UC pilots will directly deliver enhanced protection of globally important mangrove biodiversity over 560,000 hectares. Capacity building within clusters of UC provides enhanced conditions for immediate replication and uptake of increased effectiveness over more than 7,000 km² (estimated mangroves in intervention clusters). Additional positive affects will be incurred in ecosystems associated to mangroves many globally significant species including those in other countries given the importance of mangroves for long distance migrants (Annex 1).</p> <p>Protected area mosaics and integrated management systems provide a basis to establish priorities for investment of scarce national and international resources for long term conservation and sustainable use of globally important mangroves in Brazil.</p> <p>Increased awareness of global mangrove protection benefits and ecosystem service values, lead to definition of options to finance protected area mosaics and design of incentive measures to reward sustainable resource use in globally significant mangroves along the Brazilian coastline, including certification of products and services generated thereby.</p> <p>This, plus the enhanced enabling framework for a subset of mangroves will, over the long term, provide positive affects in all the Brazil's mangrove endowment representing 9% of world mangrove ecosystems. These benefits will be incurred both through the SNUC and through the improved licensing procedures that adequately incorporate restrictions toward mangrove conversion making APP category more effective.</p> <p>Increased protection will also secure the significant role of mangrove forests as carbon sinks. Indirectly benefits will be incurred in mangroves across the world through lessons learnt on mangrove multi-use PA management with a focus on livelihood protection, links to regional and spatial planning, cost-efficiencies and knowledge-transfer.</p>

Costs	Baseline (B) USD\$		Alternative (A) USD\$		Increment (A-B) USD	
Outcome 1. Enabling framework for subsystem of mangrove UC	Baseline:	39,818,318	a) Baseline:	39,818,318	GEF:	920,000
	MMA:	5,635,533	b) Co-financing:	2,283,900	Co-financing Total:	2,283,900
	IBAMA:	26,688,865	c) GEF:	920,000	MMA	485,000
	Compensation Fund:	1,559,801	d) Total Alternative:	43,022,218	IBAMA	500,000
	State Governments:	4,461,544			SEAP	44,000
	NGOs:	106,818			CE	425,000
					PB	104,900
					SP	245,000
					CI	480,000
					Total:	3,203,900
Outcome 2. Replicable models in sustainable-use mangrove UC.	Baseline:	51,142,668	a) Baseline:	51,142,668	GEF:	1,550,000
	MMA:	4,118,974	b) Co-financing:	7,001,720	Co-financing Total	7,001,720
	IBAMA:	41,817,274	c) GEF:	1,550,000	MMA	564,000
	Compensation Fund:	3,199,602	d) Total Alternative:	59,694,388	IBAMA	4,400,000
	State Governments:	2,006,818			SEAP	1,637,720
					CE	400,000
					Total:	8,551,720
Outcome 3: Piloting UC management alignment with sectoral and spatial planning	Baseline:	25,651,335	a) Baseline:	25,651,335	GEF:	1,332,500
	MMA:	5,458,463	b) Co-financing:	3,576,472	Co-financing Total	3,576,472
	IBAMA:	13,559,603	c) GEF:	1,332,500	MMA	435,000
	State Governments:	1,283,468	d) Total Alternative:	30,560,307	IBAMA	2,700,000
	Compensation Fund:	1,599,801			PB	441,472
	Private Sector CVRD:	3,750,000			Total:	4,908,972
Outcome 4: Mangrove- related outreach, dissemination and adaptive management	Baseline:	25,286,339	a) Baseline:	25,286,339	GEF:	1,197,500
	MMA:	4,887,351	b) Co-financing:	2,483,600	Co-financing:	2,483,600
	IBAMA:	14,141,990	c) GEF:	1,197,500	MMA	632,000
	State Governments:	2,506,998	d) Total Alternative:	28,967,439	IBAMA	1,400,000
	Private Sector:	3,750,000			SEAP	40,000
					CE	175,000
					PB	136,600
					SP	100,000
					Total:	3,681,100
Total costs	Baseline:	140,572,902	a) Baseline:	140,572,902	GEF:	5,000,000
	MMA:	20,100,320	b) Co-financing:	15,345,692	Total Co-financing:	15,345,692
	IBAMA:	96,207,732	c) GEF:	5,000,000	MMA	2,116,000
	State Governments:	10,258,828	d) Alternative:	160,918,594	IBAMA	9,000,000
	Compensation Fund:	6,399,204			SEAP	1,721,720
	Private Sector:	7,500,000			State Governments	2,027,972
	NGOs:	106,818			CI Brazil	480,000
					Total:	20,345,692
			GEF PDF-B	330,000		
			Co-Financing PDF-B	120,000		
			TOTAL PDF-B	450,000		
			GRAND TOTAL	161,368,594		

PART II: Logical Framework Analysis

PART I: Structure of Project



NB: UC = Conservation Unit – Brazilian terminology for the legal instrument that governs the PAs that form the pillar of the National Protected Area System
 APA = Environmental Protected Area (=IUCN Category VI)

Project Strategy	Indicator	Baseline	Targets (for Project end)	Sources of verification	Risks and Assumptions																																																		
GOAL	The conservation and sustainable use of Brazil's mangrove ecosystems and the environmental services and functions important for national development and the well-being of traditional and marginalized coastal communities																																																						
OBJECTIVE: A field tested protected area management strategy is adopted for the effective conservation of a representative sample of mangrove ecosystems in Brazil	1. Populations of threatened and overexploited species, selected as indicators of improved protection from threats in pilot UC ⁴⁸	<ul style="list-style-type: none"> • Tbd • Tbd (Final selection of species and monitoring methods and frequencies will be determined by end of inception phase)	Remain the same as at project outset	Monitoring reports at end of first 6 months, mid and end of project	Federal and State Gov. commitments to improving mangrove conservation is sustained, facilitating the integration of improved institutional procedures and regulations frameworks																																																		
	2. Vegetation cover of mangroves in project intervention UCs	568,000 hectares	At least the same as at project start	Satellite imagery analysis at start, mid and end project	Key baseline UC management actions are successfully implemented																																																		
	3. % of mangrove ecosystems in mangrove UCs under management categories or other legal instruments that allow sustainable use (SU) and or limit any use and targets strict conservation (SC) Examples of legal instruments for SU other than management categories is no take zones	<table border="1"> <thead> <tr> <th>Unit, #UCs</th> <th>% SU</th> <th>% SC</th> </tr> </thead> <tbody> <tr> <td>I (3)</td> <td>0%</td> <td>100%</td> </tr> <tr> <td>II (2)</td> <td>100%</td> <td>0%</td> </tr> <tr> <td>III (19)</td> <td>84%</td> <td>16%</td> </tr> <tr> <td>IV (12)</td> <td>69%</td> <td>31%</td> </tr> <tr> <td>V (55)</td> <td>80%</td> <td>20%</td> </tr> <tr> <td>VI (6)</td> <td>50%</td> <td>50%</td> </tr> <tr> <td>VII (36)</td> <td>44%</td> <td>56%</td> </tr> </tbody> </table> Baseline information is still incomplete to measure accurately the exact % of mangroves under SU and SC in UC or if it is representative sample of different mangrove types	Unit, #UCs	% SU	% SC	I (3)	0%	100%	II (2)	100%	0%	III (19)	84%	16%	IV (12)	69%	31%	V (55)	80%	20%	VI (6)	50%	50%	VII (36)	44%	56%	<table border="1"> <thead> <tr> <th colspan="3">Network Targets (Indicative)</th> </tr> <tr> <th>Unit, #UCs</th> <th>% SU</th> <th>% SC</th> </tr> </thead> <tbody> <tr> <td>I (tbd)</td> <td>25%</td> <td>75%</td> </tr> <tr> <td>II (tbd)</td> <td><70%</td> <td>tbd</td> </tr> <tr> <td>III (tbd)</td> <td>50%</td> <td>50%</td> </tr> <tr> <td>IV (tbd)</td> <td>45%</td> <td>55%</td> </tr> <tr> <td>V (tbd)</td> <td>55%</td> <td>45%</td> </tr> <tr> <td>VI (tbd)</td> <td>50%</td> <td>>50%</td> </tr> <tr> <td>VII (tbd)</td> <td>30%</td> <td>70%</td> </tr> </tbody> </table> The Project will design a network of areas with a good balance of SU and SC instruments in key locations. The targets above are indicative and will be determined as part of project.	Network Targets (Indicative)			Unit, #UCs	% SU	% SC	I (tbd)	25%	75%	II (tbd)	<70%	tbd	III (tbd)	50%	50%	IV (tbd)	45%	55%	V (tbd)	55%	45%	VI (tbd)	50%	>50%	VII (tbd)	30%	70%	Project M&E reports; other Project studies
Unit, #UCs	% SU	% SC																																																					
I (3)	0%	100%																																																					
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V (tbd)	55%	45%																																																					
VI (tbd)	50%	>50%																																																					
VII (tbd)	30%	70%																																																					
	4. % Management effectiveness (METT) of pilot mangrove PAs	METT applied during PDF B on a sample of pilot UCs: Poor: 1%	70% Pilot UCs with a METT score of Good/Excellent	Mid-term and final METTs; RAPPAMs																																																			

⁴⁸ UC = Conservation Unit is the Brazilian terminology for the protected areas that form the National Conservation Unit System

⁴⁹ Increases in *Eudocimus* indicates reduced disturbance to nesting colonies and poaching

Project Strategy	Indicator	Baseline	Targets (for Project end)	Sources of verification	Risks and Assumptions
		Fair: 61% Good: 27% Excellent: 1%			
	5. % of other pilot PAs testing 1 or more of financing strategies developed in the project	0%	50%	UC financial reports, Project M&E	
	6. % of Environmental agencies that have agreed to and signed to the Mangrove Plan	State IBAMA =0% OEMAs=0% Coastal municipalities • in clusters = 0% • out of cluster =0%	State IBAMA =100% OEMAs=100% Municipalities • in clusters = 80% • out of cluster =60%	Project M&E surveys at mid and end	
Outcome 1: The enabling environment for a sub-system of mangrove ecosystem protected areas is in place, including policy, regulatory, and financial mechanisms	1. % of “Mangrove” States with a set of norms and guidelines agreed with and coordinated between federal, state and municipal agencies on the management of mangroves.	0 % of the States	At least 80% of the States	Project reports, signed agreements	Integration between the three levels of government for environmental management continues to increase.
	2. Existence of a core group of trained staff members (of IBAMA, OEMAs and/or municipal agencies) capable of implementing and using those norms and regulations	< 30% of States have core group of trained staff in key aspects of mangrove management <i>By end of year one full staff competency skills specific for mangrove UC manager will have been defined and baseline and end targets determined</i>	All OEMAs (BA, CE, MA, PA, PB, PI, PR, SP) involved, have a core group of staff-members trained in procedures of licensing & enforcement for mangrove conservation At least 1 more specialized staff in agency for mangrove management in each case	Project reports; Progress reports on capacity-building programs	
	3. # regulations tailored to mangroves in <u>at least</u> : • UC management categories • management plans guidelines • financing mechanisms • integrating water planning to mangroves	• 0 • 0 • 0 • 0 • Measures for fisheries management are insufficient to provide sustainability	• ≥ 2 • 1 for each management category • 4 • 1 resolution presented to CNRH linking classification of water bodies upstream from mangroves to needs of these ecosystems	Annual monitoring reports - Legal record of submissions to the judiciary.	

Project Strategy	Indicator	Baseline	Targets (for Project end)	Sources of verification	Risks and Assumptions
	<ul style="list-style-type: none"> fisheries management plans for mangrove UC 		<ul style="list-style-type: none"> 1 resolution outlining rules and procedures for ecosystem-based, integrated fisheries resources management 		
	4. Composition/source of financing in the project intervention areas that will develop new financing strategies	UC funding comes from Federal and State budgets with an average funding gap of 50% in mangrove UCs	Tested mechanisms increase PA funding 30% in the two pilot intervention areas (Bahia and SP)	METTs, UC financial reports	
	5. Existence of a national mangroves plan in Brazil's Wetland Plan	No plan . Activities for conserving mangroves are <i>ad hoc</i> and un-coordinated with on-going plans and programmes	Mangrove Plan agreed and legally formalized as part of Wetlands and contributes to target of national PA Plan	Legal norm formalizing the Plan. Minutes of meetings Project reports	
Outcome 2. Replicable models are in place for the management of mangrove resources in SNUC sustainable-use protected areas.	1. Degree of ecosystem management of fisheries resources in Para <ul style="list-style-type: none"> # hectares under integrated fisheries resource plan # no-take areas in the 3 pilot UCs 	0 ha under fisheries resource plan that limit practices and catches. 0 no-take areas agreed	70,000 ha under ecosystem-based, integrated fisheries resource plan. ≥ 3 no-take zones agreed	<ul style="list-style-type: none"> Official ecosystem fisheries plan and associated pilot UC management plans Signed agreements (eg, no-take zones) 	Key stakeholders maintain at least current levels of interest and willingness to work with Project actions. Category IV management and conservation targets in PAs are agreed upon with local population
	2. Degree of exploitation of the <i>uçá</i> crab resources Piauí/Maranhão/Ceará <ul style="list-style-type: none"> % mortality rates decrease in capture rates and maintenance of income Up-take of model 	<ul style="list-style-type: none"> 60% mortality in <i>uçá</i> crab 21 tons <i>uçá</i> crab and income of 40-60US/month No resource management plans exist for <i>Uca</i> crabs in sustainable use UC 	<ul style="list-style-type: none"> 25% decrease in mortality and harvesting at levels established in resource plan 20% decrease in capture of <i>uçá</i> crab and income remains same or higher Model is incorporated in official practices and policies and replicated in 1 UC cluster 	Project reports on the condition of fishery stocks; Project M&E report on losses in the <i>uçá</i> crab productive chain	Positive signs for agreement with local population on management and conservation targets in SU PAs continue at least at the same level as that indicated during project preparation
	3. Development and marketing of new Mangrove products	At present, most local communities and populations lack the capacity to produce and market potential new	100 potential local small entrepreneurs trained in the preparation of a business plan	Project monitoring reports. Marketing of new products	

Project Strategy	Indicator	Baseline	Targets (for Project end)	Sources of verification	Risks and Assumptions
		products from mangrove areas 18 families involved in sustainable economic alternatives to <i>uçá</i> capture	100 families in the pilot UCs involved in sustainable alternatives including women and youth		
	4. Number of UC and cluster management councils reaching agreement on harvesting levels and enforcement in Pilot areas	5	25	UC and mosaic council reports	
Outcome 3: Conservation of mangroves is improved by piloting the alignment of UC management with sectors and spatial planning	1. # of water management instruments agreed upon by the Mamanguape waterbasin committee that take into account the water quantity and quality for mangroves	<ul style="list-style-type: none"> 0 of 6 	<ul style="list-style-type: none"> 2 	Water management Plan and classification, Minutes from UC council meetings; Minutes from regional watershed committee meetings; Project reports	The level of threats in the pilots UCs does not worsen.
	2. Degree that mangrove conservation is incorporated in Zoning of the Reentrâncias Maranhenses APA ⁵⁰ <ul style="list-style-type: none"> Zoning restriction on main sectors reflected in UC plan # municipalities agreed on APA zoning % of the key actors in APA have signed a formal document of adherence to zoning regulations 	<ul style="list-style-type: none"> Initial zoning for agro-ecological activities, shrimp farming, and indicators starting for deforestation but reflected in PA-planning and management. 1 municipality in the APA has a development plan that considers mangrove needs zoning. 0% of the key actors in APA have signed a formal document of adherence to zoning regulations 	<ul style="list-style-type: none"> UC management plan reflects zoning and limits of all main economic activities 16 municipalities (200,000 ha.) in the APA have agreed on the zoning. 50% of the key actors in the APA sign formal document of adherence to zoning regulations. 	Management plan of the APA Reentrâncias Maranhenses. METTs; signed zoning regulations.	<p>Key stakeholders maintain at least current levels of interest and willingness to work with Project actions.</p> <p>Water resources sector remains receptive to working with the project on integrated UC and water resources management.</p> <p>Sustainable use categories PAs deliver sufficient mangrove conservation benefits at the national level.</p>
Outcome 4. Mangrove-	1. Awareness among	TBD by survey in first 6	Increased by at least 30%	Survey reports	

⁵⁰ APA = Environmental Protected Area (=IUCN Category VI)

Project Strategy	Indicator	Baseline	Targets (for Project end)	Sources of verification	Risks and Assumptions
related outreach, dissemination and adaptive management is increased.	private and public stakeholders on the management of mangrove UCs and the ecosystem services they provide.	months	compared to baseline survey		
	2. Frequency and quality of monitoring of mangrove land cover	<ul style="list-style-type: none"> Uncoordinated individual state M&E programs 	<ul style="list-style-type: none"> M&E programs coordinated and linked to national system 	Project reports; Mangrove Biodiversity Monitoring Program reports	
	3. Number of instances in which adaptive management takes place taking into account M&E results	0	6	Project M&E reports	
	4. Number of replications of the Project pilots Brazil's in other mangrove PA	0	≥ 3	Project reports, UC reports	

SECTION III : Total Budget and Workplan

Award ID: 00046839								
Project Title: Pims 3280 BD FSP: BR Effective Conservation and sustainable Use of the Mangrove Ecosystems in Brazil								
Project ID: 00055992								
GEF Project Outcomes /Atlas Activity	Responsible Party	Source of Funds	2007	2008	2009	2010	2011	Total
			US \$	US \$	US \$	US \$	US \$	Amount
Outcome 1. The enabling environment for a sub-system of mangrove ecosystem protected areas is in place, including policy, regulatory, and financial mechanisms.	MMA	GEF						
			46,000	184,000	276,000	276,000	138,000	920,000
TOTAL OUTCOME 1 COST			46,000	184,000	276,000	276,000	138,000	920,000
Outcome 2. Replicable models are in place for the management of mangrove resources in SNUC sustainable-use protected areas	MMA	GEF						
			77,500	310,000	465,000	465,000	232,500	1,550,000
TOTAL OUTCOME 2 COST			77,500	310,000	465,000	465,000	232,500	1,550,000
Outcome 3. Conservation of mangroves in landscape-level UCs improved by piloting the alignment of their management with sectors and spatial planning	MMA	GEF						
			66,625	266,500	399,750	399,750	199,875	1,332,500
TOTAL OUTCOME 3 COST			66,625	266,500	399,750	399,750	199,875	1,332,500
Outcome 4. Mangrove-related outreach, dissemination and adaptive management increased.	MMA	GEF						
			59,875	239,500	359,250	359,250	179,625	1,197,500
TOTAL OUTCOME 4 COST			59,875	239,500	359,250	359,250	179,625	1,197,500
TOTAL by Source of Fund/Donor (without PDF-B)		GEF	250,000	1,000,000	1,500,000	1,500,000	750,000	5,000,000
		MMA	105,800	423,200	634,800	634,800	317,400	2,116,000
		IBAMA	450,000	1,800,000	2,700,000	2,700,000	1,350,000	9,000,000
		SEAP	86,086	344,344	516,516	516,516	258,258	1,721,720
		CE State	50,000	200,000	300,000	300,000	150,000	1,000,000
		PB State	34,148	136,594	204,892	204,892	102,446	682,972
		SP State	17,250	69,000	103,500	103,500	51,750	345,000
		CI	24,000	96,000	144,000	144,000	72,000	480,000
Total Co-Fin. (without PDF-B)			767,284	3,069,138	4,603,708	4,603,708	2,301,854	15,345,692
GRAND TOTAL			1,017,284	4,069,138	6,103,708	6,103,708	3,051,854	20,345,692

SECTION IV : ADDITIONAL INFORMATION

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Letter of endorsement in separate file with Cofunding letters

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ANNEX 1: MANGROVES, BIODIVERSITY AND PROTECTED AREAS IN BRAZIL

I. ECOSYSTEM SERVICES PROVIDED BY MANGROVES

1. Mangroves, a salt-tolerant forest ecosystem, are physically and biologically fragile coastal ecosystems found in low-lying plains formed by muddy sediments. They are usually associated with the extreme end of bays, beaches, sandbanks, river mouths and lagoons where seawater meets river waters or are directly exposed to the coastline. Mangroves ecosystems also comprise a transition zone (ecotone), known as 'tannes' (or *apicum*) on the inland side of the mangroves that is usually a sandy area with no vegetation cover or with grasses. Variations in high and low tides leave a cover of phytoplankton on this sandy ground thereby creating the conditions for the beginning of a food chain which supports the entire ecosystem.

2. Mangrove ecosystems are among the most productive ecosystems on earth and are considered 'key ecosystems' as they provide a wide variety of natural resources and environmental services that support economic activities and ensure the environmental integrity of coastal areas. The 2005 Millennium Ecosystem Assessment⁵¹ groups the types of ecosystem services provided by mangroves into four categories: provisioning, regulating, cultural and supporting services.

- Provisioning Services. Mangrove resources are a source of traditional medicines, building materials for houses, bridges, fences and the like, and are used for traditional practices such as treating fishing nets with tannins collected from the bark of mangrove trees. Additionally, they provide fisheries resources for local consumption and for commercial purposes. These resources play an important role in the economies of many countries through the domestic sale and the exportation of fish, shrimp, crabs, lobsters and a variety of other invertebrates. They also provide traditional products including honey, tannins and traditional remedies.
- Regulating Services include recharge and discharge of groundwater, shoreline protection, retention of sediments and pollutants, reduction of coastal erosion, protection of coastal communities and development from storms and floods, moderation of tidal variations in deltas, lagoons and estuaries, reduction of sedimentation in coral reefs, capture and storage of carbon dioxide and the maintenance of water quality in nearby marine habitats including through the absorption of pollutants.
- Cultural Services, including tourism destinations and ancestral or sacred sites. While their role as shoreline protectors is generally acknowledged and is essential to the maintenance of beaches, mangroves themselves have not normally been considered tourist destinations. This is beginning to change in some parts of the world, particularly Africa and Asia and to a lesser degree on the Pacific coast of South America, where local communities have begun to promote educational visits to mangroves as a way to see the unique species assemblages they harbor. In Latin America, both Colombia and Ecuador have established ecotourism ventures with traditional communities to showcase the ecological, cultural and gastronomic richness of mangroves. In this way, this cultural service also serves to protect mangroves through educating visitors and local communities on the importance of these ecosystems and through providing sustainable alternatives to exploitive livelihoods. Brazil has begun some boat trips in mangrove areas although these are for purely touristic purposes and environmental education has not been brought into play. In addition, since some mangrove areas are the traditional homes of local populations, in Latin America this includes especially Afro-Ecuadorians and Afro-Colombians, these ecosystems are considered to be sacred or ancestral sites.

⁵¹ Millennium Ecosystem Assessment. 2005.

- Supporting Services provided by mangroves are those essential to the maintenance of the cycle of plant and animal life in these areas and associated ecosystems. These services include the maintenance of biodiversity and genetic resources, production of nutrients, remineralization of organic and inorganic matter and provision of feeding, reproductive, protective and nursery sites to several terrestrial and marine species. Mangroves also facilitate the movement of species between terrestrial and marine habitats through their role as ecological corridors between these habitats.

II. STATISTICS ON MANGROVES IN BRAZIL⁵²

3. Mangroves cover an estimated area of 162,000 km² globally, of which 30% occurs in Tropical America. In Brazil, mangroves are found along approximately 80% of the coastline and some statistics suggest that this ecosystem covers an area of approximately 13,400 km², which means about 9% of mangroves in the world.
4. There are no reliable statistics on mangrove cover per geographic region (North, Northeast, Southeast, and South). However, under the PDF-B, preliminary mapping was prepared based on Landsat images from 2000 and 2001. This information enabled the plotting of Conservation Units located in mangrove areas as shown in the National Registry of Conservation Units⁵³ and provides a quantitative parameter of sorts on which to base the Project strategy. These maps can be seen in Annex 10.

III. MANGROVES AND PROTECTED AREA INSTRUMENTS

5. Brazil defines protected areas as those “*areas of land or sea specially dedicated to the protection and maintenance of biological diversity and associated nature and cultural aspects and managed through legal instruments or other effective measures*”⁵⁴. With regard to mangrove areas, the most important are Areas of Permanent Preservation (APPs) and Conservation Units (UCs)⁵⁵.

AREAS OF PERMANENT PRESERVATION (APPs)

6. In Brazil, mangrove forests are considered Areas of Permanent Preservation (APP) and are covered under various constitutional provisions (Federal and State Constitutions) and other legal mechanisms (laws, decrees, resolutions, conventions)⁵⁶. Examples of Areas of Permanent Preservation are mountains and the banks of rivers and lakes. Under the Forest Code, all mangroves in Brazil are recognized as APPs and are afforded the special protections that this designation carries with it. APPs are defined as:

...certain public or private areas in which partial or total extraction of the vegetation is only permitted through prior authorization by the Executive Branch of the Federal Government, whenever public works, plans, activities or projects are needed for the purposes of public utility or for furthering the interests of society at large.

⁵² Spalding et al., 1997; Schaeffer-Novelli et al. 1990, FAO 1992; Kjerve and Lacerda 1993, Melo 1996; Proisy, C., et al (2003).

⁵³ MMA, 2006.

⁵⁴ www.mma.gov.br/port/sbf/dap

⁵⁵ Although they may be established with the purpose of protecting a particular ecosystem, each UC generally houses a variety of different ecosystems. However, since mangroves are the focus of this project, any UC with mangroves in its boundaries will be referred to in this document as a “mangrove UC”.

⁵⁶ Federal Constitution; Federal Law 7.803/89; Federal Law 5.197/67; Federal Decree 88.351/83; Federal Law 7.347/86; Federal Law 7.661/88; Federal Law 8.617/93; Federal Decree 92.302/86; Federal Decree 97.632/89; Federal Decree 99.274/90; CONAMA Resolution 001/86.

7. In this regard the Federal Constitution strengthened what Article 2 of the Forestry code had already set out: namely, that mangroves can only be altered or suppressed through legislative acts, which means that Municipal Governments, State Governments (through their Secretariats or environmental agencies), and the Federal Government (through SPU – *Serviço de Patrimônio da União* [Federal Property Service]) or IBAMA may not authorize any alteration or extinction of mangroves, since they are **permanent preservation** areas established by law, therefore only through another federal law – and not by administrative acts – can these areas be altered, mutilated or suppressed. In this regard, the Federal Constitution contains a key provision that must be taken into account, since “not only does it not allow the alteration or suppression of mangroves through acts promoted privately or by the Executive Branch”, but it also does not allow these areas to be “used in ways that undermine the integrity” of their attributes.

8. Compliance with these legal instruments, however, entails a series of measures surrounding the appropriate use of - and activities carried out in - mangrove areas. Some events in the historical process of Brazilian environmental legislation have rendered this undertaking more complex. For instance, the Provisional Measure [*Medida Provisória*] 1605/98 (which revised Provisional Measure 5111/96) amended articles 2 and 3 of the Forestry Code, thereby reducing the permanent preservation areas from 80% to 20%, whereas these areas were extended from 50% to 80% by Provisional Measure 1511/96. Provisional Measure 1736 amended Article 2 of the Forestry Code, thus enabling environmental licensing and partial or total suppression of permanent preservation areas.

9. Another key issue is that the mangroves are traditionally occupied and exploited by indigenous and fishing communities, which inevitably entails adopting use and conservation paradigms that are tailored to local peculiarities in the relationship between humans and nature. Generally speaking, these social groups are part of the informal sector of society and the economy, since their production activities - and the benefits they generate - are not duly accounted for in economic indicators and statistics, thus reinforcing the process of social marginalization. Human development indices in some municipalities (MHDI) where traditional communities are located in mangrove areas are, on average, ranked as low.

CONSERVATION UNITS (UCs)

10. These are a special type of protected areas defined as “*territorial spaces that together with their natural resources have been legally recognized by a Public Authority and have defined limits and conservation objectives and that are brought under a management regime to guarantee adequate protection*”.

11. This legal and socio-environmental framework has recognized that, in practice, designation as APP has not ensured efficient preservation of relevant sites or conservation and rational use of the biodiversity associated with mangroves. In this context, Brazil has gained strides in defining, designing, and implementing a National System of Conservation Units [*Sistema Nacional de Unidades de Conservação*] – SNUC – under Law Num. 9.985/2000 and under Decree Num. 4.340/2002, which instituted the creation and strengthening of Conservation Units⁵⁷ (UCs), comprised of special types of protected areas, which are divided up into two main groups:

- Strict Protection UCs with the objective of preserving nature, in which only indirect use of natural resources is allowed, i.e. educational, scientific, and recreational activities. Five management categories are recognized under the strict protection group. Each with different degrees of protection these categories are as follows: Ecological Station (EE), Biological Reserve (RB), National Park (PN), Natural Monument (MN) and Wildlife Refuge;

⁵⁷ Territorial space and its environmental resources, including bodies of water within its jurisdiction and relevant natural features, which must be legally instituted by public authorities with well-defined goals and boundaries under a special management regime and are entitled to appropriate protection measures.

- Sustainable Use UCs: the aim of these units is to promote the use of the environment/ecosystem in ways that ensure the sustainability of renewable natural resources and of ecological processes, thereby maintaining biodiversity and other ecological attributes in a socially just and economically viable fashion. Seven management categories are recognized again each with different levels of permitted uses. These are Environmental Protection Areas (APA), Areas of Ecological Interest (ARIE), National Forest (FLONA), Extractive Reserves (RESEX), Fauna Reserves, Sustainable Development Reserves (RDS) and National Heritage Private Reserves (RPPN).

12. The SNUC is based on categories of protected areas adopted by the World Conservation Union (IUCN), which is the most widely accepted and implemented classification system worldwide. The main ground gained by this set of Conservation Units lies in the legal and technical definition of specific instruments designed to further the aims of conservation and sustainable use, namely:

- **Management Plans:** Based on the overall objectives of each conservation unit, this technical document provides for zoning and establishes norms for using the area and managing its natural resources, including the construction of infrastructure needed to manage the unit. This plan must encompass the area within the conservation unit, its buffer zone, and the ecological corridors.
- **Buffer Zone:** the surrounding area of conservation units, where human activities are subject to specific norms and restrictions, with the purpose of minimizing negative impacts on the unit. The boundaries of the buffer zone must be drawn when the Management Plan is drafted;
- **Consultative and Steering Councils:** mechanisms whereby stakeholders participate in collective decision-making, management, implementation, monitoring and evaluation of conservation measures and strategies.

13. While all mangroves are already considered APPs, the creation and establishment of Conservation Units, especially those in the sustainable use group, is adopted quite widely and adaptable to the reality of mangrove ecosystems and to the socioeconomic dynamics of human populations residing amongst or using their natural resources.

14. In addition to Conservation Units, Brazil uses a number of other land-use categories to provide some form of protection to contribute to biodiversity conservation. These include Biosphere Reserves, Ecological Corridors, indigenous territories and quilombo lands (former slave havens). It also includes other legal instruments such as those under the Forestry Code that afford conservation to biodiversity through a protected area approach. Amongst these legal instruments are the **Legal Reserves** that must be observed on private land and in which vegetation cannot be clean cut but rather exploited through management plans that allow only sustainable extraction practices and levels.

Environmental Protection Areas (APAs) and Extractive Reserves (RESEX)

15. The management categories most directly relevant to this project are Environmental Protection Areas (APAs) and Extractive Reserves (RESEX).

16. APAs are generally large areas with specific cultural or biotic attributes especially important to the well-being or quality of life of the human populations occupying them. The basic objectives of an APA are to protect biological diversity, manage the process of human occupation and ensure the sustainable use of the natural resources within its boundaries. The APA categorization, which is fundamentally linked to land use planning and should restrict the development of activities which are potentially damaging to the environment, requires zoning of its UCs. This zoning, an important part of overall APA management as determined by the APA management plan, establishes use guidelines and should include wildlife zones

designated for conservation and preservation where the use of natural resources is restricted or prohibited. The establishment of this type of extensive PA on private and public lands frequently leads to conflicts between conservation objectives and the interests of their inhabitants. Sixty-two mangrove UCs fall under this management category.

17. RESEX are only established on public lands and upon demand from the traditional populations that live there. The basic objectives of this management category is to protect the livelihoods and culture of these populations and to ensure the sustainable use of the natural resources found there. While these populations engage in subsistence farming and small animal husbandry, they depend primarily on the extractive use of available natural resources for their subsistence. In addition, they may commercialize products which are extracted in a sustainable manner as defined in the management plan. Use rights to resources in the RESEX are regulated by a contract signed with the relevant state government. Additionally, agreements are made with these communities allowing them to continue their traditional activities and also allowing them a role in the management of the PA through the PA advisory committee. In this way, RESEX are both productive and conservation areas, making them ideal sites to test innovative approaches to the rational and sustainable use and management of their resources. Eighteen mangrove UCs fall under this management category.

IV. DISTRIBUTION OF MANGROVES IN UCs

18. There are 132 UCs housing mangroves in Brazil. In recent years, Brazil has embarked on a process of decentralization of its environmental management. Currently, responsibilities are shared between the three levels of government. With regard to the level of government in charge of managing the mangrove Conservation Units, 33% are administered by the Federal government, 60% by a state government and the remaining 7% by a municipality. In addition, while there are two broad categories of UCs, those designed for strict conservation and those aimed at sustainable use, a full 67% of all mangrove UCs fall within the sustainable use group, with nearly 70% of those categorized as Environmental Protection Areas (APA).

19. An estimated 56% of the area of Brazil's mangrove cover is located within Conservation Units although information on mangrove area is only available for 81 of the country's 132 mangrove UCs. However, within this sample, nearly 80% of the area of Brazil's mangrove UCs fall under Sustainable Use categories, with the remaining 20% in Strict Protection UCs. The largest portion of Conservation Units encompassing mangrove ecosystems are located in the Northeast region (77) UCs, which accounts for approximately 58% of total mangrove cover estimated in this preliminary mapping exercise, followed by the Southeast (42 UCs) which accounts for 32% and, lastly, the Northern Region (13) UCs, which contains 10%.

20. With regard to the level of government in charge of managing the Conservation Units in mangrove areas, a majority of UCs were created and are managed by the state government in the Northeast (69%) and South/Southeast (59%), whereas in the North 64% of UCs are managed at the federal level.

Table 1: UCs per region and level of management

UCs	Region	Number of UC's	
		Strict Protection	Sustainable Use
		Number of UCs	Number of UCs
Municipal UCs	North	0	-
	Northeast	5	1
	Southeast	3	-
	Total	8	1
State UCs	North	0	1
	Northeast	7	45
	Southeast	15	11
	Total	22	57
Federal UCs	North	3	9
	Northeast	5	14
	Southeast	5	8
	Total	13	31
Total UCs	North	3	10
	Northeast	17	60
	Southeast	23	19
	Total	43	89

V. MANGROVE PHYSICAL-ENVIRONMENTAL UNITS

21. In 1994, following studies developed by the World Bank and supported by the World Wildlife Fund (WWF), a workshop⁵⁸ was held which identified and classified 37 mangrove eco-regions in Latin America and the Caribbean. Each eco-region is a large expanse of water or land that houses a distinct complex of biological communities with specific species and dynamics. According to this classification, seven mangrove eco-regions were identified in Brazil.

22. Previous to this workshop, a similar approach⁵⁹ had been used to characterize the mangroves and marshes in Brazil, which substantiated the Environment Ministry's Sub-Project on the "Biodiversity of Brazil's Coastal and Marine Areas." According to this national classification, Brazil's mangroves and marshes could be divided into eight physical-environmental units with each corresponding to a section of the Brazilian coast within which similar environmental and physiographic conditions could be found, characterized by relief forms and specific environmental processes. Thus, each unit: (i) occupies a certain place in the relief context that is typical of each energy system; (ii) develops systems with similar products and features (development and productivity levels); (iii) presents similar vulnerabilities and responses to disturbances; and (iv) is equally sensitive to certain types of protection activities. This classification offers a discrete regional vision with great potential for identifying conservation and management priorities and strategic.

⁵⁸ WWF Ecoregional Workshop. 1994.

⁵⁹ Schaeffer-Novelli, Y. & Cintrón-Molero, G., 1990.

23. While the eco-region⁶⁰ classification is widely accepted, the Project has focused on the physical-environmental units since it is specific to Brazil, bases its classification in part on common threats and responses of the ecosystem, and since the two classifications match quite closely although one characterizes mangroves on a regional scale and the other zeroes in at the national level. However, with regard to mangroves, there are only seven units with which to work since marshes are the primary ecosystem found in the eighth. This is due to low winter temperatures which inhibit the growth of mangrove species.

24. Brazil's mangrove UCs are distributed among the seven physical-environmental units as outlined in Table 2 below. Table 3 immediately following it presents the geographic extension of each unit. Table 4 provides a list of species associated with Brazil's mangroves.

Table 2. Distribution by Physical-Environmental Units

Physical-Environmental Unit	Number of UCs per unit	% of Sustainable Use UCs	% of Strict Conservation UCs
I	3	0%	100%
II	2	100%	0%
III	19	84%	16%
IV	12	69%	31%
V	54	80%	20%
VI	6	50%	50%
VII	36	44%	39%

Table 3. Physical-environmental units

GEOGRAPHICAL REGIONS	MANGROVE PHYSICAL-ENVIRONMENTAL UNITS (GEOGRAPHIC EXTENSION)
North	UNIT I: Mouth of Rio Oiapoque – Mouth of Rio Araguari (AP)
	UNIT II: Mouth of Rio Araguari (AP) – Colares (PA)
	UNIT III: Colares (PA) – Alcântara (MA) Alcântara – Ponta do Tubarão (MA) Ponta do Tubarão – Parnaíba Delta (MA/PI)
Northeast	UNIT IV: Parnaíba Delta (MA/PI) – Acaraú (CE) Acaraú – Fortaleza (CE) Fortaleza – Jaguaribe (CE) Jaguaribe (CE) – São Bento do Norte (RN) São Bento do Norte – Cabo Calcanhar (RN) Cabo Calcanhar – Rio Guajú (RN/PB)
	UNIT V: Rio Guajú (RN/PB) – Ponta de Lucena (PB) Ponta de Lucena – Rio Goiana (PB/PE) Rio Goiana (PB/PE) – Cabo de Santo Agostinho (PE) Cabo de Santo Agostinho (PE) – Rio Coruripe (AL) Rio Coruripe (AL) – Rio Branco/Cidade do Conde (BA) Rio Branco/Cidade do Conde – north boundary of Lauro de Freitas (BA) North boundary of Lauro de Freitas – Jaguaribe (BA)

⁶⁰ Olson, D.M.; Dinerstein, E.; Cintrón, G. & Iolster, P. (eds.), 1996.

	Jaguaribe – Itacaré/Rio das Contas (BA) Itacaré/Rio das Contas – Ilhéus (BA) Ilhéus – Santa Cruz de Cabralia (BA) Santa Cruz de Cabralia – Prado (BA) Prado (BA) – BA/ES boundary
Southeast	UNIT VI: BA/ES boundary – Rio Doce Delta (ES) Rio Doce Delta – Vitória Bay (ES) Vitória Bay (ES) – Rio Paraíba do Sul Delta (RJ) Rio Paraíba do Sul Delta – Cabo Frio (RJ)
	UNIT VII: Cabo Frio – Ponta de Itaipu (RJ) Ponta de Itaipu – Guaratiba (RJ) Guaratiba – Mangaratiba (RJ) Mangaratiba (RJ) – Praia da Boracéia (SP) Praia da Boracéia – São Vicente (SP) São Vicente – Juréia (SP) Juréia (SP) – Pontal do Sul (PR) Pontal do Sul – Guaratuba (PR) Guaratuba (PR) – Barra do Sul (SC)

Table 4: Key Species Associated with Mangroves in Brazil

A= Strongly Associated or Endemic to Mangroves

B= Estuary Specialist

C= Long-distance Migrant Status

D= Conservation Status⁶¹: CR = Critical; DD = Data Deficient; VU = Vulnerable, EN= Endangered; NT = Near Threatened

E= Distribution in Mangrove Units

Animal Taxa	A	B	C	D	E	Notes
Mollusca						
<i>Anomalocardia brasiliiana</i>	yes	yes		DD in Brazil	all	economic importance
<i>Crassostrea brasiliiana</i>	yes	yes			all	economic importance
<i>Crassostrea gigas</i>	yes	yes			all	economic importance
<i>Lucina sp.</i>	yes	yes			all	
<i>Melampus coffeus</i>	yes	yes		DD in Brazil	all	
<i>Mitylus edulis</i>		yes			all	economic importance
<i>Mytella falcata</i>	yes	yes			all	economic importance
<i>Mytella guyanensis</i>	yes	yes		DD in Brazil	all	economic importance
<i>Neoteredo reynei</i>	yes	yes			all	
<i>Crassostrea rhizophorae</i>	yes	yes		DD in Brazil	all	economic importance
<i>Psiloteredo healdi</i>	yes	yes			all	
<i>Tagelus gibbus</i>	yes	yes			all	
<i>Tagelus plebeius</i>	yes	yes			all	
<i>Teredo sp.</i>	yes	yes			all	
Crustacea						
<i>Aratus pisonii</i>	yes	yes			all	economic importance
<i>Atya scabra</i>				VU in Brazil	IV to VII	relies on estuaries as nurseries
<i>Callinectes sapidus</i>		yes		overexploited in Brazil	all	economic importance
<i>Cardisoma guanhumí</i>	yes	yes		overexploited in	all	economic importance

⁶¹ MMA 2003 – Normative Instruction # 03 of May 28th, 2003; IUCN 2006 – The 2006 IUCN Red List of Threatened Species at <http://www.iucnredlist.org/>; and the Biodiversitas Foundation 2003 - *Lista da Fauna Brasileira Ameaçada de Extinção* at http://www.biodiversitas.org.br/f_ameaca/

Animal Taxa	A	B	C	D	E	Notes
				Brazil, locally threatened		
<i>Chasmagnathus granulatus</i>		yes			V to VII	
<i>Chthamalus rhizophorae</i>	yes	yes			all	
<i>Eurytium limosum</i>	yes	yes			all	
<i>Goniopsis cruentata</i>	yes	yes			all	
<i>Kalliapseudes schubartii</i>	yes	yes			all	
<i>Macrobrachium carcinus</i>		yes		VU in Brazil	V- VII	economic importance
<i>Macrobrachium heterochirus</i>		yes		DD in Brazil	all	economic importance
<i>Merguia rhizophorae</i>	yes	yes			all	
<i>Metasesarma rubripes</i>	yes	yes			all	
<i>Minyocerus angustus</i>		yes		VU in Brazil	III -VII	
<i>Farfantepenaeus brasiliensis</i>		yes		overexploited in Brazil	all	economic importance
<i>Penaeus notialis</i>		yes			all	economic importance
<i>Farfantepenaeus paulensis</i>		yes		overexploited in Brazil	all	economic importance
<i>Litopenaeus schmitti</i>		yes		overexploited in Brazil	all	economic importance
<i>Sesarma augustipes</i>	yes	yes			all	
<i>Sesarma crassipes</i>	yes	yes			IV -VI	
<i>Sesarma rectum</i>	yes	yes			all	
<i>Uca cordatus</i>	yes	yes			all	
<i>Uca burguesi</i>	yes	yes			III - VII	
<i>Uca cumulanta</i>	yes	yes			all	
<i>Uca leptodactyla</i>	yes	yes			all	
<i>Uca maracoani</i>	yes	yes			all	
<i>Uca mordax</i>	yes	yes			all	
<i>Uca olympioi</i>	yes	yes			all	
<i>Uca victoriae</i>	yes	yes			VI	restricted to Espirito Santo
<i>Uca rapax</i>	yes	yes			all	
<i>Uca thayeri</i>	yes	yes			IV to VII	
<i>Uca uruguayensis</i>		yes			VII	
<i>Uca vocator</i>	yes	yes			all	
<i>Ucides cordatus</i>	yes	yes		overexploited in Brazil, locally threatened	all	economic importance
<i>Xiphopenaeus kroyeri</i>		yes		overexploited in Brazil	all	economic importance
Pisces						
<i>Anableps microlepis</i>	yes				I to III	
<i>Brachyplatystoma vaillanti</i>		yes	migrates between the Amazonas estuary and the upper catchment	overexploited in Brazil	I to III	a long-distance migrant of great economic importance
<i>Epinephelus itajara</i>				IUCN - CR, overexploited in Brazil	all	the young rely on estuaries and mangroves
<i>Ginglymostoma cirrhatum</i>				IUCN - DD, VU in Brazil	all	commonest in northeastern Brazil, associated to reefs
<i>Guavina guavina</i>	yes	yes			all	
<i>Isogomphodon oxyrinchus</i>		yes		IUCN - CR, EN in Brazil	I to III	
<i>Lupinoblennius paivai</i>	yes	yes			VII	
<i>Lutjanus analis</i>				IUCN - VU, VU in Brazil	IV to VII	
<i>Macrodon ancylodon</i>		yes		overexploited in	I to III	economic importance

Animal Taxa	A	B	C	D	E	Notes
				Brazil		
<i>Mugil liza</i>		yes		overexploited in Brazil	all	economic importance
<i>Mugil platanus</i>		yes		overexploited in Brazil	V to VII	economic importance
<i>Negaprion brevirostris</i>				VU in Brazil	mainly I to V	
<i>Ocyurus chrysurus</i>				overexploited in Brazil	all	economic importance
<i>Pomatomus saltatrix</i>				overexploited in Brazil	all	economic importance
<i>Pristis pectinata</i>		yes		IUCN - CR, EN in Brazil	formerly in all	has declined steeply, now mostly restricted o Amazonas estuary
<i>Pristis perotteti</i>		yes		IUCN - CR, CR in Brazil	formerly in all	has declined steeply, now mostly restricted o Amazonas estuary
<i>Rivulus santensis</i>					VII	restricted to mangroves and wetlands in nearby restinga, declining due to habitat destruction
<i>Rivulus bahiensis</i>					V	restricted to wetlands north of the Recôncavo. Probably threatened by habitat destruction
<i>Rhinobatus horkellii</i>				overexploited in Brazil	V to VII	uses shallow waters for pupping, where intensively fished
<i>Sardinella brasiliensis</i>				overexploited in Brazil	all	species of economic importance
<i>Umbrina canosai</i>		yes		overexploited in Brazil	V to VII	species of economic importance
Reptilia						
<i>Caretta caretta</i>			long-distance migrant across Atlantic	IUCN - EN, VU in Brazil	all	nests near unit IV and V
<i>Chelonia mydas</i>			long-distance migrant across Atlantic	IUCN - EN VU in Brazil	all	
<i>Dermochelys coriacea</i>			long-distance migrant across Atlantic	IUCN - CR CR in Brazil	all	nests near unit V
<i>Eretmochelys imbricata</i>			long-distance migrant across Atlantic	IUCN - EN, EN in Brazil	all	
<i>Lepidochelys olivacea</i>			long-distance migrant across Atlantic	IUCN - EN VU in Brazil	all	nests near unit IV and V
<i>Caiman latirostris</i>				locally threatened in Brazil (VII)	V to VII	largest populations associated to coastal areas
Aves						
<i>Actitis macularia macularia</i>		yes	Nearctic Migrant		all	
<i>Amazona brasiliensis</i>				IUCN - VU; Brazil - VU	VII	restricted to mangroves and nearby coastal lowland forests
<i>Anas bahamensis</i>		yes		locally threatened in Brazil (VII)	all	
<i>Aramides cajanea avicenniae</i>	yes	yes			VII	
<i>Aramides mangle</i>	Near endemic	yes			all	a few records of dispersing birds inland, otherwise restricted to mangroves
<i>Arenaria interpres</i>		yes	Nearctic Migrant		all	

Animal Taxa	A	B	C	D	E	Notes
<i>Buteogallus aequinoctialis</i>	yes	yes		locally threatened in Brazil (VII)	all	
<i>Calidris alba</i>		yes	Nearctic Migrant		all	
<i>Calidris pusilla</i>		yes	Nearctic Migrant		all	
<i>Calidris minutilla</i>		yes	Nearctic Migrant		all	
<i>Calidris fuscicollis</i>		yes	Nearctic Migrant		all	
<i>Calidris canutus</i>		yes	Nearctic Migrant		all	North American populations are in decline
<i>Calidris bairdii</i>		yes	Nearctic Migrant		all	
<i>Calidris melanotos</i>		yes	Nearctic Migrant		all	
<i>Calidris himantopus</i>		yes	Nearctic Migrant		all	
<i>Carpornis melanocephalus</i>				IUCN VU, VU in Brazil	VII	uses lowland forests by mangroves
<i>Charadrius collaris</i>			Intertropical Migrant		all	
<i>Charadrius semipalmatus</i>		yes	Nearctic Migrant		all	
<i>Charadrius wilsonia</i> subsp.	yes	yes			III to V	resident Brazilian population may be specifically distinctive
<i>Charadrius melodus</i>		yes	Nearctic Migrant	IUCN - NT	V	North American populations are threatened
<i>Conirostrum bicolor bicolor</i>	yes	yes			all	nominate form may be specifically distinctive from one in Amazonian varzea
<i>Eudocimus ruber</i>		yes		locally threatened in Brazil (VII)	I to IV, VII	in Brazil restricted to mangroves & associated freshwater wetlands
<i>Gelochelidon nilotica</i>		yes		Data Deficient in Brazil	I to IV	in Brazil largely restricted to mangroves and estuaries
<i>Limnodromus griseus</i>		yes	Nearctic Migrant		I to IV	
<i>Limosa haemastica</i>		yes	Nearctic Migrant		all	
<i>Limosa fedoa</i>		yes	Palaearctic Migrant		II to III	
<i>Netta erythrophthalma</i>				In Brazil SE States locally threatened	all	
<i>Numenius phaeopus</i>		yes	Nearctic Migrant		all	
<i>Nyctanassa violacea cayennensis</i>	Near endemic	yes			all	restricted as a breeding species to mangroves and saltmarshes
<i>Parabuteo unicinctus</i>				Sao Paulo State locally threatened	VII	
<i>Pandion haliaetus</i>		yes	Nearctic Migrant		all	
<i>Phoenicopterus ruber</i>				Data Deficient in Brazil	I to II	has experienced major range contraction in last 200 years, now extinct south of Amazon estuary
<i>Phylloscartes kronei</i>				IUCN - VU, VU in Brazil	VII	restinga forest specialist
<i>Pluvialis dominica</i>		yes	Nearctic Migrant		all	
<i>Pluvialis squatarola</i>		yes	Nearctic Migrant		all	
<i>Rallus longirostris crassirostris</i>	yes	yes			all	may be specifically distinctive from other taxa in the group
<i>Sterna hirundinacea</i>		yes		In Brazil SE States locally threatened	all	
<i>Sterna dougallii</i>		yes	Nearctic Migrant	Data Deficient	III to V	North American populations are threatened
<i>Thalasseus sandvicensis eurygnathus</i>		yes		In SE States is locally threatened	all	both locally breeding and northern hemisphere populations occur in Brazil

VI. SELECTION CRITERIA FOR PROJECT INTERVENTIONS

25. The Project UCs and clusters were selected based on a set of criteria related to biological diversity, national and global biological significance of the site, representativity and range of each site's threats and biological resources, possibility and value for replication, level of human development, base level of information existing on the site, and likelihood of a viable intervention within the Project timeframe and budget.

26. Project UCs and clusters have been selected as a national priority for GEF support both for the immediate biodiversity benefits expected from the Project in these important areas and by applying a longer-term vision of incremental and replicable results that Brazil hopes to be able to extend to mangroves throughout its PA system and, eventually, to inform its broader multi-ecosystem PA approach. While many share similar threats, the Project has elected to focus on a different set of threats in each pilot to address the maximum number of threats and create multiple lessons for replication.

27. While all of the intervention sites selected have been classified as having high biological importance, Project intervention sites are also a mix of well-conserved areas of great global importance, such as the *Reentrâncias Maranhenses*, extensive areas of intact mangrove cover, such as those in the North of the country, and home to endangered species, as is the case of Paraíba with the manatee. Moreover, given the great biodiversity value of virtually all of the country's mangroves, it was also necessary to consider the threat levels facing each target area in order to narrow it down to a manageable number of Project sites. Thus, well-conserved areas confronted by significant and growing threats were included so as to alleviate these threats, preserve these areas, and test models that can later be replicated in other PAs facing similar threats.

28. The selection of Project intervention sites was carried out in three phases. First, priority regions in line with those established by the 1997 Probio/MMA study "Assessment and Priority Actions for the Conservation of Biodiversity in Coastal and Marine Zones" were selected. Second, groups or "clusters" of mangrove UCs within these areas were pre-selected as representative samples of Brazil's mangrove biodiversity in line with the physical-environmental units described above⁶². Finally, individual mangrove UCs within those groups were selected for direct Project interventions. Selection criteria focused on the following:

- Ecosystem and Biodiversity: Considers the spatial distribution of mangroves on the Brazilian coast and ecosystem characteristics included in the identification of priority areas, such as biological wealth and diversity. Also considers global importance of the areas, such as designation as Ramsar sites, and the degree of protection afforded to the mangroves as a result of protected areas within which they lie and the representativity and importance of mangroves in each area.
- Importance of Resources and Extent of Threat: Considers the level of economic and social importance of the area's natural resources, degree of pressure on those resources and the vulnerability of biodiversity as measured by the presence of threatened and overexploited species. Is an aggregate of both natural and anthropogenic pressures on resources.
- Information and Scientific Knowledge: Considers the level of information and scientific knowledge about the mangroves in each area accumulated by established research groups, as well as the scientific structure of this knowledge.

⁶² The Project will not work in unit 1 (Amapá) given the existence of another GEF project there focusing on improved management of coastal PAs, the Protected Areas of the Amazon (ARPA).

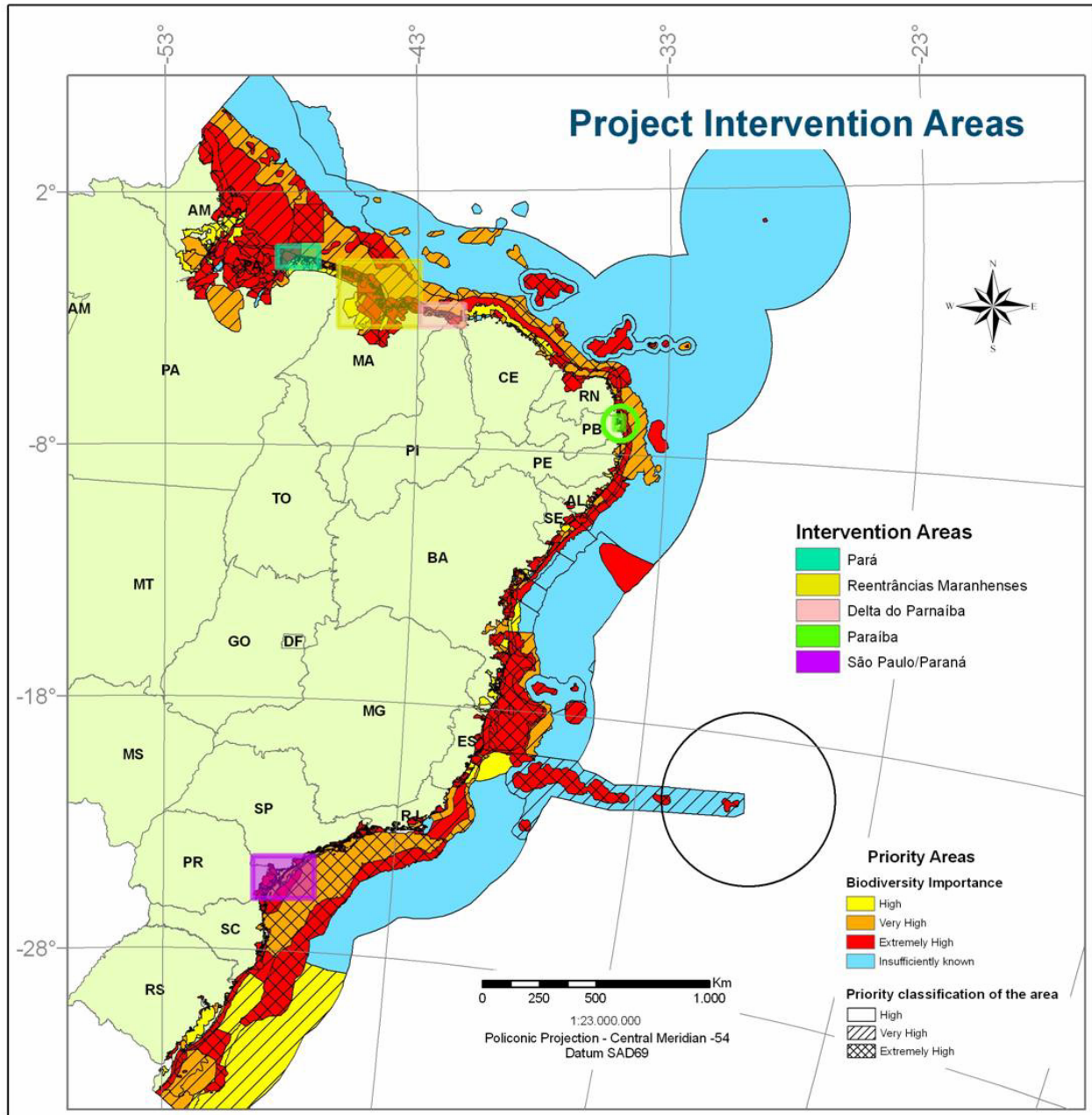
- Human Development: Ranks areas by taking into account the extent of human development in their municipalities as measured by the United Nations Human Development Index (HDI) and field surveys.
- Vegetation Cover: To ensure global and national relevance of Project actions, groups of UCs selected needed to have at least 6,000 ha of non-degraded mangrove areas that harbor important and representative portions of biodiversity deemed important nationally and internationally.
- Proximity and Category of Conservation Units: UCs in clusters selected should have overlapping boundaries or be located nearby. In addition, each cluster was required to have at least two distinct UC categories. Moreover, at least one UC was required to be under federal jurisdiction in order to promote the participation of the federal government in the institutional arrangements for implementing the pilot interventions.
- Aptness for Project Pilot: Relates to the likelihood that sustainable, replicable Project interventions could be successfully implemented in the areas in the Project timeframe and budget. Thus, the local potential to harness initiatives was assessed as were existing innovative experiences that might show efficient tools for protection that can be replicated. In this regard, indicators such as the level of institutional presence and capacities and the existence of initiatives stemming from federal, state, and municipal policies, as well as an interest expressed officially by local governments in establishing partnerships, were considered.

CHARACTERIZATION OF THE SELECTED CLUSTERS

29. In line with the sets of indicators outlined above, the following clusters of UCs were selected for the Project:

States	Geographic Region	Unit
Pará	North	II
Maranhão	North	III
Maranhão/Piauí/Ceára	North/Northeast	IV
Paraíba	Northeast	V
Bahia	Northeast	V/VI
São Paulo/Paraná	Southeast	VII

Map 1: Project Intervention Areas



30. The Pará and Maranhão clusters are characterized by extensive mangrove areas, many of which are highly preserved, which comprise approximately 80% to 90% of Brazilian mangroves, and by the potential threat of occupation due to the expansion of shrimp farming activities there. They were considered extremely important priority areas for the conservation of this ecosystem.

31. The Pará target area is totally encompassed by sustainable use UCs, including mainly Extractive Marine Reserves (RESEX) and the state APA of Ilha do Marajó. The region includes a vast stretch of generally well preserved and continuous mangroves, with extensive *tannes*, thus comprising important sites for migratory birds and providing high fishing yields for local communities.

32. The Maranhão target area, as well as the crossborder cluster in Maranhão, Piauí and Ceará encompass the largest expanses of mangroves in Brazil, with over 500,000 hectares, as well as two Ramsar sites and one site belonging to the Western Hemisphere Shorebird Reserve Network, the only such site in coastal regions where mangroves occur. These areas also contain many coastal Conservation Units, especially Environmental Protection Areas (APA), which include important stretches of mangroves.

33. From the socio-economic perspective, the target UCs in Pará, Maranhão and Piauí have the lowest average HDI, followed by Paraíba and Bahia, and in these regions artisanal marine fishing methods provide an important source of income.

34. The Bahia area has numerous sparse mangrove areas and a high degree of artisanal marine fishing, notwithstanding the existence of sizeable human pressures stemming from real estate development, tourism, and shrimp farming. It also has a great deal of available information and accumulated scientific knowledge.

35. The São Paulo/Paraná target area stands out because of the relatively good state of preservation of the mangrove ecosystem, although it is also considered vulnerable because of significant human pressures stemming from real estate speculation and poorly planned tourism. On the other hand, the region has the greatest amount of available information and accumulated scientific knowledge, in addition to a significant number of Conservation Units aimed at conserving mangroves. This area is also the only formally recognized SNUC mosaic in the coastal and marine zone and is comprised of a total of 38 UCs including federal, state, municipal, and private conservation units and reserves, 19 of which include mangroves. The mosaic concept refers to multiple protected areas either in close proximity to one another or with overlapping boundaries whose management, under the SNUC denominated “mosaic approach” is to be undertaken in an integrated and participatory manner to yield improved management and to take advantage of cost-efficiencies and limited human and financial resources.

36. The characteristics and threats of each of these selected intervention areas and its relation to the mangrove physical-environmental units are presented in the following table.

Table 5: Characteristics of Project Clusters, Main Threats and Project Response

Project Intervention Site	Corresponding Physical-Environmental Unit	Percentage of Brazilian mangroves in each cluster	Overall Description	Biodiversity Features	Main Threats	Project Intervention
Pará (N)	II	8.8%	Well-developed mangrove area due to large inflow of fresh water from rains and from the Amazon Basin. May extend inland for over 40km from the coast. Located in a transition zone between holms, fields, wooded savannahs, and the Amazon Forest.	The flora is composed by three species of <i>Rhizophora</i> , (<i>Rhizophora mangle</i> , <i>Rhizophora racemosa</i> e <i>Rhizophora harisonii</i>)_two species of <i>Avicennia</i> (<i>Avicennia germinans</i> e <i>Avicennia schaueriana</i>) as well as <i>Laguncularia racemosa</i> and <i>Conocarpus erecta</i> . Rare and threatened fauna include: birds: Guará and Jaçanã; mammals: manatee.	<ul style="list-style-type: none"> - Overfishing of crabs; predatory fishing - Extraction and exports of wood, minerals, products made from palm trees, chestnut trees and oil; - Animal grazing, mainly buffalo - Gold mines (mercury contamination). - Subsistence agriculture - Tourism - Industrial development 	<i>Output 2.1:</i> Develop ecosystem approaches to the sustainable use of mangrove fisheries resources to ensure its sustainability and the integrity of the ecosystem.
Maranhão (N)	III	26.4%	Contains the most complex mangroves in Brazil and the largest biomass mangrove forest in the world.	Flora is composed mainly by “mangue vermelho” (<i>Rhizophora mangle</i>), siriuba (<i>Avicennia nitida</i>); “mangue preto” (<i>Avicennia schaueriana</i>), “mangue branco” (<i>Laguncularia racemosat</i>) and <i>Stigmaphylon heringeriana</i> . Rare and threatened fauna include: birds: Guará and Jaçanã; mammals: manatee; and three sea turtles	<ul style="list-style-type: none"> - Subsistence agriculture and buffalo grazing (deforestation); - Tourism; - Wood extraction; - Mineral exploitation; - Commercial, industrial, and road development; - Land speculation of lands in UC; - Urban expansion 	<i>Output 3.1:</i> Develop approaches to land planning and permitted uses in large sustainable use UCs coordinated with State and Municipal planning
Maranhão, Piaui and Ceará (N/NE)	IV	3.8%	Mangroves less developed given the little fresh water associated with prolonged droughts. Mangroves in this unit are predominantly found in estuarine regions.	Flora is composed mainly by “mangue vermelho” (<i>Rhizophora mangle</i>), siriuba (<i>Avicennia nitida</i>); “mangue preto” (<i>Avicennia schaueriana</i>), “mangue branco” (<i>Laguncularia racemosat</i>) and <i>Stigmaphylon heringeriana</i> . Rare and threatened fauna include: birds: Guará and Jaçanã;	<ul style="list-style-type: none"> - Overfishing & predatory fishing of crabs and other species of fishes - Shrimp farming - Industrial development - Subsistence agriculture (mangrove deforestation); - Buffalo grazing - Rice cultivation 	<i>Output 2.2:</i> Develop integrated resource management plans for uçá crab collectors to ensure sufficient and stable levels of this species important in mangrove functionality

Project Intervention Site	Corresponding Physical-Environmental Unit	Percentage of Brazilian mangroves in each cluster	Overall Description	Biodiversity Features	Main Threats	Project Intervention
				mammals: manatee; and three sea turtles		
Paraíba (NE)	V	0.6%	Large estuarine area of well-preserved mangrove. Given coastal dynamics, mangroves develop in sheltered areas associated with coastal estuaries and lagoons.	The flora is composed of <i>Rhizophora mangle</i> , <i>Avicennia germinans</i> , <i>A. schaueriana</i> , <i>Laguncularia racemosa</i> and <i>Conocarpus erectus</i> . The largest <i>Rhizophora</i> found in this area reach 20m in height and 60cm in diameter Rare and threatened fauna include the marine manatee (<i>Trichechus manatus</i>)	<ul style="list-style-type: none"> - Overexploitation of resources; - Rice cultivation; - Commercial shrimp farming; - Sugar cane cultivation - Tourism - Water pollution 	<i>Output 3.2:</i> Integrate mangrove PA management with water resource management so as to increase biodiversity protection and conserve the long-term functionality of these wetlands and the ecosystem services they provide
Bahia (NE)	V/VI	2.4%	Various remnants of discontinued mangroves, associated to estuaries and outlets of rivers interspersed between sand dunes. High diversity of species associated to algae banks and coral reefs.	Mangrove: formed by: <i>Avicennia germinans</i> , <i>Laguncularia racemosa</i> e <i>Rhizophora mangle</i> (Rhizophoraceae). And associated species like <i>Acrostichum aureum</i> e <i>Hibiscus pernambucensis</i> . Biodiversity not well known scientifically. Area of refuge and nursery for various species of fish, crab, shrimp, mollusks, birds, and mammals. Five species of sea turtles probably feed in the mangroves. Migratory birds.	<ul style="list-style-type: none"> - Urban expansion; - Industrial and agricultural pollution; - Deforestation; - Predatory fishing - Tourism - Real Estate enterprises - Shrimp farming - Oil exploration 	<i>Output 1.3:</i> Develop criteria for valuation of potential damage to flows of ecological services as a basis for negotiating resource transfers to PAs through existing compensation mechanisms in the SNUC.
São Paulo and Paraná (SE)	VII	8.4%	Significant corridor of mangrove. Associated with important rivers and estuaries with high fisheries productivity.	Mangrove: trees are distributed along estuaries, rarely are taller than 10m and with no predominance of any single species. Include “mangue vermelho” (<i>Rhizophora mangle</i>),	<ul style="list-style-type: none"> - Industrial centers; - Ports; - Deforestation; - Oil exploration; - Untreated sewers; - Deforestation; 	<i>Output 1.3:</i> Test an improved system of ecological value-added tax (ICMS-E), valuation/cost effectiveness analysis and PES to contribute to the long-term financial sustainability of Project UCs.

Project Intervention Site	Corresponding Physical-Environmental Unit	Percentage of Brazilian mangroves in each cluster	Overall Description	Biodiversity Features	Main Threats	Project Intervention
				<p>“mangue branco” (Laguncularia racemosa), or “mangue preto and sítibeira” (Avicennia germinans and Avicennia schaueriana) and “mangue botão” (Conocarpus erecta)</p> <p>Rare and threatened fauna includes: manatee.</p> <p>Includes an Area of Endemic Birds.</p> <p>Several migratory birds use these areas as nesting and resting sites.</p>	<ul style="list-style-type: none"> - Timber extraction; - Road construction; - Chemical pollution; - Shrimp farming; - Mining; - Irrigation - Tourism 	

ANNEX 2: THREAT ANALYSIS

The following table lists pressures on biodiversity in the mangrove protected areas in the Project intervention sites. The relative intensity of these threats is indicated based on consultations in the region during Project preparation. These threats and their drivers are discussed in detail in the text below.

Table 1. Threats on Biodiversity in Project

	<i>Pará</i>	<i>Maranhão</i>	<i>Maranhão, Piauí & Ceará</i>	<i>Paraíba</i>	<i>São Paulo & Paraná</i>	<i>Bahia</i>
Threats	Level	Level	Level	Level	Level	Level
I. Biodiversity loss through transformation of terrestrial habitats in mangrove PAs						
1. Aquaculture	Low	Medium	High	High	medium	High
2. Timber extraction	High	High	High	High	High	High
3. Urban, industrial & tourism development	Low	Medium	Medium	High	High	High
4. Transportation infrastructure	Low	Low	Medium	Medium	Medium	Medium
5. Climate change	Low	Low	Low	High	High	Medium
II. Biodiversity loss through transformation of aquatic habitats in mangrove PAs through:						
<i>(a) decreased water quality due to pollution</i>						
1. Agriculture	Low	Low	High	High	High	High
2. Aquaculture	Low	Low	High	High	High	High
3. Industrial & urban pollution	Low	Medium	Medium	High	High	High
4. Residential & tourism infrastructure	Low	Low	High	High	High	High
<i>(b) changes in hydrodynamic circulation</i>						
1. Climate change	Low	Low	Medium	High	High	High
2. Irrigation	NA	NA	Low	High	High	High
3. Coastal construction	Medium	Medium	Medium	Medium	High	High
III. Biodiversity loss through species depletion in mangrove PAs						
1. Unsustainable capture levels of fisheries resources	Medium	Medium	Medium	High	High	High
2. Unsustainable capture methods	Medium	Medium	High	High	High	High
3. Poaching	High	High	High	High	High	High

Main Threats to Mangrove Biodiversity

1. A 1995 conservation assessment⁶³ of mangrove ecosystems carried out by the World Bank and the World Wildlife Fund categorizes many of Brazil's mangrove ecosystems, especially those found in the Northeast and the Southeast, as vulnerable or endangered. Despite the essential role mangroves play as key ecosystems which harbor biodiversity of great importance, Brazil's mangroves are exposed to a serious and growing threat - the significant loss of biodiversity through habitat transformation and species depletion. Since the beginning of the twentieth century, an estimated 25% of Brazil's mangroves have been destroyed. Additionally, some of the most important species, both for the ecosystem services they provide as well as their role in the local economy, are overexploited. This includes the *uça* crab which plays an important role in sole aeration and in the cycling of nutrients and which is the primary economic resource of many mangrove communities. Moreover, the nutrient deficit in marine ecosystems caused by

⁶³ Dinerstein, E. et al (1995).

the degradation of mangroves results in annual losses worldwide of approximately 4.7 million tons of fish and 1.5 million tons of shrimp for the fishing industry⁶⁴.

2. Ultimately, this biodiversity loss can be attributed primarily to basing development decisions on immediate interests which seek the greatest and most rapid financial and political returns with little consideration of the economic losses to be incurred in the short-, medium- and long-term from the overexploitation of environmental resources.⁶⁵ In addition, in the absence of integrated regional planning which includes long-term objectives and targets and considers the economic, social and environmental costs and risks of various development alternatives, it is unlikely that consensual and balanced decisions which consider the needs of development, environmental conservation and local communities will be made.

3. Biodiversity loss through habitat transformation. Given the transition nature of mangroves, habitat transformation is experienced on two levels: in the loss and fragmentation of vegetation cover and in the decreased quality of aquatic habitats.

4. *The transformation of terrestrial habitat* is a result of a number of unsustainable economic practices carried out in mangrove areas which lead to the deforestation and fragmentation of mangrove cover and increased instability in the economic well-being of local communities that depend on mangrove resources for their livelihoods. They include:

- *Unsustainable aquaculture practices* – Shrimp farming, which has been pursued mainly in the states of Rio Grande do Norte and Ceará in the last decades, has transformed significant areas of mangroves. It is now expanding to the states of Piauí and Maranhão, threatening some of the best conserved mangroves in the country. This activity, which carries minimal start-up costs and significant returns, leads to the loss of mangrove vegetation through the construction of tanks for shrimp which bisect natural water bodies and change the water flow on which many flora species depend for survival and the dispersion of their seeds. The construction of dykes for shrimp farms also modifies the flow of water in tannes and may cause parts of these areas to silt up, thereby preventing their expansion and altering the biodiversity of the mangrove ecosystem. It is a serious threat which has expanded rapidly since the late eighties. Between 1997 and 2003 alone, shrimp production increased 97% along with an average yearly increase of 20% in the total area of shrimp farms, particularly in tannes.
- *Timber extraction*– Despite the illegality of cutting down mangrove trees, mangrove timber, especially the species *Rizophora mangle* and *Laguncularia*, is used to build bridges, fences, boats and houses, oftentimes because it is the only source of wood available. Additionally, it provides the only source of energy for a large part of the rural population in the North and Northeast. Various other timber products are used for their astringent and antibiotic properties, and for sweeteners and traditional remedies. Regardless of existing prohibitive environmental legislation, the cutting and removal of mangrove wood products continues throughout Brazil's mangroves with no consideration for sustainable extraction levels or techniques.
- *Urban, industrial and tourism development* – Ports, real estate and industrial activities have caused degradation and loss of mangroves mainly in the South. However, urban growth, in particular, is spread all along the coast and endangers mangroves due to irregular occupation and unsustainable land use practices which lead to erosion, eutrophication and, ultimately, deforestation. The

⁶⁴ Juma, C., 1997.

⁶⁵ Maciel, N.C., 1991.

construction of summer homes and tourist resorts has led to increased deforestation throughout Brazil, particularly in the Northeast.

- *Transportation infrastructure* – Road construction serving tourism and urban development constitutes one of the major sources of human-caused degradation of Brazil’s mangroves.
- *Climate change* –Rising sea, increase storms surges and beach erosion caused by climate change can result in the landward retreat of mangroves as species migrate inland in the search for their ideal environmental conditions. Where physical obstacles are built immediately inland from mangroves this impedes retreat and wide scale habitat loss occurs. Whilst Brazil has been relatively free in the past, 2006 marked the first tropical depression to hit Brazil’s coast. The frequencies of such extreme events are predicted to increase. Climate change induced alterations in precipitation rates and patterns, coupled with changes in run-off rates will also affect the amount and quality of water inflows from upstream with concomitant affect on biodiversity of mangroves, Thus although this is not a present threat to Brazil’s mangroves, future climate variability predictions should be incorporate into mangrove management planning.

5. These specific threats can be attributed to a number of underlying causes, including pressure from economic development and urban growth along the coast, which is home to world-famous beaches and 40% of the Brazilian population; policies that do not sufficiently consider coastal conservation when designing development plans and infrastructure projects; the steady demand for shrimp for domestic consumption, and especially export; and limited economic alternatives for local mangrove communities.

6. *Biodiversity loss through the transformation of aquatic habitats* results from two principal dynamics: (i) decreased water quality in mangrove waterways and coastal areas due to pollution and (ii) changes in hydrodynamic circulation due to irrigation and construction of infrastructure.

7. The main drivers of pollution, which transforms aquatic habitats by chemically modifying water temperature salinity and quality, consequently creating an environment inhospitable for mangrove species and causing species depletion, include:

- *Agricultural production* – With its intensive use of agrottoxins, chemical fertilizers, irrigation and mechanized production, agricultural production is a growing threat to mangrove ecosystems in Brazil’s Northeast given the expansion of agro-industry. In addition to consuming significant amounts of water, agro-industry pollutes water sources with contaminated water used for irrigation, cooling plants, and the cleaning of animal carcasses. The primary agricultural products grown along the coast in the microcatchments that include mangrove areas are rice, subsistence crops and sugar cane. The farming and processing of sugar cane in the Northeast has proven to be an especially potent source of agricultural pollution as a result of its high levels of nitrates and fertilizers as well as the improper disposal of liquid waste produced from processing sugar cane.
- *Aquaculture* – This pollutes water sources with effluents resulting from its own production. Shrimp farming, with its ever-higher inputs of fertilizers, antibiotics and fungicides, is the major culprit. As mentioned above, this is well-established in the states of Rio Grande do Norte and Ceará and is now spreading to the states of PiauÍ and Maranhão.
- *Industrial and urban pollution* – Inadequately treated domestic and industrial pollutants, including bacteriological and viral pollutants, sewage, heavy metals and other toxic products such as ammonia, nitrites and nitrates, seep or are dumped into waterways.

- *Residential and tourism infrastructure* – The rapid expansion of tourist resorts and settlements in previously remote coastal areas has led to the landfill of mangrove areas and pollution due to inappropriate sewage management.

8. The discharge or seeping of agricultural, domestic and industrial pollutants into mangrove waterways is due, in part, to financial incentives that promote agricultural production through market-based production and value-added products with little consideration of the negative environmental externalities. Again, it is short-term gain that is valued over long-term sustainability.

9. Another cause of the pollution of coastal waterways is poorly planned urban development. Real or perceived job opportunities in urban areas along the coast continue to bring about rural to urban migration but the investment capacity of agencies responsible for providing public services has not seen commensurate growth. As a result, public agencies do not have the necessary resources to ensure that urban growth is undertaken in an environmentally-conscious manner. The resulting pollution can be traced to limited water resources and basic sanitation in urban and peri-urban areas as well as the building of industrial areas and poor neighborhoods on swampy areas where mangroves once stood, making them vulnerable to flooding during rainy days and high tide, a process which then carries waste and pollutants into the ocean and groundwater sources.

10. The principal drivers and impacts of modified hydrodynamic circulation include:

- *Irrigation* – In addition to polluting coastal waterways with high salinity water, pesticides and fertilizers, irrigation causes changes in hydrology due to the diversion of streams and the draining of lagoons for rice cultivation. The most common results are water scarcity and changes in the courses of rivers and streams and in ocean currents which can lead to increased sedimentation, erosion and silting up. Moreover, irrigation diverts water from rivers and lakes that would otherwise be used by mangrove tree and animal species as habitats, nesting grounds and sources of fresh water.
- *Construction along the coast* – Primarily undertaken for tourist and urban development as outlined above, this includes building hotels, resorts, summer homes and industrial plants as well the unplanned appearance of poorer neighborhoods in less desirable, swampy areas. Coastal construction includes the creation of dunes for property protection, the dredging of waterways for shipping and commerce, and the introduction of such structures as jetties and sea walls. It requires dredging, soil excavation, soil replacement or backfilling, surface sealing, water drainage and the like, all of which can result in modifications in wave and flow dynamics and in sediment transport which can cause erosion of the adjacent coast line. These alterations, in turn, can have far-reaching effects on coastal ecosystems, hydrodynamic and tidal regimes, and sediment transport rates⁶⁶. Again, this can be attributed to rural-urban migration, population pressure in coastal areas, the steady flow of international and domestic tourists drawn to Brazil's beaches, and policies that do not adequately consider coastal conservation when designing development plans and infrastructure projects.

11. Biodiversity loss through species depletion. In addition to the transformation of aquatic habitats, biodiversity loss experienced as species depletion is also a direct result of unsustainable pressure on fisheries resources in estuarine and associated mangrove ecosystems. The overexploitation of species results primarily from the inadequately planned use of these resources, both in the level of pressure put on them as well as the methods and timing of their capture and processing. The latter may best be illustrated by the estimated 40% to 60% loss in the transport phase of the *uça* crab productive chain and high levels

⁶⁶ www2.nature.nps.gov/geology/coastal/human_impact.cfm

of capture during crucial periods of the *uçá*'s reproductive cycle, which coincide with tourist season. Moreover, in some areas, poaching, often through dynamiting and other illegal practices, is increasing pressure on fisheries resources by exceeding any sort of sustainable level of capture as well as capturing young specimens and species at crucial points in their reproductive cycle. By-catch of juveniles and non-targeted species, too, carries this risk and is a common occurrence in Brazil, where bottom trawling is a widespread fishing practice.

12. Unsustainable pressure on the *uçá* crab is also linked to low market prices for the resource and insufficient coverage and incentives for seasonal closures. While the most common method of ensuring a more rational use of fisheries resources is the establishment of these no-catch periods at crucial points in the species' reproductive cycle, the case of the *uçá* crab has proven difficult to operationalize the traditional closed seasons and the temporary unemployment benefits that accompany them. This is due to the brevity of the closed season for this resource and the undocumented status of most crab collectors who are not officially registered as fishermen associated with a specific fishing colony. Exacerbating this situation are (i) the overlap of the *uçá*'s mating season with the November to May tourist season, a time of high demand for the resource and, consequently, of great earning potential for the communities, as well as (ii) inadequate sustainable economic alternatives that could provide income to fishing communities during the monthly closed season. Thus, there are few immediate incentives for crab collectors to modify their capture during these periods.

a. METT ANALYSIS
(METTs attached separately)

1. A full 132 UCs have mangroves within their boundaries. In the majority of cases these UCs are larger areas protecting a mix of ecosystems associated to one degree or another with mangroves. Thus the mangroves within them are already being addressed from a larger landscape level through the internal zoning process of the UC. Whilst these are not entirely mangroves areas, these UC will be referred to henceforth in this document as mangrove UCs⁶⁷.
2. An assessment of UC management effectiveness was conducted on 26 mangrove UCs during the project preparation using the WB/WWF Management Effectiveness Tracking Tool (METT)⁶⁸. These sample UCs were selected within the different mangrove units as part of the process for defining potential site based interventions (see paragraphs 60-63 in the ProDoc and Annex 1 for selection criteria). One (4%) of the 26 UCs ranked as having excellent management effectiveness, 62% fair, 23% as good and three UCs ranked as poor. Despite these overall positive scores, a closer analysis of each of the six METT elements revealed a number of deficiencies that would seem to contradict this picture. However, bearing in mind that the METT tool weights each question evenly, a score of ‘excellent’ in one category given for the mere existence of boundary demarcation would balance out a ‘poor’ received for complete lack of budget.
3. Nonetheless, some common deficiencies can be determined if individual elements of the METT score are considered and these substantiate other Project assessments of UC strengths and weaknesses. The sample UCs’ strengths were in areas such as legal status and definition of PA boundaries, objectives and existing biodiversity bringing up the final METT score and providing a crucial basis for even modest management effectiveness. Much lower scores were seen in the existence and implementation of management plans and monitoring and evaluation as well as availability of budget, staff and equipment. For example, scarce budgetary resources were a significant obstacle across the board for effective UC management with at least half the UCs in each cluster lacking adequate resources, confirming the overall figures obtained through work at the national level (see paragraphs 43-47 in the ProDoc). Some 66% of the sample UCs had major deficiencies in staff capacity and resources to enforce SNUC legislation and regulations. Additionally, while high marks were received overall for the existence of regular work plans, only 15% of UCs sampled have regular work plans *and* are also able to complete most of the actions in those plans. Even more worrisome is the fact that 77% of the UCs have not completed their management plan although to a large extent this is because many are newly formed particularly the RESEXs.
4. In sum, the METT analysis demonstrates that the agencies responsible for UC implementation are understaffed and have limited capacities for the development of management plans for individual UCs and for the management of ecosystems as complex as mangroves. While budgets are also weak, additional analyses revealed that the funding gap for mangrove UCs was less than that for UCs as a whole. Thus, while, to some extent, these issues are common throughout the SNUC, the following analysis focuses on those issues that are most relevant to mangrove UCs and which the proposed GEF alternative will address.

⁶⁷ Rather than being established around any single ecosystem, each UC generally houses a variety of different ecosystems. However, since mangroves are the focus of this project, any UC with mangroves in its boundaries will be referred to in this document as a “mangrove UCs”.

⁶⁸ Annex 11 provides the complete METT.

Table 1. METT scores for the UCs analyzed during PDF-B

UCs by Cluster	METT Category ⁶⁹						1. METT ⁷⁰ Total
	Context	Planning	Inputs	Processes	Outputs	Outcomes	
PARÁ CLUSTER							
RESEX Arai- Peroba (F)	67	60	27	53	0	56	49
RESEX Caeté-Taperaçu (Bragança)(F)	60	33	33	40	0	56	40
RESEX Chocoaré-Mato Grosso (F)	73	60	40	53	0	67	53
RESEX Gurupi-Piriá (F)	60	60	27	33	0	22	38
RESEX Mãe Grande do Curuçá (F)	47	47	33	43	0	67	42
RESEX Maracanã (F)	67	53	80	47	0	56	54
RESEX São João da Ponta (F)	67	53	27	30	0	44	39
RESEX Soure (F)	60	53	20	43	17	22	40
RESEX Tracuateua (F)	73	47	27	20	0	56	37
Average Sub-total Pará	64	52	35	40	2	49	44
MARANHÃO CLUSTER							
APA Reentrancia Maranhense (S)	40	33	40	20	0	56	31
RESEX de Cururupu (F)	60	47	33	17	0	56	34
Average Sub-total Maranhão	50	40	37	18	0	56	33
MARANHÃO/CEARÁ/PIAUI CLUSTER⁷¹							
APA Delta do Parnaíba (F)	47	47	53	23	0	33	36
RESEX do Delta do Parnaíba (F)	67	33	27	40	33	44	41
Average Sub-total Maranhão/Ceará/Piauí	57	40	40	32	17	39	38
PARAÍBA CLUSTER							
APA Barra do Rio Mamanguape (F)	87	67	60	83	17	67	71
ARIE FOZ do Rio Mamanguape (F)	80	73	47	53	0	67	58
Average Sub-total Paraíba	83	70	53	68	8	67	64

⁶⁹ These categories are aggregates of the following METT questions: **Context:** 1) Legal status; 2) Protected area regulations; 3) Law enforcement; 6) Protected area boundary demarcation; 9) Resource inventory; **Planning:** 4) Protected area objectives; 5) Protected area design; 7) Management plan; 8) Regular work plan; 30) Monitoring and evaluation; **Inputs:** 10) Research; 12) Staff numbers; 14) Staff training; 15) Current budget; 16) Security of budget; **Processes:** 11) Resource management; 13) Personnel management; 17) Management of budget; 18) Equipment; 19) Maintenance of equipment; 20) Education and awareness programme; 21) State and commercial neighbours; 22) Indigenous people; 23) Local communities; 25) Commercial tourism; **Outputs:** 24) Visitor facilities; 26) Fees; and **Outcomes:** 27) Condition assessment; 28) Access assessment; 29) Economic benefit assessment

⁷⁰ Shown as a % of the maximum possible score for each management effectiveness category (100% = 90 pts.), with corresponding ranges: Poor: < 25% (0 – 22.5 points); Fair: 25–50% (23 - 45 pts.); Good: 51–75% (46-67.5 pts.); Excellent: 76–100% (68-90 pts.).

⁷¹ In this cluster, the APA falls in all three states. The RESEX, which falls within the APA, falls only within the state of Maranhão.

SÃO PAULO/PARANÁ CLUSTER⁷²							
EE de Juréia-Itatins (S)	80	67	67	50	17	33	57
APA Cananéia-Iguape e Peruíbe (F)	60	40	47	70	33	22	52
Sub-total State of São Paulo	70	53	57	60	25	28	54
APAE de Guaraqueçaba (S)	60	33	13	10	0	33	24
APA de Guaraqueçaba (F)	53	40	47	27	33	44	39
EE de Guaraqueçaba (F)	40	33	27	13	0	33	24
PARNA do Superagüi (F)	67	47	67	43	0	56	50
PARES da Ilha do Cardoso (S)	93	93	60	67	67	78	76
APAE de Guaratuba (S)	73	47	47	30	0	67	44
FLOES do Palmito (S)	60	33	53	33	33	44	42
Estação Ecológica de Guaraguaçu (S)	67	53	53	30	0	44	43
PARES do Boguaçu (S)	40	20	13	7	0	22	17
Sub-total State of Paraná	61	44	42	29	15	47	40
Sub-total São Paulo/Paraná	63	46	45	35	17	43	43
Average per category by cluster	63	50	42	39	9	51	44

⁷² An additional ten UCs comprise this intervention area. While METT scores for these are not yet available, they will be gathered during the first six months of Project implementation.

b. PROBLEM TREE: THREATS TO MANGROVES IN PROTECTED AREAS:

Impacts, Causes, Barriers to the Protected Areas Approach, Project Response to Barriers, and Baseline Activities

Impacts	Causes	Barriers to the PA Approach	Project Response to Barriers (by Output)	Baseline Activities
<p>1) Threat – The transformation of terrestrial habitat. <i>Main Drivers:</i> Unsustainable aquaculture practices; Timber extraction; Urban, industrial and tourism development; Transportation infrastructure – <i>see description and levels above</i></p>				
<p>Biodiversity loss due to degradation and fragmentation of mangrove complexes and associated flora and fauna</p> <p>Degradation of coastal landscape and deforestation of mangrove areas due to shrimp farming and construction, resulting in loss of provision of services such as production of nutrients, remineralization of organic and inorganic matter and provision of feeding, reproductive, protective and nursery sites.</p> <p>Change in water flow in <i>apicuns</i>, due to dyke construction for shrimp farms, causes siltation, thereby endangering the entire ecosystem.</p> <p>Habitats altered due to modified water circulation systems from shrimp farm tanks and dams.</p>	<p>Shrimp farming ventures often operate without a license or with irregularities in their license process (an estimated 70% of shrimp farming ventures in the Northeast).</p> <p>Policies that do not consider coastal conservation when designing development plans and infrastructure projects.</p> <p>Weak regulation and lack of enforcement of urban and industrial expansion parameters related to zoning and defined in legal acts.</p> <p>Inconsistencies in definitions of the extent of the mangrove ecosystem</p> <p>Mangroves not considered in ecological-economic zoning for urban, tourism, infrastructure development</p> <p>Strong livelihood dependence of local communities on mangrove resources and</p>	<p>Weak Capacity for effective UC Management: OEMA staff not properly trained to undertake EIAs or monitor and enforce compliance with use permits Planning: Mangrove conservation not situated within broader regional planning</p> <p>Regulatory Framework: Norms and standards for the regulation of UC categories do not provide specific guidelines for the conservation and sustainable use of mangroves; Different interpretations by state of the full composition of mangroves and different procedures and criteria for licensing activities in these areas.</p> <p>Institutional Framework: Overlapping and unclear mandates; weak enforcement capacities; poor integration and coordination of multiple stakeholders - local communities, UC authorities and the private sector do not work together for the sustainable use mangrove resources.</p> <p>Financial constraints: Inadequate resources for mangrove UCs; Few</p>	<p>Barrier removal: Improved Capacity Capacity building to UC and environmental authorities (1.2)</p> <p>Barrier removal: Planning Mangrove network designed and superimposed with regional development plans (1.4) National Plan for Mangroves (1.5) Mangrove planning integrated with regional zoning (3.1) Mangrove UC planning integrated with microcatchment planning (3.2)</p> <p>Barrier removal: Regulatory Framework Regulation of UC categories, proposed amendments to existing laws and norms, harmonization of relevant state laws (1.1)</p> <p>Testing of proposed laws and norms in replicable demonstrations (2.1, 2.2, 3.1, 3.2)</p> <p>Development and testing of UC management plans and related integrated management approaches</p>	<p>GERCO E SDS (secret. de desenvolvimento sustentável do MMA) – considerar o mapeamento dos manguezais no zee</p> <p>CNPT na constituição de conselhos (integrando com os NEAs); bem como as experiências da APA Costa dos Corais na constituições dos Condemas</p> <p>PROBIO I & II: mapping of biodiversity conservation priority areas</p> <p>PNAP: PA planning and management nationwide</p> <p>MMA: UC regulations</p> <p>NZCM: integration of coastal and marine policies and programs</p> <p>Federal Plurianual Plan for MMA/IBAMA: protected areas planning, enforcement, corridor development</p>

Impacts	Causes	Barriers to the PA Approach	Project Response to Barriers (by Output)	Baseline Activities
<p>Increased poverty and social exclusion of local communities that depend on mangrove resources for their livelihoods due to (i) shrimp farming-induced displacement and exclusion from traditional fishing territories, and (ii) deforestation and fragmentation of mangrove cover and the concomitant loss of species.</p> <p>Destruction of ecological corridors used by species to move between terrestrial and marine habitats for breeding, feeding and nursery purposes due to mangrove fragmentation from inappropriate siting of infrastructure development such as roads and buildings.</p>	<p>limited economic alternatives.</p> <p>Mangrove timber often the only source of energy or wood with which to build houses for a large part of the rural population in the North and Northeast. Traditional uses of various other timber products culturally entrenched.</p>	<p>experiences with innovative mechanisms tailored to mangrove PAs; Limited economic alternatives for communities</p> <p>Knowledge: Knowledge gap of the exact extension and biological representativity of Brazil's mangroves within UCs, as well as information on the dynamics and functions of mangroves in general, prevent adaptive management, sustainable use and strategic planning of a mangrove conservation strategy within the PA approach.</p>	<p>to inform the regulatory f (1.3, 2.1, 2.2, 3.1, 3.2)</p> <p><u>Barrier removal: Institutional Framework</u></p> <p>Clarification of mandates relevant to mangrove PAs (1.1) and capacity building on related procedures and processes (1.2)</p> <p>Capacity building in enforcement of environmental management instruments (1.2)</p> <p>Community-based enforcement of established fisheries practices and limits (2.1, 2.2)</p> <p>Promote registration of crab collectors and other measures necessary for their access to compliance incentives (2.2)</p> <p>Development of partnerships with the private sector for their involvement in mangrove protection (2.3, 4.3)</p> <p>Strengthen local stakeholders capacity for UC management (2.4, 3.3)</p> <p><u>Barrier removal: Financial Mechanisms</u></p> <p>Development and testing of innovative financing mechanisms tailored to mangrove PAs (1.3)</p> <p>Economic alternatives with local communities (2.2)</p> <p>Development of business plans for</p>	<p>FUNBIO: business planning and financial sustainability in PAs</p> <p>National Forum on PAs: analysis of environmental compensation, water use charges, other environmental services</p> <p>National Fund for Environmental Compensation/States: environmental compensation agencies, adoption of compensation criteria</p> <p>Mangrove valuation studies in São Paulo</p> <p>PROBIO: national biodiversity information system</p>

Impacts	Causes	Barriers to the PA Approach	Project Response to Barriers (by Output)	Baseline Activities
			mangrove products with local communities (2.3) Barrier removal: Knowledge Mapping of Brazil's mangroves (4.1) Valuation studies of mangrove's ecosystem services (1.3) Development of Mangrove M&E program (4.1)	
<p>2) Threat – Biodiversity loss through the transformation of aquatic habitats (decreased water quality and quantity) <i>Main Driver of decreased water quality:</i> - Agricultural production, Aquaculture, Industrial and urban pollution, Residential and tourism infrastructure; <i>Main Drivers of changes in water quantity:</i> Irrigation, Construction</p>				
<p>Biodiversity losses including depletion of local stocks of native fish and shellfish due to poisoning from pollutants and from the poisoning and physical alteration of their habitats, specifically: - Loss of sources of fresh water - Loss of nesting and nursery grounds</p> <p>Increased poverty of local communities which depend on mangrove timber and fisheries resources for their livelihoods due to alteration of flora and fauna assemblages across the mangrove complexes.</p> <p>Sedimentation and silting up of water courses which have</p>	<p>Zoning does not take into account the water needs of mangrove ecosystems.</p> <p>Water resources and coastal management not linked.</p> <p>Economic incentives promote intense agricultural and aquacultural production, but few compensation schemes exist to deal with negative environmental externalities.</p> <p>Many mangrove areas are not zoned nor do they have buffer zones.</p> <p>Poor sewage and sanitation coverage and treatment especially in the North and Northeast and in peri-urban areas and slums due to poor</p>	<p>Weak capacity for effective UC management: agencies are understaffed and have limited technical and budgetary resources to develop and implement effective zoning and licensing or to enforce compliance.</p> <p>Planning: zoning not in line with mangrove conservation needs. Water resources and coastal management are not integrated nor are coastal ecosystems viewed as users of water resources.</p> <p>Regulatory Framework: no standardized guidelines for licensing each type of threat.</p> <p>Institutional Framework: weak enforcement capacity related to permitted activities</p>	<p>Barrier removal: Improved Capacity Promote integrated management of nearby UCs to take advantage of scarce resources (1.3, 2.1, 2.2, 3.1, 3.2) Capacity building for UC managers for development of management plans and the effective use of this and other tools (EIAs, licensing) for UC management and enforcement (1.2, 3.3)</p> <p>Barrier removal: Planning Development of land planning (zoning) guidelines in line with mangrove needs and broader state and regional planning processes (3.1) Capacity building for environmental and water resources authorities on the consideration of</p>	<p>Existing zoning in MA</p> <p>Existing coastal management plans in Project states</p> <p>GERCO</p> <p>Watershed Committee for the Northern Coast of Paraíba</p> <p>DAI capacity building program</p> <p>IBAMA EEC training</p> <p>Federal government's plan on combating predatory fishing</p> <p>Federal Plurianual Plan for MMA/IBAMA: protected areas planning, enforcement,</p>

Impacts	Causes	Barriers to the PA Approach	Project Response to Barriers (by Output)	Baseline Activities
<p>been diverted for dams or irrigation.</p> <p>Sedimentation and eutrophication due to altered coastal hydrodynamics that accelerate coastal erosion and allow sediments and nutrients to be carried in higher rates to the sea.</p>	<p>water resources infrastructure, increased pressure from hotels, and water deficits in some states.</p> <p>Urban and tourism growth not accompanied by adequate investment in public services.</p> <p>Construction in coastal areas due to rural-urban migration and tourists does not consider environmental conservation.</p>	<p>Financial constraints: Compensation mechanisms and PESs not developed and tested in mangrove ecosystems.</p> <p>Knowledge constraints: Insufficient information on the economic value of mangrove goods and services on which to base financing mechanisms</p>	<p>mangrove PA in on-going CZM processes and mangrove functionality requirements in water resources instruments (3.3) and integration of mangrove concerns in the classification of water bodies and awarding of use permits (3.2)</p> <p><u>Barrier removal: Regulatory Framework</u></p> <p>Training in the procedures for licensing processes including guidelines for the development and review of EIA tailored to mangrove characteristics. (1.2)</p> <p><u>Barrier removal: Institutional Framework</u></p> <p>Capacity building in enforcement of environmental management instruments (1.2)</p> <p>Community-based enforcement of established fisheries practices and limits (2.1, 2.2)</p> <p>Promote registration of crab collectors and other measures necessary for their access to compliance incentives (2.2)</p> <p><u>Barrier removal: Financial Mechanisms</u></p> <p>Development and testing of innovative financing mechanisms tailored to mangrove PAs (1.3)</p> <p><u>Barrier removal: Knowledge Generation</u></p> <p>Valuation studies (1.3)</p>	<p>corridor development</p> <p>FUNBIO: business planning and financial sustainability in PAs</p> <p>National Forum on PAs: analysis of environmental compensation, water use charges, other environmental services</p> <p>National Fund for Environmental Compensation/States: environmental compensation agencies, adoption of compensation criteria</p> <p>Mangrove valuation studies in São Paulo</p>

Impacts	Causes	Barriers to the PA Approach	Project Response to Barriers (by Output)	Baseline Activities
<p>3) Threat – Biodiversity loss through species depletion. Main Drivers: Overexploitation – unsustainable pressure on fisheries resources, significant losses in transport and processing, poor implementation of no-catch periods designed to coincide with key phases of reproductive cycle, poaching, by-catch.</p>				
<p>Biodiversity losses and increased risk for extinction of local stocks of native fish and shellfish including native shrimps, the uçá and guaiamum crabs, and fish such as the mullet <i>Mugil platanus</i> and <i>M. lisa</i>.</p> <p>Modification and weakening of ecological structures and functioning.</p> <p>Increased poverty of local communities who depend on mangrove fisheries resources for their livelihoods and for a large part of their protein intake.</p>	<p>Management of fisheries resources poorly planned and not coordinated with resource users.</p> <p>Strong livelihood dependence of local communities on mangrove resources and limited economic alternatives.</p> <p>Uçá crab collectors ineligible for temporary unemployment insurance during closed seasons and thus continue to collect during key phases of the uçá reproductive cycle.</p> <p>Inappropriate capture, handling and transport methods leads to high mortality rates.</p> <p>Untrained fishermen or poor methods, such as using nets, capture young specimens and females.</p> <p>No standardized guidelines for sustainable capture limits or practices.</p>	<p><u>Weak capacity for effective UC management:</u> UC authorities have limited technical capacity to develop and implement effective resource management plans and to enforce compliance.</p> <p><u>Planning:</u> The planning and management of individual mangrove UCs have been pursued in isolation from other neighboring PAs thereby delivering ineffective conservation and sustainable use of resources.</p> <p><u>Institutional Framework:</u> Local resource users not sufficiently integrated in management of mangrove resources; legal norms related to closed season compensation not applicable to Uçá crab collectors.</p> <p><u>Financial constraints:</u> Limited experiences with economic alternatives</p> <p><u>Knowledge:</u> Limited experience with technologies designed for conservation and sustainable use of fisheries resources</p> <p><u>Awareness:</u> Societal perception of mangroves as ecologically and economically unimportant</p>	<p><u>Barrier removal: Capacity Building</u> Development of resource management plan with UC authorities & communities (2.1) and capacity building for UC authorities in UC management & enforcement (1.2) Community enforcement volunteers (2.1, 2.2)</p> <p><u>Barrier removal: Planning</u> Collective ecosystem plan for fisheries resources developed (2.1)</p> <p><u>Barrier removal: Institutional Framework</u> Participatory development of UC & resource management (2.1, 2.2, 3.1, 3.2); strengthening of discussion forum (2.2); capacity building to local communities for mangrove PA management (2.4, 3.3)</p> <p>Possible updates to existing legislation regarding closed seasons & develop new approaches to registering Uçá crab collectors (2.2)</p> <p><u>Barrier removal: Economic Alternatives</u> Development of economic alternatives (2.2) and mangrove products (2.3) for environmentally</p>	<p>DAI capacity building program</p> <p>IBAMA EEC training</p> <p>Federal government’s plan on combating predatory fishing</p> <p>MMA/IBAMA: initial structuring of mosaic approach with PA managers</p> <p>Federal Plurianual Plan for MMA/IBAMA: fisheries planning, aquaculture-related capacity building, enforcement</p> <p>Federal Plurianual Plan for MMA/IBAMA: protected areas planning</p> <p>SEAP & fishing colonies working to register Uçá crab collectors</p> <p>MMA/IBAMA/States: M&E, dissemination of lessons learned in adaptive management in PAs</p> <p>Inter-institutional</p>

Impacts	Causes	Barriers to the PA Approach	Project Response to Barriers (by Output)	Baseline Activities
			<p>sustainable income stability in local communities</p> <p><u>Barrier removal: Knowledge Generation</u></p> <p>Training of Uçá crab collectors in appropriate capture, handling & transport methods (2.2)</p> <p>Studies and community surveys to gather technical information for ecosystem approaches to fisheries resource management and sustainable fisheries practices and limits (2.1)</p> <p><u>Barrier removal: Dissemination</u></p> <p>Dissemination program including nationwide mangrove awareness campaign (4.3)</p>	<p>Environmental Education Commissions: environmental education in schools</p> <p>20 Green Halls in coastal states to promote environmental education</p>

ANNEX 3: STAKEHOLDER INVOLVEMENT PLAN

1. During project preparation, a stakeholder analysis was undertaken in order to identify key stakeholders with respect to mangroves conservation and sustainable use in protected areas, their mandates and responsibilities, interest in the project, as well as potential problems and their mitigation. A number of consultations were held with a broad range of stakeholder groups through formal and informal meetings, interviews and site visits in the project's eight intervention States (*Pará, Maranhão, Piauí, Ceará, Paraíba, Bahia, São Paulo* and *Paraná*). A Project preparation steering committee was established and provided significant input on project design, identification of baseline and of synergies for cooperation throughout the project's intended implementation and associated co-financing. This steering committee is composed of key institutional stakeholders including representatives of: the Ministry of Environment (MMA) through the Secretariat of Biodiversity and Forest (SBF) and its Directorate of Biodiversity Conservation (DCBio), Directorate of Protected Areas (DAP), the Coastal and Marine Zones Division (NZCM) and the Directorate of Environmental Education (DEA); the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) through its Directorate of Fauna and Fisheries Resources (DIFAP), Directorate of Ecosystems (DIREC), Directorate of Environmental Licensing (DILIC), National Center for Traditional Populations (CNPT) and the General Coordination of Environmental Education (CGEAM); and federal organizations that are responsible for national policies related to the conservation and use of mangrove biodiversity resources: The Ministry of Science and Technology (MCT), and Special Secretariat for Aquaculture and Fisheries (SEAP).

2. State Environmental agencies (OEMAS) were formally consulted and demonstrated interest in participating in the Project's activities. The OEMAs of Paraíba (SECTMA/SUDEMA), Maranhão (SEMA), Ceará (SEMACE), Piauí (SEMAR), Paraná (SEMA and IAP), São Paulo (SMA), Bahia (SEMARH) and Pará (SECTAM) have formalized their participation in the Project. In addition, the Project was discussed with UC managers and local research centers through IBAMA's regular meetings. At intervention sites, all UC managers and local community representatives demonstrated interest in the Project and its strategy. Two private sector institutions (SEBRAE and EMBRAPA) and two universities (UFMA and UFPA) have also demonstrated interest in participating in the Project's on-site interventions. In fact, Pilot sites were selected based on their composition of different scenarios of sector pressure, diversity of stakeholders, management challenges and protected areas categories. As such, it is expected that the Pilot interventions will feed the project's implementation through participation of local communities in monitoring processes, implementation and management of the project. Additional partnerships will be sought and formalized during the first year of Project implementation.

3. Once the Project is initiated, a Project Steering Committee (SC) will be created to provide guidance to the project. The SC will have representatives from MMA, IBAMA, SEAP and project stakeholders from each of the Project intervention areas, such as OEMAS, universities, local communities, NGOs and the private sector, and will meet to assess the project's implementation. While the Project Management Unit (PMU) will do the overall coordination of all project activities, communication channels will be established between stakeholders and the PMU, and different stakeholders, such as IBAMA and its Centers, universities, NGOs and community-based organizations, will directly implement some of the activities. Therefore, throughout the project's implementation, full participation of key stakeholders is expected. These partnerships will be established using the appropriate agreements or contract modalities, depending on their nature. This decentralized mechanism for project implementation was chosen to ensure that the Project's on-the-ground activities build the capacity of stakeholders, and foster a sense of ownership through direct involvement. In cases where stakeholders have proven expertise, this strategy will allow a wider participation in Project implementation and technical collaboration, increasing the cost-efficiency of the Project strategy.

4. In general terms, the essential elements of this Stakeholder Involvement Plan include: participatory management and monitoring with local government and UC authorities and resource users; establishment of management councils for participatory management of UCs; development of private sector partnerships for the financial and environmental sustainability of UCs housing mangroves; and consultation with stakeholders for the validation of the project's National Mangrove Areas Protection Plan. In addition, associations of resource users, especially associations of fishermen, will play an important role in the participatory implementation of the Project. The following information outlines the participation of the different stakeholders at the Outcome and Output levels.

Outcome 1: The enabling environment for a sub-system of mangrove ecosystem protected areas is in place, including policy, regulatory, and financial mechanisms.

Output 1.1. Regulatory framework and corresponding operational guidelines developed for improved mangrove PA management

5. The management and use of mangrove resources at project intervention sites falls under the responsibility of IBAMA, OEMAs and municipalities in 8 states. As such, their participation will be essential in the review of the regulatory framework and methodological guidelines for preparation of management plans for mangroves in those locations. Basic studies for the preparation of methodological guidelines will be prepared under the technical coordination of IBAMA, and a workshop on overlapping mandates and jurisdictions will be promoted among stakeholders from those municipalities, OEMAs and IBAMA. Regulatory frameworks will thereby be created based on the exchange of ideas and close collaboration with key stakeholders. Furthermore, IBAMA's technical role is paramount to the discussion and preparation of UC category regulations, management plan guidelines, and definition of buffer zones adapted to mangroves UCs, since they are directly involved in the implementation of those activities. Finally, MMA, IBAMA and OEMAs of São Paulo, Ceará and Paraíba are co-financing this output, to be technically coordinated by MMA and IBAMA.

Output 1.2. Institutional procedures and capacities aligned to new regulatory framework for mangrove management and coordinated with sectoral policies

6. The Project will formalize the proposed institutional procedures and work in close coordination with IBAMA's UC managers and MMA/DAI's capacity building programs to promote capacity building of UC managers (federal, state and municipal), OEMAs and municipalities in the use and implementation of the protected area management framework, guidelines on PA management and conflict resolution. MMA/DAI is in the process of initiating a capacity program to train municipalities on environmental management through agreements with OEMAs. The Project will complement those activities by fostering the signature of partnerships with all states involved in the Project, and providing the technical material prepared on mangroves management for inclusion in a training module to be conducted on a continuous basis. While the Project's focus is on the 8 states of intervention, this activity can be replicated throughout all coastal states in the country. Finally, MMA, IBAMA, OEMAS of São Paulo, Ceará and Paraíba are co-financing this output, to be technically coordinated by MMA and IBAMA. Other OEMAs (Piauí, Paraná, Maranhão, Pará and Bahia) have also confirmed interest in participating.

Output 1.3. Financial strategies for mangrove PA management tested and supported by the regulatory framework

7. The Project will support mangrove valuation studies and the promotion of financial mechanisms for the sustainability of PAs in Bahia and São Paulo/Paraná intervention areas. This will be done through partnerships with the private sector, NGOs, and individual specialists, in close coordination with IBAMA and UC managers. In particular, the confirmed partnership with Conservation International (CI) will bring their expertise to this activity in the state of Bahia, while the OEMA of Bahia will engage in multi-sector

negotiations to use mangrove valuations as a basis for determining environmental compensation amounts. Furthermore, the OEMAs of São Paulo and Paraná will be involved in the valuation and testing of financial mechanisms at the project intervention area in those states. The mosaic approach will also be tested in this area⁷³ through coordination of actions and meetings of the Mosaic Council, and will rely heavily on the participation in the Council by stakeholders from state, municipal and local levels. Finally, MMA, IBAMA, SEAP, OEMAS of São Paulo and Ceará, and CI are co-financing this output, to be technically coordinated by MMA and IBAMA.

Output 1.4. *A representative network of mangrove UCs is designed within the existing PA system.*

8. A working group with representatives from MMA, IBAMA and OEMAs will be established to orient the design of a network of mangrove UCs, based on technical studies coordinated by the Project. A national workshop will then be held to promote wider discussion and stronger definition of this network, as well as assist in its initial stages of implementation. MMA, IBAMA, OEMA of Ceará, and Conservation International are co-financing this output, to be technically coordinated by MMA. OEMAs of Piauí and Paraná have also confirmed interest in participating.

Output 1.5. *National Plan for the Conservation and Sustainable Use of Mangroves is designed and formalized.*

9. In order to assist in the preparation of this National Plan, the project will build on lessons learned during Project implementation, bringing expertise outside MMA and IBAMA to assist in its development. IBAMA will be preparing species conservation plans to form part of this plan and will implement them in partnership with NGOs, universities and research centers. The Project steering committee will be pivotal to the preparation and approval of this plan, as well as contributions from the Water Resources Secretariat of the MMA, in coordination with NZCM. MMA, IBAMA, OEMAS of Paraíba and Ceará, are co-financing this output, to be technically coordinated by MMA.

Outcome 2: Replicable models are in place for the management of mangrove resources in SNUC sustainable-use protected areas

Output 2.1. *Resource management plan for fisheries developed at the ecosystem level in the protected area cluster of Pará.*

10. Local fishermen organizations will work with IBAMA and SEAP to ensure that the ecosystem management of fisheries is possible in 9 RESEX in the state of Pará. IBAMA's local team will support the PMU and assist in technical studies, facilitating contact with traditional populations that use the resources. SEAP will also be involved in the diagnosis of fisheries, resource management plans, instruction on the use of tools and regulations for fishing, and provision of incentives to fisheries communities, among others. The National Fishermen's Movement (MONAPE) and Pastoral Fishermen's Council (CPP) will participate in the management of fisheries resources as they currently work with those RESEX fishing communities. A working group with fishermen's representatives will be formed locally to prepare the ecosystem management plan, capacity building and monitoring activities, with technical support from IBAMA/DIFAP and SEAP. Studies and instruments related to coastal management will be made available by the Pará OEMA and will also serve as a basis for the ecosystem management plan. The Pará OEMA also coordinates a science and technology committee that promotes discussions on fisheries. This partnership will facilitate the mobilization process and definition of sustainable levels of capture compatible with ecosystem management to be discussed with RESEX communities and UC managers from the local IBAMA team. A partnership with the Federal University of Pará (UFPA) will also provide

⁷³ Currently, this is the only official SNUC mosaic in Brazil and is comprised of 38 UCs, 19 of which house mangroves.

important data to the design of the management plan, including studies of fish species that spend part of their life cycle in mangroves, information on the dynamics of the coast, and cartography related to mangroves.

11. In relation to the management plans of 3 RESEX in Pará, IBAMA will coordinate the technical activities to be implemented in coordination with Output 1.1 based on the experience of IBAMA's Fisheries Research Center at the North (CEPNOR), and will assist in studies and fishing statistics.

12. MMA, IBAMA and SEAP are co-financing this output, to be technically coordinated by IBAMA. During initial project implementation, additional partnerships will be sought with the National Council for Scientific and Technological Development of the Ministry of Science and Technology (CNPQ/MCT) for scholarships to fund studies on fisheries resources management; as well as the National Employment System Program of the Ministry of Work and Employment (SINE/MTE) for review of regulations on temporary unemployment insurance during no catch-periods.

Output 2.2. Resource management plan for the Uçá Crab developed and tested in the Parnaíba Delta

13. The site demonstrations in the Delta do Parnaíba intervention area comprise one APA and one RESEX across the states of Ceará, Piauí and Maranhão. The involvement of different stakeholders is crucial to the strengthening of the uça-crab management plan and the promotion of alternative uses of mangrove biodiversity. Key partnerships for this output include SEBRAE, which already works in the region for the improvement of the uça-crab commercialization and will play an important role in training on productive use alternatives, and in the preparation of production and commercialization guidelines; EMBRAPA, which has developed improvement practices of the uça-crab productive chain and is investing in a native honey production chain in Piauí in partnership with SEAP; UFMA, which is developing a program in Maranhão mangroves on economic alternatives for local communities; and the OEMA of Piauí (SEMAR) with studies on crab collection, implementation of management plans and studies on coastal management. IBAMA will coordinate the technical activities of the uça-crab management plan in the APA and RESEX to be implemented in coordination with Output 1.1, based on the experience of the fishing communities and the sustainable use levels to be practiced. A working group with representatives of MMA, IBAMA, SEAP, EMBRAPA, SEBRAE, UFMA, OEMAs and representatives of local communities will be established to orient the design and implementation of the uça-crab management and the sustainable use alternatives in each of the site intervention areas.

14. In addition, the Ministry of Tourism (MTur) has been defining the standards for certification of hotels that support biodiversity conservation and whose activities are not detrimental to the ecosystem. In this sense, the PROECOTUR programme, which is implemented in cooperation by MTur and MMA, will assist in the implementation of the community-based tourism activities in this project output, specifically in the development and implementation of a strategy to integrate Mangrove UCs-based tourism into national tourism planning.

15. MMA, IBAMA and SEAP are co-financing this output, to be technically coordinated by MMA and IBAMA. Potential partnerships to be sought during initial project implementation include CODEVASF, in relation to the region's water management plan, and UFPI, with regards to the preparation of ZEE norms.

Output 2.3 Value-added mangrove products are identified and potential market opportunities are explored.

16. Based on the above outputs, the established working group (with representatives of MMA, IBAMA, SEAP, EMBRAPA, SEBRAE, UFMA, OEMAs and local communities), will provide guidance to experts

on the commercialization of non-timber forest products in order to analyse the potential of establishing productive chains of mangrove products, including community-based tourism, within and outside the intervention areas. MMA, IBAMA, SEAP and OEMA of Ceara are co-financing this output, to be technically coordinated by MMA. Potential partnerships include SEBRAE and Wetlands International, among others, and will be engaged to prepare business plans, commercialization and certification agreements.

Output 2.4. *Capacity building program delivered to facilitate implementation and replication of sustainable use approaches to mangrove PA resources.*

17. Based on the above outputs, capacity building will take place with the local communities of the Delta do Parnaíba and Para State intervention sites, and will focus on co-management, practices that decrease pressure on uça-crab, development and implementation of economic alternatives, and marketing of new mangrove products. Capacity building and conflict resolution is also envisaged for local community representatives to the UC Councils. Furthermore, UC managers will receive guidance and support to implement management plans in a participatory manner. A series of workshops and meetings will be undertaken to identify individual needs for skills development, as well as the level and type of skills development needed. MMA, IBAMA, SEAP and OEMA of Ceara are co-financing this output, to be technically coordinated by MMA. Potential partnerships with UFPA, UFMA, UFPI, UFCE and NGOs will be fostered to organize training of local communities, extension workers, and enforcement volunteers.

Outcome 3: Conservation of mangroves is improved by piloting the alignment of UC management with sectoral and spatial planning

Output 3.1. *Land planning guidelines tailored to mangrove conservation are developed and tested in a large APA and coordinated with state and regional planning processes.*

18. This output includes a participatory approach to zoning preparation (16 municipalities and OEMA) for an APA and RESEX in Maranhão that will feed into the management plans of the respective PAs. Frequent meetings and consensus building among stakeholders, including the UCs Councils, will be critical to this. MMA, through its Economic and Ecological Zoning program, will provide expertise on zoning initiatives, while the Project will contribute technical studies and promotion of seminars to ensure maximum participation in the zoning preparation exercise. At the same time, IBAMA's Directorate of Socio-Environmental Development (DISAM) will work with local communities to identify possible demands for the creation of new RESEX. MMA, and IBAMA are co-financing this output, to be technically coordinated by MMA and IBAMA. OEMAs of Maranhão have confirmed interest in participating in zoning activities, bringing lessons learned from previous experiences in ecological and economic zoning. A potential partnership with UFMA will be explored during the first year of project implementation.

Output 3.2. *Water resources planning processes in Paraíba developed and tested to include mangrove conservation needs*

19. This output envisages the capacity of the Water Committee to include mangrove needs (in terms of quality and quantity of fresh water) in water resource management plans of the *Mamanguape* Watershed of Paraíba State. The project will contribute with technical studies and promotion of meetings between the Water Resources Secretariat of MMA, OEMAs of Paraíba (Environment Agency - SUDEMA and Water Agency - AESA), UC Managers and Council, municipal water authorities and the local Water Committee. AESA and SUDEMA will support the technical studies and seminars and, later consolidate the Water Committee. MMA, IBAMA, and OEMA of Paraíba are co-financing this output, to be technically

coordinated by MMA. OEMAs of Piauí will also participate through their exchange of experiences in water management. EMBRAPA at Paraíba has contributed to the preparation of water quality studies of the Watershed and seems interested in participating.

***Output 3.3.** Capacity building program designed and under implementation for relevant planning institutions, sectoral stakeholders and UC management*

20. This output will focus on providing advice and training to the State Planning and Economic Development Management Agency (GEPLAN), the organization responsible for zoning, so as to ensure the inclusion of mangrove concerns in the zoning and planning of the APA and RESEX management plan. Training of the Agency and members of the Water Committee will focus mainly on awareness raising regarding the need for the management of water resources to include the needs (i.e. quality and quantity of fresh water) of the mangrove system and the people who depend on it for their livelihoods, as well as norms for regulations and licensing processes. In addition, capacity building and conflict resolution is envisaged for local community representatives to the UC Councils, while UC managers will receive guidance and support to implement management plans in a participatory manner. A series of workshops and meetings will be undertaken to identify individual needs for skills development, as well as the level and type of skills development needed for each of the capacity building initiatives at the intervention sites. MMA, and IBAMA are co-financing this output, to be technically coordinated by MMA. Potential partnerships with national and international NGOs, such as CapNet, will be sought for capacity activities of the water Committee.

Outcome 4: Mangrove-related outreach, dissemination and adaptive management increased.

***Output 4.1.** Mangrove Biodiversity Monitoring and Project M&E Programs developed and functioning.*

21. The participation of IBAMA's Research Centers, in particular the Remote Sensing Center (CSR) and CEPNOR, will be crucial to the mapping and monitoring of mangroves throughout the country. MMA, IBAMA, and OEMAs of Paraíba and Ceará are co-financing this output, to be technically coordinated by IBAMA and MMA. OEMAs of Piauí and Paraná will participate with studies of mangrove areas in their states. Partnerships will be sought with universities, such as UFPA, UFMA, UFPE, UNIVALI, and the Spatial Research National Institute (INPE), for the provision of satellite images.

***Output 4.2.** Project Management developed and implemented*

22. In an effort to emphasize adaptive management planning, and in addition to the SC, the project will conduct a series of meetings for planning at the local level that will provide the basis for preparing annual work plans, active management and monitoring of results at the intervention sites. The PMU will be responsible for communicating with local communities about proposed site interventions and ensure that local communities benefit from the project's implementation through capacity building, resources management and access to income generation activities. In addition, the key functions of M&E system to be established by the project, including application of the METTS, will facilitate the adaptive measures to improve impact and capture lessons learned from project implementation. The results will be disseminated to the stakeholders through the SC's meetings and to the wider public. MMA and IBAMA are co-financing this output, to be technically coordinated by MMA.

***Output 4.3.** Dissemination, outreach and research on Mangrove Ecosystems Management delivered to community and sectoral stakeholders and the broad public.*

23. To mainstream an awareness of the ecological and economic values and functions of mangroves throughout relevant sectors and to the broad public, the Project will design and implement a dissemination

and outreach program on the importance of mangroves and on the Project strategy to be implemented on a national scale. The Mangrove Action Project has developed a booklet on the conservation of mangroves which can be used by the project for environmental education and made available at the National Mangrove Coordination Center. However, it should be noted that for the development of mangroves education programs and materials, an analysis of the available material and the preparation of a detailed awareness campaign are programmed with leveraged resources. MMA, IBAMA, SEAP, and the OEMAs of Ceara and Sao Paulo are co-financing this output, to be technically coordinated by IBAMA. The OEMA of Piaui is also interested in participating with dissemination material. Potential partnerships with the private sector will be sought for the construction of the Center and for the implementation of the awareness campaign, while others, UFMA and the Mangrove Action project, will be engaged in research activities and technical/dissemination material.

SOCIO-ECONOMIC INFORMATION OF SITE INTERVENTION AREAS

24. The diversity of groups living in the coastal areas of Brazil, and in mangroves in particular, is enormous. Within the Protected Areas throughout the country, three main categories should be considered: traditional populations, Afro-descendants living in *quilombolas* (former havens for escaped slaves) and indigenous groups. The traditional populations have historically taken their subsistence out of natural resources, using low impact technologies. They are a culturally diverse group comprehending all sorts of agro-extractive people, such as collectors of rubber, nuts and seeds in terrestrial ecosystems, and of crabs, mollusks and other shellfishes in marine ecosystems, as well as small family farmers and artisanal fishermen. The two latter categories, Afro-descendants and indigenous groups, relate to the ethnic origin of such groups and do not exclude the first condition, that is to say that a traditional population may also be indigenous or an Afro-descendant. Some traditional populations live within the boundaries of sustainable use protected areas under the scope of SNUC including especially APAs and RESEX. As a matter of fact, RESEX are created by request of those populations to protect their livelihoods and culture and ensure sustainable use levels of natural resources. Other traditional populations may live in areas adjacent to these SNUC protected areas and in this sense form an important part of the conservation strategy for those.

25. Indigenous groups and Afro-descendants are particularly important because in Brazilian legislation they are given specific legal rights over the territory they occupy (called indigenous territories or *quilombolas*), at the same time that it is recognized that they assist in the conservation of these areas through the sustainable management of natural resources. While the lands in which indigenous groups and Afro-descendants live are outside the scope of the SNUC, they will participate in the National Protected Areas Plan and the ecological functions and services they deliver are widely recognized.

26. Given that indigenous territories and *quilombolas* do not fall within either the UC or APP protected area designations with which the Project will deal, it will not work directly with these groups. Rather, the Project concentrates on those traditional populations living in the direct intervention areas, which total 19,550 families in the 11 Project RESEX alone. In addition, there are communities living in the APAs and neighboring areas, all represented in the various fora for the management of those conservation units. Additionally, a GEF/UNDP project is being developed in Brazil to specifically address sustainable use of biodiversity with indigenous populations.

27. The North Coast of Brazil, is full of non-indigenous, *quilombola* and indigenous traditional populations undertaking extractive activities, such as the Amazon *caboclos/ribeirinhos*, who live close to rivers, lagoons, and mangroves and undertake small agriculture and fishing activities in a complex yearly calendar regulated by raining patterns. In the Pará cluster, most traditional populations are artisanal fishermen and small farmers; crab and mollusk collection is seen as a complementary activity. There is some use of mangroves wood for building houses, canoes, and other small-scale subsistence activities.

28. The second cluster in Maranhão is mostly constituted by different groups of artisanal fishermen, such as *praieiros* (groups living by the beach who fish and complement their income transporting people on their boats). Other economic activities in the region are the vegetal extraction of *babaçu* (*orbignya phalerata*) and tourism, including some incipient tourism activities at the Cururupu RESEX.

29. At the Maranhão, Ceará and Piauí cluster centered around the Delta do Parnaíba, communities are formed by artisanal fishermen, crab collectors and *marisqueiras* (female shellfish collectors), with some presence of *quilombolas*. The *uça-crab* is one of the main resources collected by communities living close to mangroves in this region and is presently overexploited there. Other economic activities that are expanding to the region are tourism and shrimp farming. While the first is concentrated in the surroundings of the municipality of *Parnaíba*, the latter is starting to grow in the municipalities of *Parnaíba*, *Luis Correia*, and *Cajueiro da Praia*. Besides bringing serious socio-economic and environmental impacts to the region, shrimp farming also creates a conflict with the perspective of ecological-tourism activities envisaged by some communities.

30. In the Paraíba cluster, a significant number of traditional fishermen and indigenous groups are present. The region is composed by two municipalities of *Rio Tinto* and *Marcação* and 17 villages; parts of these human settlements are indigenous lands (*Potiguara Reserve*) at the North of Mamanguape River. Artisanal fishermen use *jangadas* (small wooden boats originally used by Amerindians) and are also known as *jangadeiros*. They possess traditional knowledge on the diversity of species they fish, their occurrence in seasons, migration and feeding habits. However, the most relevant economic activity undertaken on the mangrove areas of the *Mamanguape* River is crab-collection, more than 1,000 families depend on crab and mollusk's collection for their subsistence. Sugar cane and pineapple plantations are also present and together with shrimp farming contribute to the decay of water quality in the region.

31. In the last intervention area of São Paulo and Paraná mosaic, traditional populations encompass *quilombolas*, indigenous communities and *caiçaras*; the latter are specific communities formed by mixed Indigenous, Portuguese and African descents who live in the coast from Rio de Janeiro until Paraná and undertake itinerant agriculture activities, fishing, vegetal extraction and handcrafts. On the population of the mosaic in particular, most depend directly or indirectly on fisheries, but there are also some extractive activities of heart-of-palm and bromelias. In addition to port activities of Paranaguá, tourism activities are growing in the region and bringing socio-economic impacts to the region, such as displacement of *caiçaras* to peri-urban areas and impoverishment of local populations.

Table 1. Key Stakeholders, their mandates and responsibilities, interest in the project and potential problems and their mitigation

Key Stakeholder	Institutional Mandate/Responsibilities	Role/Interest in the Project	Potential Problem and Mitigation
Ministry of the Environment (MMA)			
Secretariat of Biodiversity and Forests (SBF): <ul style="list-style-type: none"> • Directorate for the Conservation of Biodiversity (DCBio); • Directorate of Protected Areas (DAP); • Coastal and Marine Zone Division (NZCM). 	Elaboration and development of federal environmental policies related to biodiversity and forests, in particular those with focus on conservation and sustainable use of biodiversity, protected areas, coastal and marine environment	<ul style="list-style-type: none"> • Chair the Steering Committee; and • Project Coordination 	<ul style="list-style-type: none"> • Many of the financial instruments and activities require coordination of many institutions at state and local levels for project implementation; • National legislation does not clearly define roles and mandates of federal, state and municipal institutions leading to lack of coordination and weak enforcement. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> • Establishment of a Steering Committee and of a National Project Coordination team. • Meetings to build consensus on institutional mandates guiding licensing procedures related to mangroves. • Capacity building for local institutions and municipalities.
Secretariat of Sustainable Development (SDS) through three of its programmes: <ul style="list-style-type: none"> • National Eco-tourism Program (PROECOTUR); • The Family-based Production Socio-environmental Development Program (PROAMBIENTE), and • Economic and Ecological Zoning Program (ZEE) 	Promotion of environmentally sustainable development policies at the federal level	<ul style="list-style-type: none"> • Member of Steering Committee; • Collaborate on technical activities related to community based tourism and regional land planning and zoning initiatives 	<ul style="list-style-type: none"> • Disagreement on criteria for the conservation and sustainable use of resources in areas with high eco-tourism potential and for land planning and zoning. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> • Training and technical assistance for developing income generation initiatives based on eco-tourism and for land planning zoning.
Secretariat of Water Resources (SRH)	Promotion of policies for water management	<ul style="list-style-type: none"> • Collaborate on training and capacity building of water managers and of member of Watershed committee 	<ul style="list-style-type: none"> • Disagreement on decisions regarding the management of water resources and water resources needs for UCs management.

Key Stakeholder	Institutional Mandate/Responsibilities	Role/Interest in the Project	Potential Problem and Mitigation
		<ul style="list-style-type: none"> Promote articulation with state water agencies 	<u>Mitigation Strategy:</u> <ul style="list-style-type: none"> Joint meetings between Watershed Council and UC Council Training and technical assistance
Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA)			
Directorate of Social Environmental Development: <ul style="list-style-type: none"> National Centre of Traditional Populations (CNPT); General Coordination for Environmental Education (CGEAM) 	Responsible for policies and programs to create and consolidate Extractive Reserves and to promote sustainable development of traditional communities and to increase environmental awareness with stakeholders involved in the management of PAs	<ul style="list-style-type: none"> Member of Steering Committee Coordinate technical activities related to Extractive Reserves (RESEX) councils and management plans, including resource use management and other sustainable uses in those PAs. Provide capacity building to promote conflicts resolution and technical capacity at the PA authorities, managers and local partners. 	<ul style="list-style-type: none"> Weak coordination with the Council of those PAs. Problems in building of consensus among stakeholders, including in the criteria for use and conservation of natural resources; Activities of the project require the agreement and coordination of other IBAMA divisions and local actors. <u>Mitigation Strategy:</u> <ul style="list-style-type: none"> Regular meetings among stakeholders; Capacity building for active participation in project agreements and consensus building. Implementation and enforcement of RESEX Councils.
Directorate of Ecosystems (DIREC)	Responsible for the policies and programmes related to PA's strictly preservation and sustainable use.	<ul style="list-style-type: none"> Member of Steering Committee Coordination of technical activities related to methodological guidelines and regulation of PAs' categories. 	<ul style="list-style-type: none"> Diversity of types of PA categories and number of local actors brings problems in building consensus and establishing agreements on APAs' regulation and on methodological guidelines. More complex needs for technical and administrative capacity building. <u>Mitigation Strategy:</u> <ul style="list-style-type: none"> Regular meetings and technical assistance for the preparation of management plans and methodological guidelines. Councils' strengthening.
Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA)			
Directorate of Fauna and Fisheries	Responsible for the policies and	<ul style="list-style-type: none"> Member of Steering Committee 	<ul style="list-style-type: none"> Disagreement on the sustainable use

Key Stakeholder	Institutional Mandate/Responsibilities	Role/Interest in the Project	Potential Problem and Mitigation
Resources (DIFAP): <ul style="list-style-type: none"> Centers for the Research and Management of Fisheries Resources and Fauna Conservation 	programmes with focus in responsible fisheries and conservation of fauna's species	<ul style="list-style-type: none"> Coordinate technical studies on fisheries management plans and fauna conservation plans. 	<p>level and the conservation measures between IBAMA and resource users.</p> <ul style="list-style-type: none"> Disagreement on the methodology and application of fisheries ecosystem management among stakeholders (government institutions, universities and local users). <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> Establishment of participatory fora for technical issues and management measures. Regular meetings and technical assistance for management plans. Strengthening of monitoring of fauna species
Directorate of Environmental Licensing (DILIC)	Responsible for the analysis of EIA-RIMA and issue licenses for operation of enterprises at the national level	<ul style="list-style-type: none"> Member of Steering Committee Provide technical support for capacity building related to local government mandates on licensing. 	<ul style="list-style-type: none"> Lack of agreement on licensing procedures among different government institutions at federal, state and local levels. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> Regular meetings and technical assistance for licensing criteria. Preparation of specific technical guidelines for capacity building of state and local institutions on licensing.
Remote Sensing Center (CSR)	Responsible for remote monitoring and mapping	<ul style="list-style-type: none"> Member of Steering Committee Coordinate projects' mapping and monitoring activities 	<ul style="list-style-type: none"> High cost of long-term mapping at 1:50,000 scale <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> Definition of partnerships and strategic priorities for costs reduction of mapping and monitoring activities
Sectoral Government Agencies			
Special Secretariat for Aquaculture and Fisheries (SEAP) <ul style="list-style-type: none"> Directorate of Industrial Fishing; and 	Responsible for the policies and programmes related to development of aquaculture and fisheries at the federal level. Organizes and	<ul style="list-style-type: none"> Member of Steering Committee Collaborate with technical support, financial instruments for the development of fishing and 	<ul style="list-style-type: none"> Disagreement on the criteria for sustainable use level and the conservation measures. <p><u>Mitigation Strategy:</u></p>

Key Stakeholder	Institutional Mandate/Responsibilities	Role/Interest in the Project	Potential Problem and Mitigation
<ul style="list-style-type: none"> Coordination of Artisanal Fishing 	maintains fisheries registries and, in articulation with states and municipalities, undertakes programmes for exploiting aquiculture in public and private lands.	aquiculture.	<ul style="list-style-type: none"> Establishment of participatory fora for technical issues and management measures. Regular meetings and technical assistance for management plans.
National Water Agency (ANA)	Responsible for implementation of federal policies for water management. Participate at the National System for Water Resources Management, in coordination with MMA and the National Water Resources Council, at the federal level, and the Water Resources State Councils, State Environmental and Water Agencies, and the Watershed Council and Watershed Agencies at the local level.	<ul style="list-style-type: none"> Promote guidance to state water agencies on the use of water resources instruments. 	<ul style="list-style-type: none"> Disagreement on decisions regarding the management of water resources and water resources needs for UCs management. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> Joint meetings between Watershed Council and UC Council Training and technical assistance
Ministry of Tourism (MTur)	Responsible for policies and programmes directed towards the economic development of tourism in the country.	<ul style="list-style-type: none"> Promote a sustainable agenda for tourism, preparing technical norms for the sustainable development of this activity. 	<ul style="list-style-type: none"> Disagreement on the criteria for sustainable tourism activities considering mangroves conservation. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> Establishment of participatory fora for technical issues and management measures. Regular meetings and technical assistance for management plans.
Ministry of Agricultural Development (MDA): <ul style="list-style-type: none"> Secretary of Family Agriculture (SAF) 	Responsible for policies and programmes directed towards agricultural development, including sustainable rural development and food security, strengthening family agriculture, providing access to credit and technical assistance to families, associations and cooperatives.	<ul style="list-style-type: none"> Promote articulation of public policies directed towards supporting family agriculture, artisanal fisheries and aquiculture. 	<ul style="list-style-type: none"> Disagreement on the criteria for sustainable use level and the conservation measures. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> Establishment of participatory fora for technical issues and management measures. Regular meetings and technical assistance for management plans.

Key Stakeholder	Institutional Mandate/Responsibilities	Role/Interest in the Project	Potential Problem and Mitigation
<ul style="list-style-type: none"> • Sao Francisco and Parnaíba Valley Development Company 	Promote development and revitalizing of Sao Francisco and Parnaiba Bays using sustainable natural resources and structuring productive alternatives for economic and social inclusion	<ul style="list-style-type: none"> • Promote development of best practices in freshwater and estuarine resources • Jointly with SEBRAE works on the improvement of uca crab productive chain • Mangrove mapping 	<ul style="list-style-type: none"> • Disagreement on decisions regarding the management of water resources and water resources needs for UCs management. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> • Joint meetings between Watershed Council and UC Council • Training and technical assistance
State Governments			
<ul style="list-style-type: none"> • OEMAS: <ul style="list-style-type: none"> <u>Para State:</u> Secretariat for Science and Technology and the Environment (SECTAM); <u>Maranhão State:</u> Secretariat for the Environment and Natural Resources (SEMA/GEMA); <u>Piauí State:</u> Secretariat for the Environment and Natural Resources (SEMAR); <u>Ceará State:</u> Secretariat for the Environment (SEMACE); <u>Paraíba State:</u> Special Secretariat for the Environment, Water and Mineral Resources (SECTMA/SUDEMA); <u>Bahia State:</u> Secretariat for the Environment and Water Resources (SEMARH); <u>São Paulo State:</u> Secretariat of the Environment (SMA); <u>Paraná State:</u> State Secretariat of the Environment – (SEMA/IAP) • States agencies for planning, infrastructure and agriculture 	Elaboration, development and implementation of state environmental policies, enforcement and control. Issuing licenses for new enterprises. Current and potential management of State Protected Areas.	<ul style="list-style-type: none"> • Involvement in regional planning. • Development of synergies among relevant stakeholders to fulfill their mandates. • Collaborate with technical support on fisheries. • Take part in initiatives concerning mangroves protection. • Coordinate the creation of State UCs management councils • Coordinate the elaboration of state UC management plans • Capacity building of municipalities under its jurisdiction 	<ul style="list-style-type: none"> • Lack of capacity to coordinate stakeholders. • Potential conflict between local planned infrastructure and conservation priorities. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> • Strengthening of the OEMA through technical assistance, information and lessons-learned workshops and activities within project's outputs, particularly in the site demonstrations.
	Responsible for land use planning and	<ul style="list-style-type: none"> • Participate at Watershed Committees 	<ul style="list-style-type: none"> • Potential conflict between

Key Stakeholder	Institutional Mandate/Responsibilities	Role/Interest in the Project	Potential Problem and Mitigation
	other incentives for investment of the private sector	<ul style="list-style-type: none"> Participate at zoning of Watersheds and land use practices on Outcome 3 	<p>local planned infrastructure and conservation priorities.</p> <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> Strengthening of the those agencies through technical assistance, participation at Watershed Committee, information and lessons-learned workshops and activities within project's outputs, particularly in the site demonstrations.
Local Governments			
Municipalities	Elaboration, development and implementation of municipal environmental policies, enforcement and control. Current and potential management of Municipal Protected Areas.	<ul style="list-style-type: none"> Coordination, monitoring and local management of municipal PAs. Assisting in creating linkages with relevant local organizations. Involvement in local planning. 	<ul style="list-style-type: none"> Lack of capacity to act as control and local coordination for PA's policies. Potential conflict between local planned infrastructure and conservation priorities. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> Capacity building at municipal level for licensing procedures, land planning and PA management, whenever applicable. Councils' strengthening. Law enforcement
Research Institutes and Universities			
Brazilian Agricultural Research Corporation (EMBRAPA)	National agency that develops research for improvement of sustainable agriculture practices.	<ul style="list-style-type: none"> Collaborate with technical support for the environmental and water management of rural activities in APA do Mamanguape. Collaborate with technical support on the research for improving production and for the technological development of honey-keeping and <i>uçá-crab</i> productive chain at the Parnaíba region. 	<ul style="list-style-type: none"> Disagreement on the criteria for sustainable use level and the conservation measures. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> Establishment of participatory fora for technical issues and management measures. Regular meetings and technical assistance.
Federal University of Pará (UFPA)	Research and education institution.	<ul style="list-style-type: none"> Partnership and production of technical and scientific knowledge 	<ul style="list-style-type: none"> Diverging opinions in relation to the fisheries ecosystem management and

Key Stakeholder	Institutional Mandate/Responsibilities	Role/Interest in the Project	Potential Problem and Mitigation
		on fisheries, mapping of mangroves and monitoring of biodiversity.	research strategies. <u>Mitigation Strategy:</u> <ul style="list-style-type: none"> Regular meetings to build consensus on methodologies and strategies for fisheries management.
Federal University of Maranhão (UFMA)	Research and education institution.	<ul style="list-style-type: none"> Partnership and production of technical and scientific knowledge on fisheries, mapping of mangroves and monitoring of biodiversity. 	<ul style="list-style-type: none"> Current information indicates that there are no conflicts.
Private Sector			
Brazilian Service on Support of Micro and Small Enterprises (SEBRAE)	National Technical Agency responsible for the sustainable development of small enterprises	<ul style="list-style-type: none"> Collaborate with technical support to the provision of capacity building and access to financial resources on productive use activities on outcome 2. 	<ul style="list-style-type: none"> Weak on the ground capacity for the production and commercialization of mangroves products. <u>Mitigation Strategy:</u> <ul style="list-style-type: none"> Capacity building and technical assistance.
Private sector representatives: agriculture, aquaculture, commerce, oil and gas company, tourism agencies, industry, among others	Contribute on the definition of guidelines and policies about water resources or UC management in the respective consultative or deliberative PA management councils and watershed committee	<ul style="list-style-type: none"> Guide project activities during its implementation as councils members Assess management decisions and plans at PA or watershed levels 	<ul style="list-style-type: none"> Weak participation and influence on decision making due to lack of specific knowledge on water resources and environmental management Conflicts on the use of resources and land <u>Mitigation Strategy:</u> <ul style="list-style-type: none"> Capacity building for council members Promoting regular meetings of the councils
Non-governmental institutions and civil society			
Conservation International (CI)	Technical guidelines and support to the establishment of PAs and biodiversity conservation strategies	<ul style="list-style-type: none"> Valuation studies and support to the creation of mangrove UCs. 	<ul style="list-style-type: none"> Current information indicates that there are no conflicts.
Mangrove Action Project	Environmental education towards mangroves conservation	<ul style="list-style-type: none"> Environmental education and awareness raising on mangroves value and conservation needs. 	<ul style="list-style-type: none"> Current information indicates that there are no conflicts.
Wetlands International	Develop guidelines and best practices	<ul style="list-style-type: none"> Collaborate with mobilization and 	<ul style="list-style-type: none"> Current information indicates that

Key Stakeholder	Institutional Mandate/Responsibilities	Role/Interest in the Project	Potential Problem and Mitigation
	for wetland conservation	<p>capacity building of local communities.</p> <ul style="list-style-type: none"> • Collaborate with technical expertise on the development of the National Plan for the Conservation and Sustainable Use of Mangroves. • Technical expertise on innovative financial instruments 	there are no conflicts.
National Fishermen's Movement (MONAPE)	Fisherman representative association in charge of social rights, fishermen registration, among others. Contribute on the definition of guidelines and policies about UC management in the respective consultative or deliberative PA management councils	<ul style="list-style-type: none"> • Participate in the management decisions on fisheries resources. • Guide project activities during its implementation as councils members • Assess management decisions and plans at PA 	<ul style="list-style-type: none"> • Low representativeness of fisheries communities. • Conflict of interest on the use and conservation of fisheries resources. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> • Capacity building and technical assistance. • Participation at regular meetings.
Pastoral Fishermen's Council - CPP	Fisherman representative association. Contribute on the definition of guidelines and policies about UC management in the respective consultative or deliberative PA management councils	<ul style="list-style-type: none"> • Participate in the management decisions on fisheries resources. • Guide project activities during its implementation as councils members • Assess management decisions and plans at PA 	<ul style="list-style-type: none"> • Conflict of interest on the use and conservation of fisheries resources. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> • Capacity building and technical assistance. • Participation at regular meetings.
ABCC (Brazilian Shrimp Farmers Association)	Promote shrimp farming at national level.	<ul style="list-style-type: none"> • Formally inserted in a variety of national level sectoral groups, promoting the development of shrimp farming 	<ul style="list-style-type: none"> • Conflict of interest on the use and conservation of fisheries resources. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> • Outreach materials and capacity
Local communities inside or near Protected Areas, including beekeepers, tourism and other associations and cooperatives.	Co-management of PAs, management of buffer zones, resources users, service providers. Target audience for capacity building, awareness initiatives and education for conservation and sustainable use.	<ul style="list-style-type: none"> • Participate in the PA's Councils. • Participate in the resources use. Potential employment opportunities and/or other source of income. • Beneficiaries of project activities. 	<ul style="list-style-type: none"> • Conflict of interest on the use and conservation of fisheries resources. <p><u>Mitigation Strategy:</u></p> <ul style="list-style-type: none"> • Capacity building and technical assistance. • Participation at regular meetings. • Develop alternative sustainable livelihoods.
Traditional populations (artisanal fishermen, crab collectors, <i>marisqueiras</i> , family farmers),	Those populations undertake subsistence familiar economic	<ul style="list-style-type: none"> • Participate in the PA's Councils. • Participate in the resources use. Potential employment opportunities 	<ul style="list-style-type: none"> • Conflict of interest on the use and conservation of fisheries resources. <p><u>Mitigation Strategy:</u></p>

Key Stakeholder	Institutional Mandate/Responsibilities	Role/Interest in the Project	Potential Problem and Mitigation
<p><i>quilombolas</i> (afro-descents) and indigenous groups, living inside or near Protected Areas.</p>	<p>activities, such as artisanal fisheries, extractive activities and family agriculture. Co-management of PAs, management of buffer zones, resources users, service providers. Target audience for capacity building, awareness initiatives and education for conservation and sustainable use.</p>	<p>and/or other source of income.</p> <ul style="list-style-type: none"> • Beneficiaries of project activities. 	<ul style="list-style-type: none"> • Capacity building and technical assistance. • Participation at regular meetings. • Develop alternative sustainable livelihoods.

ANNEX 4: REPLICATION STRATEGY

Project Strategy	Replication Strategy
<p>The Project's design aims inherently at the replication of its strategy. In order to ensure the sustainability and replicability of Project actions and its vision and approach over the long-term, Outcome 1 develops specific mechanisms and capacities for replication and integrates Project guidelines, models and lessons learned into national policies. In addition, the establishment of a Mangrove Coordination Center and the development of a dissemination plan under Output 4.2 will together serve as fora to increase awareness of the Project's actions and enable them to be scaled up for other mangrove UCs and, eventually, to be adapted for replication in protected areas housing other ecosystems.</p> <p>Outcomes 2 & 3 will serve as the basis of guidelines and lessons learned to be scaled up and supported by the enabling environment created under Outcome 1.</p>	
<p>Outcome 1: The enabling environment for a sub-system of mangrove ecosystem protected areas is in place, including policy, regulatory, and financial mechanisms.</p>	<p>Output 1.1 - <u>The Regulatory Framework</u> and accompanying operational guidelines will serve as one of the primary replication-facilitating elements of the Project. All of the guidelines for management and business plans, buffer zones and ecological-economic zoning as well as the financial mechanisms, sustainable use practices and proposed amendments to legal norms developed and tested under the Project will be integrated into this framework. This will create an enabling environment for Project actions to be implemented nationwide by mitigating currently existing regulatory barriers.</p> <p>Output 1.2 - <u>Capacity building</u> of UC managers and environmental authorities on mangrove issues and in UC management skills will create a team of authorities capable of implementing mangrove actions under the Project's integrated, ecosystem vision. This will be an important mechanism to replicate the Project strategy in mangrove UCs all along the coast and, eventually, in other ecosystems in Brazil.</p> <p>Output 1.3 - <u>Innovative Financial Mechanisms</u> tailored to mangrove UCs may be used to increase financial sustainability of all mangrove UCs and, eventually, those identified in the Mangrove Network under Output 1.4. Lessons learned from their implementation may be used to inform improved and innovative financial mechanisms for protected areas throughout Brazil's PA system. This will include lessons learned on compensation mechanisms, PESs and the cost-effectiveness of the SNUC mosaic approach. The latter will also serve as a model to strengthen individual UC management through integrating the management of overlapping or neighboring UCs. By integrating enabling policies into the regulatory framework, the Project will facilitate long-term replication of these mechanisms.</p> <p>Output 1.4 - <u>The Mangrove UC Network</u> is essentially a blueprint for the replication and scaling-up of the Project strategy. It will identify specific geographical areas and mechanisms for this building on the strengthened institutional, regulatory, planning and financing frameworks developed through Project actions. The identification of priority areas for establishment of new UCs and ecological corridors will define areas most in need of replication of project activities for improved conservation and management. IBAMA and CI/Brasil will undertake initial implementation of this network.</p> <p>Output 1.5 - <u>The Nationwide Mangrove Strategy</u> will consolidate the studies, pilots, frameworks and lessons learned from the Project and other mangrove-relevant initiatives. It will serve as an integrated, systems approach to the conservation and sustainable use of this ecosystem. The plan will be developed in three phases with short, medium and long-term objectives, legally formalized with the Government and agreed with mangrove municipalities to ensure stakeholder buy-in. It will also form part of the Wetlands Strategies to be designed by MMA. IBAMA will be</p>

	responsible for implementation of the final version of the plan.
<p>Outcome 2: Replicable models are in place for the management of mangrove resources in SNUC sustainable-use protected areas</p>	<p>The following Project actions will provide lessons learned to be disseminated and guidelines and models to be replicated in other PAs in Brazil under the regulatory framework strengthened by the Project. They will form part of the <u>National Mangrove Strategy</u> to be agreed with the Government and will be shared with relevant national and local agencies and communities through the dissemination plan Output 4.3. Moreover, an <u>International Seminar</u> will be held on lessons learned under this Outcome on sustainable use practices, experiences in social participation and the experiences of technicians and authorities in these pilots. Participatory development of these pilots will create capacity and interest for the sustainable use of mangrove resources among local stakeholders and create capacity in environmental agencies and UC councils to replicate this in their own UCs and in UCs across the country. Creating transferable knowledge and capacity will provide the basis for future replication of these approaches which include:</p> <p>Output 2.1 Development of a <u>collective resource plan</u> to serve as a model for integrating resource management across UCs.</p> <p><u>Studies on improved fisheries practices</u> will feed into the knowledge base to improve adaptive management of fisheries resources.</p> <p><u>The zoning and agreement of no-take areas</u> in RESEX will first serve as a model for mangrove-conscious zoning in PAs and will also serve as a model for negotiating resource user buy-in and compliance with increased restrictions on use in certain areas of the PA.</p> <p><u>Testing methodologies in the Government’s plan</u> on combating predatory fishing and recovering fisheries stocks (under design) will allow for mangrove-related adjustments to be made to that plan which can then be disseminated all along the coast.</p> <p>Output 2.2 <u>A resource management model</u> for the <i>uçá</i> crab will serve as a model for ensuring resource and ecosystem sustainability by keeping extraction levels within limits that maintain ecosystem functionality. Replicable elements include developing <u>economic alternatives</u> including value-added mangrove products, ecotourism and beekeeping with native, stingless bees; creating a model for <u>community enforcement volunteers and community monitoring</u>; and <u>developing guidelines for a closed season</u> for the <i>uçá</i> crab.</p> <p><u>Training in improved capture, handling and transport methods</u> will yield lessons learned for crab collectors to teach the next generation and for UC authorities to share with other environmental managers in training and dissemination events and in the international seminar under Output 2.4.</p> <p><u>Partnerships explored with MTE-SINE</u> for channeling the payment of temporary unemployment insurance will inform proposed changes to legislation preventing <i>uçá</i> crab collectors from accessing this insurance and may prove relevant for other non-registered extractivist communities.</p> <p><u>New approaches to documenting/registering</u> <i>uçá</i> crab collectors may be scaled up through IBAMA & SEAP to reach crab collectors along the coast.</p> <p><u>Strengthening the Parnaíba Delta <i>uçá</i> crab discussion</u> forum will facilitate an arena for lessons learned related to legislation and sustainable practices and limits which be disseminated throughout the Delta through this forum and be passed onto relevant government agencies from there.</p>

	<p>Output 2.3 <u>Publicity events to showcase and market community-developed mangrove products</u> will set the stage for the replication of these experiences.</p> <p>Output 2.4 <u>Capacity building</u> under this Outcome will provide the basis to replicate best practices and improve mangrove management and use at the systemic level through training a broad range of stakeholders including municipalities, UC management councils, rural and environmental extension agents; partnering with EMBRAPA and IBAMA to deliver training; and testing more inclusive methods of implementing economic alternatives to include women and youth. Lessons learned here can be scaled up into existing EMBRAPA, IBAMA and DAI training events.</p>
<p>Outcome 3: Conservation of mangroves improved by piloting the alignment of UC management with sectoral and spatial planning.</p>	<p>The following actions, guidelines and models to be developed and validated under this Outcome will feed into the regulatory framework for improved management of mangrove UCs and PPs; will inform the designation of UC areas, extension, management categories, no-take zones and the like in the mangrove UC network; and will serve as a basis for the National Mangrove Strategy to orient actions aimed at the conservation and sustainable use of these ecosystems:</p> <p>Output 3.1 <u>Coordination of APA planning</u> with state, municipal and coastal zone planning. This will also provide immediate opportunities for the scaling up of this in the affected state and coastal zone.</p> <p><u>Development and testing of zoning guidelines</u> tailored to mangrove PAs will serve to orient licensing activities in the 16 states with mangroves to make APA land-uses more compatible with maintaining the equilibrium of the mangrove ecosystem.</p> <p><u>Establishment of an APA management council</u> as a mechanism for participation in a vast, multi-use UC with 16 municipalities will generate replicable approaches to bringing together stakeholders with vastly different resource needs and interests.</p> <p><u>Identification of partners and implementation strategies</u> to assist the APA Council in developing its APA Management Plan will contribute to immediate opportunities for replication of the Project vision in the management plan.</p> <p><u>Changes to regulations governing fisheries resources management</u> will be proposed based on lessons learned from this model.</p> <p>Output 3.2 <u>By integrating institutions that govern water resources and UC councils</u>, the Project will create knowledge, mechanisms and precedence for linking these two sectors. This will include participation of UC authorities and management councils in the development of local watershed management plans, integrating mangrove concerns related to quantity and quality of water into water management planning processes at the watershed level and defining mechanisms to regulate the use of water resource instruments, especially those related to water permits.</p> <p><u>Guidelines and priority actions to improve environmental quality</u> of interstitial areas of marine and terrestrial ecosystems, particularly those with influence on UCs, will be established. Levels of pollution and their sources will be discussed as part of the process to define the application of water resource instruments which will result in the development of basic parameters of water quality to ensure the maintenance of the integrity of mangroves.</p>

	<p><u>Changes to regulations governing the development of watershed plans</u> to make them more consistent with the water needs of downstream mangrove ecosystems will be proposed based on lessons learned through this demonstration.</p> <p>Output 3.3 <u>Capacity building of UC, water resource and municipal authorities</u> will facilitate the replication and scaling-up of the Project’s strategy and lessons related to inserting the mangrove strategy into broader spatial and sectoral planning through transferring knowledge into government and other stakeholder entities. To a great degree, this will focus on behavioral changes of water resource institutions, UC and municipal councils and other stakeholders.</p>
<p>Outcome 4: Mangrove-related outreach, dissemination and adaptive management increased</p>	<p>Output 4.1 Through <u>mapping Brazil’s mangroves</u>, the Project will create a database essential for the development of the mangrove network and the strategies it will promote to protect a representative sample of Brazil’s mangrove units. Without this, this important replication tool would not be possible.</p> <p><u>A mangrove biodiversity monitoring program</u> will be developed to harmonize M&E along the coast and will serve as an adaptive management tool for Brazil’s mangroves well after Project end.</p> <p><u>The Project M&E plan</u> will gather feedback from stakeholders to generate inputs for the dissemination of project results and lessons learned.</p> <p>Output 4.3 <u>Dissemination Plan</u> including a nationwide mangrove awareness campaign, publications on the Project’s activities and objectives as well as the importance of mangroves, a campaign for “mangrove friendly” hotels and the marketing of “mangrove friendly” products.</p> <p><u>The Mangrove Coordination Center</u> will serve as a forum for the dissemination of good practices, coordination of ongoing mangrove-relevant initiatives and a center for replication of Project strategies.</p> <p><u>Partnerships with the private sector</u> will allow for the replication of good practices through the provision of funds for UC management as well as the appropriation of a key actor in the sustainable use and conservation of mangrove resources.</p> <p><u>Outreach program for communities and sectors</u> will include specific consultation and outreach to key sectors that impact mangroves, including fisheries, aquaculture and tourism, on the environmental and economic importance of mangroves including the roles they play in sustaining sectoral economic activities.</p>

ANNEX 5: ADDITIONAL BASELINE INFORMATION

Systems Boundary

1. National policy would affect mangroves throughout their range of occurrence, from the mouth of the Amazon in the north to Santa Catarina in the south, through regulatory improvement and designation of new protected areas and mosaics. The project alternative selects a limited number of five intervention sites along the Brazilian seaboard as pilots to test the integrated approach to mangrove protection (see Outcome 3). In each intervention site, the system boundary is determined by the location of existing protected areas, and their respective buffer zones. Knowledge generated from these pilots will be upscaled through the entire mangrove protected area system and will also influence management practices in upland PAs.

Summary of Costs

2. Costs of the GEF Alternative represent baseline and incremental costs totalling \$161,368,594. New and additional incremental resources required to achieve project objectives are \$20,795,692 of which a GEF request is made for USD 5.0 million and USD 15.34 has been raised as co-funding, resulting in a 1:3 GEF to co-funding ratio. This represents a 12.9% increment due to GEF leveraging.

Baseline ⁷⁴

3. As described below, efforts in the baseline alone will neither be comprehensive nor timely enough to prevent further losses of globally significant biodiversity with ensuing negative effects on the well-being of traditional and local communities and erosion of the natural resource base of essential productive sectors reliant on mangroves.

The enabling environment for a sub-system⁷⁵ of mangrove ecosystem protected areas mechanisms

4. Brazil has recently promulgated a National Protected Area Plan (PNPA – Decree No. 5758, April 2006), whose Coordinating Commission and National Forum will oversee its implementation during the project period. MMA has established a Focal Group for Coastal and Marine Zones (NZCM) to integrate the policies and programs of several of its departments and other ministries and agencies related to coastal and marine environments. A total of \$32.30 million is budgeted in the federal Plurianual Plan for programs within MMA and IBAMA that provide baseline support toward the enabling framework for the proposed project, including implementation of the PNPA. Among other budget lines, this includes support for sustainable fisheries management planning, aquaculture and associated capacity building, protected areas planning and corridor development, environmental education, police powers and general administrative support. Despite this important initiative, there remain a number of crucial gaps in institutional capacity to execute coordinated approaches for protected mangrove management.

5. The National Forum on Protected Areas organized by MMA sponsored a series of studies, seminars and meetings during the PDF-B preparation period for this project, including an analysis of options for ensuring sustainability of protected areas throughout Brazil, including potential financing from environmental compensation, water use charges and other environmental services (\$106,818, including co-financing by TNC and other NGOs). These studies have yet to be transformed into definitive proposals to promote a sustainable financial base for the SNUC. Further efforts underway by FUNBIO to support

⁷⁴ All values have been converted at an exchange rate of R\$ 2.20/US\$.

⁷⁵ To avoid complications related to certain implications of the word “system” in Brazilian PA terminology, this sub-system will be referred to as a “malha” or “rede” in Portuguese.

business planning and financial sustainability in protected areas within the GEF-supported ARPA program in Amazonia is expected to provide an important contribution toward this knowledge in the baseline, but these lessons remain to be applied to mangrove and coastal ecosystems.

6. A national Environmental Compensation Fund has been created within the Caixa Econômica Federal savings bank, with capital estimated to attain as much as \$340 million in the coming years, financed from a share (at least 0.5%) of public and private infrastructure investment and directed specifically at protected areas as regulated by the SNUC. Based on licensing processes through the end of 2005, a total of at least \$6.4 million will be destined toward coastal and marine PAs as a result of this policy, during the project period.⁷⁶ However, this fund has as its priority to finance land acquisition for strict protection PAs, and will not enhance mangrove protection, since most of these areas lie within direct use areas. Furthermore, compensation occurs only at the moment of facility licensing, with no ongoing cash flow to maintain the investments in PAs. A critical gap that must be filled is that of ensuring financial support for long-term management of mangrove ecosystems.

7. Prior national efforts focused on mangrove areas have included diagnostic surveys and workshops to establish the priority of biodiversity conservation in coastal and marine resources, mapping of priority areas for biodiversity conservation and identification of threatened and invasive species. These efforts would be enhanced during the project period by additional investments associated with the current project and with PROBIO-II. Mangroves have also been mapped by IBAMA with a focus on shrimp hatcheries in selected states. Additional studies were conducted on sustainable use of coastal resources by traditional peoples by PROBIO. Despite these important investments, these instruments do not yet assure added protection to mangrove ecosystems, due to tenuous regulatory powers and insufficient management capacity.

8. The ORLA project, part of the national coastal zone management program managed by MMA and the Secretariat of the National Patrimony, includes mangroves in its plans for management of federal coastlands, where managers have defined this as a priority. The National Environmental Program (World Bank financed) foresees investing considerable resources in coastal zone management planning including mangroves in a number of states during the project period. Contingency plans financed by industry against risk of spills as part of licensing procedures for offshore petroleum and gas exploration activities also refer to mangroves. "Oil sensitivity maps" now indicate areas particularly sensitive to such risks. Some states, notably Rio Grande do Norte and Ceará, have already prepared such maps, and others are initiating such mapping. Other contributions by state governments to the project are allocated to this outcome, totaling nearly \$4.5 million, including support to state environmental agencies engaged in coastal zone and protected areas management within their territories, as well as state co-financing to federal and multilateral programs in these areas.

9. Government funds have been allotted for competitive bidding through the National Environmental Fund (FNMA - administered by MMA) for the structuring of management systems and endangered species protection including capacity-building activities among protected area managers and regional environmental authorities, NGOs and educational institutions. Such resources have however been limited to date to only a few coastal states and municipal agencies. Funding is restricted for mangrove related projects. Over the project period, it is estimated that a total in the order of \$2.3 million will be allocated by FNMA in competitive bidding for projects in mangrove-related areas, for a combination of general biodiversity conservation and fisheries resource management (actions in support of all four project outcomes).

⁷⁶ Note that the amount allocated to Outcome 1 (\$1,559,801) refers exclusively to funding for structuring of management councils and preparation of management plans in coastal PAs.

10. Brazil's commitment to the RAMSAR and CDB processes has also contributed to these efforts. Over the project period, \$55,000/yr are allocated by the Brazilian government to RAMSAR, (totalling \$330,000 in the baseline). There has been growing use of conservation gap analysis with particular emphasis on Amazonia by Ibama, where the RAPPAM tool has been applied to protected mangrove areas (ARPA, extended to additional protected areas in Amazon), and has served as the basis for the METTS analysis applied to selected protected areas with mangroves in the project alternative. Yet adoption of conservation gap analysis is no assurance that such analysis will provoke efforts to overcome these gaps, and in fact most such analysis has not been applied to strategic planning in mangrove related protected areas.

11. Valuation studies of mangrove ecosystems in several segments of the Brazilian coastline in the eastern Amazon and São Paulo coast indicate the significant benefits generated by these ecosystems to local consumption and income, regional environmental and recreational services provision and existence value. However, these studies have not been translated into incentives or financing to maintain and enhance their values, through sustainable use.

12. Part of these resources will improve capacity and governance over mangroves and related coastal areas, with an emphasis on identifying new and additional financial instruments for conservation in PAs. Under the baseline scenario, however, it is anticipated that UC management in mangrove areas will remain sub par with SNUC requirements largely unmet or ineffectively implemented. This is largely due to the designation of most mangroves as either APAs (Environmental Protection Areas) or sustainable use areas, not afforded the higher priority generally given to strict protection PAs by responsible management agencies.

13. Financing for protection and sustainable use activities in direct use PAs will have to compete for limited resources from the National Fund for Environmental Compensation, as described above, whose destination is restricted primarily to strict protection PAs. It is estimated that \$3.2 million from the compensation fund will be destined to coastal PAs under the baseline during the project period, for activities associated with improvement in sustainable use, however. The adoption of this strategy will include efforts by state governments to operate their own environmental compensation chambers, and to adopt criteria for adequate compensation of damages ensuing from major investment projects.

14. The National Center for Resource Management by Traditional Peoples (CNPT) channels resources in support of the network of marine Extractive Reserves (RESEX). IBAMA has committed resources through CNPT totaling over \$2.3 million toward actions in the baseline associated with the implementation of sustainable use strategies among traditional peoples residing in coastal RESEX. The RESEX model is clearly of great importance in demonstrating the sustainable use potential of mangrove ecosystems, yet has been insufficiently linked within an integrated approach context to overall protected area management.

15. Additional commitments in the baseline by IBAMA to the management of coastal fisheries (over \$20 million), prevention of fire and deforestation and other environmental control functions total all told over \$41 million. State governments, particularly Ceará and Bahia, have committed resources through baseline programs to foment sustainable use of mangrove related PAs (\$2.0 million).

Alignment of mangrove protected area management with existing spatial planning instruments and processes

16. Recent efforts on the part of MMA and IBAMA have provided the basis for an initial structuring of an integrated mosaic approach to management of a complex array of protected area units and surrounding mangroves in protected private properties. Such an approach is being contemplated through initial

meetings of PA managers within key groups of UCs, financed through federal operating budgets. No specific budget line has yet been established to finance the mosaic approach. However, elements of the mosaic approach have been adopted as policy within the framework of the National Protected Areas Plan, whose implementation serves as a baseline to the proposed project.

17. As part of the proposed project, five protected area clusters have been pre-selected as pilots for trial of model mangrove related integrated management approaches. In each of these areas, baseline investments by IBAMA have provided a basis for the structuring of individual protected areas. Such investments include personnel, equipment, communications facilities, buildings, etc. Maintenance and reinvestment in this operating base in the project intervention sites and buffer zone management during the project period is estimated in the baseline, at a total of approximately \$19.0 million, between MMA and IBAMA budget allocations.

18. To support the management of water resources, the Secretariat of Water Resources of MMA coordinated a planning process to develop the National Water Resources Management Plan. A separate commission was established to define appropriate uses and directives for integrated management of water resources in coastal areas. This institutional structure serves as the backdrop to development of water use criteria for mangrove areas, within the context of river basin management as specified by Law 9433, and for the allocation of water charges toward protected area management.

Learning, evaluation, and adaptive management of mangrove protected areas

19. Budgetary resources allocated by MMA and IBAMA toward baseline monitoring and evaluation, and in the dissemination of lessons learned in adaptive management in PAs are estimated in the order of \$19.0 million during the project period, while state agencies have committed \$2.5 million.

20. The Ministry of the Environment, through the GEF-funded PROBIO program, has laid the groundwork for structuring a national system of information regarding biodiversity, including information on mangroves. This facility has recently been merged into a national Environmental Information System, providing on-line access to subordinate geographical, coastal zone management and licensing databases. While information has been generated and will be available during the course of the project to guide investment and protection decisions, the ability of responsible authorities to appropriate and apply available information for management remains weak. There is still significant need to analyze the raw data that has been made available, test management guidelines and develop sectoral conservation policies.

21. At the state level, Inter-institutional Environmental Education Commissions have been formed to assure adoption of the “transversal” approach to integrate environmental aspects throughout school curricula. “Green Halls” (*Salas Verdes*) installed in state and municipal agencies, NGOs and educational institutions in coastal states to promote environmental education and cultural events to improve knowledge and awareness of environmental issues among the general public have received modest federal support totaling \$90,009, while state support to this undertaking is considerably greater. A total of 20 such facilities have been installed in states where mangroves occur and will be available for project-related events. Nevertheless, in the baseline scenario, these facilities will continue to be understaffed and not directed toward capacity building with the aim of improving management of protected areas.

ANNEX 6: PROTECTED AREA FUNDING AND POTENTIAL FINANCING MECHANISMS FOR MANGROVES

1. The potential for protected areas in mangrove areas to become financially sustainable, is a function of the overall structure of budgetary provision, compensation payments, concessions and partnerships with private enterprise and community organization both within PAs and in buffer areas. Federal and state budgets for protected areas are notoriously fragile; only the very basic operating costs (salaries and maintenance) are sustained, requiring that protected area managers seek other sources for necessary investments and support from other agencies for protection against incursion, poaching and resource extraction.

Current budgetary resources and gaps

2. A preliminary appraisal of protected area funding gaps was undertaken, using the “MICOSYS” framework (Vreugdenhil, 2003),⁷⁷ calibrated for 98 Brazilian PAs by TNC, with data from Ibama/DIREC (National Forum, 2006). Budgetary needs for investment and management of PAs were derived using this instrument, based on a uniform costing of expenditure categories. The study initially generated an estimate of the current funding level of the federal system, whose resources total approximately R\$ 200 million (including investments) and 1,339 staff. Using the MICOSYS projection of minimum requirements for efficient PA functioning, the federal system was estimated to require R\$ 327 million for operations alone (with personnel). A personnel contingent on the order of six-fold the present workforce was estimated as being necessary to manage federal protected areas (no estimates were available for current or projected state budgets or personnel).

3. Based on data extracted from the above described package (table 1), operating costs of mangrove-related PAs were estimated on average 20% lower than those for all equivalent PA types. This is the case with or without inclusion of personnel costs. The lowest costs are estimated for state-operated PAs, while the highest are those associated with national parks, but even here the two mangrove-related parks included in the sample (Lençóis Maranhenses and Superagüi) are estimated to have lower operating costs than the majority of the national park system. This is true despite the fact that the marine and coastal parks in general have larger average perimeters (89 km) than their land-based equivalents (59 km). One factor that explains this is that it may be easier to manage and control marine areas, accessible by boat, than densely vegetated areas.

4. The MICOSYS approach permits identification of investment and maintenance gaps, but should be taken with caution, as it is based on a uniform scheme of cost elements whose individual cost are budgeted homogeneously across protected areas. In practice, of course, such costs will vary by protected area location and managerial skill. The principal difficulty at present in Brazil as a whole is the lack of detailed information on a protected area basis regarding current operating expenses. Thus it is possible to project budgetary needs, but not the relation between such needs and actual expenses. It is also necessary to relate budgetary gaps to conservation shortfalls as described qualitatively in the METTS data.

5. The following table derived from initial estimates describes the average operating (personnel, maintenance and consumables) costs of selected PA types.⁷⁸

⁷⁷ MICOSYS stands for “Minimum Conservation System,” and was designed to (1) help identify a country’s biodiversity representation and gaps in an existing protected area system, (2) model the composition of protected area systems for the durable conservation of a vast majority of a nation’s species and (3) estimate the investment and operational costs of the selected system (Vreugdenhil *et al.* 2003).

⁷⁸ Investment information has also been obtained, but Ibama itself has recommended that these data not be used for expenditure gap analysis, as they are not reliable, having been prepared for the purposes of an initial appraisal for the National PA Forum.

Table 1. Average operating cost requirements in the Brazilian protected area system (US\$ 000/yr)					
	All PAs sampled		Mangrove PAs only		Mangrove PAs in sample *
	Excluding Personnel	Including Personnel	Excluding Personnel	Including Personnel	
Strict protection PAs					
Federal Biological Reserve	65,06	233,56	--	--	
Federal Ecological Station	68,69	244,89	53,18	157,33	1
National Park	154,77	582,94	105,93	458,29	2
State Biological Reserve	44,27	156,24	--	--	
State Ecological Station	42,65	163,18	32,17	127,97	2
State Park	56,64	239,48	31,99	127,79	1
Sustainable Use Areas					
Extractive Reserve	73,36	253,10	57,61	200,41	13
Federal Environmental Protection Area	46,61	160,18	48,68	172,51	4
National Forest	81,30	338,96	--	--	
Relevant Ecological Interest Area	37,35	136,59	42,59	142,57	2
State Environmental Protection Area	39,66	117,05	43,04	117,75	11
State Extractive Reserve	51,57	190,53	--	--	
State Forest	42,48	171,40	31,99	127,79	1
Overall Average	61,88	229,85	49,69	181,38	37
Average strict protection	72,01	270,05	55,82	217,85	5
Average sustainable use	53,19	195,40	44,78	152,21	32

Source: SAM Brasil spreadsheet. Calculations by project team.

* See list of mangrove PAs included in the sample, in Annex 1.

6. The next step to appraise PA funding gaps with respect to mangrove-related areas in Brazil, is to obtain detailed budgetary information on the current levels of funding of such units, as well as with specific budget items, to compare with the MICOSYS data parameterized for the Brazilian protected area system to date.⁷⁹ Some information has been obtained for the purposes of baseline assessment, and this should be correlated with the above data analysis.

7. As a first estimate, it is possible to relate the above data with information obtained from IBAMA that suggest an average operational expense (without personnel) per federal PA, of approximately US\$ 21,850, and \$ 83,700 inclusive of personnel (DIREC, DISAM/Ibama).⁸⁰ At this level of current financing, the overall MICOSYS generated average associated with mangrove-related PAs (US\$ 46,690 without personnel and \$181,380 including personnel), would suggest the existence of a funding shortfall of approximately 50%. It will be necessary to obtain more detailed budgetary and operating expense levels for each individual PA in the project clusters, and parameterize with the MICOSYS approach to estimate individual funding gaps.

8. The principal difficulties faced in organizing information on budgetary gaps in PA management have to do with the absence of uniform data collection regarding non-budgetary revenues, such as concessions, compensations and third-party contracting. Ibama/DIREC has compiled fairly complete data on federal compensations under Article 36 of the SNUC, but the state level data is incomplete. For this

⁷⁹ The MICOSYS dataset includes estimates of costs associated with guards, administration and technical personnel, buildings such as visitor facilities and guardposts, vehicles, equipment, materials and consumables. Such parameters should be specifically adjusted to the conditions associated with mangrove PAs, in order to assess funding gaps.

⁸⁰ Averages calculated on the basis of R\$ 2.15/US\$, based on reported values of R\$ 47,000 (without personnel) and R\$ 180,000 (including personnel) for coastal PAs.

reason, the project foresees activities emphasizing better allocation and management of state compensation funds to mangrove related PAs, with an emphasis on the state of Bahia.

Valuation of mangrove goods and services

9. Considering the importance of mangrove related protected areas for fisheries resources, coastal zone and water resource protection, environmental valuation studies have been conducted in many countries where such resources exist. Some such studies have focused on modeling the indirect linkages between onshore mangrove resources and offshore fisheries, while others are concerned with the more direct benefits generated for human populations who rely on these resources for their livelihoods. Nevertheless, such valuation studies have rarely been translated into action or investment on a par with the economic values identified. Valuation in and by itself is no panacea for action, but values if significant can inform policymaking and resource allocation.

10. To support the design and testing of economic instruments associated with the project, three valuation studies have been included in the budget, associated with information needs for outputs 1.3, 2.1, 2.3. and 3.2, focused on fisheries resources associated with mangroves in Pará, water resources in Paraíba and mangroves potentially affected by coastal development in Bahia. Existing valuation studies conducted in the Lagunar region of São Paulo (Iguape-Cananéia)⁸¹ and focused on the services and visitation values associated with Superagüi National Park in Paraná will inform the trial and improvement of existing economic instruments in the intervention site in this area.

11. The valuation study in Pará will be concerned primarily with appraising the linkages between mangrove ecosystem protection and near- and offshore fisheries. For this purpose, similar linkage models developed in other mangrove areas⁸² can provide an initial basis for establishing the importance of mangroves to the fisheries industry and artisanal fisheries in Pará. However, the study will also take advantage of a rich scientific literature on the characteristics and functions of mangrove ecosystems and the benefits they generate in Pará, such as the results of the MADAM project and studies conducted by researchers at the Goeldi Museum and by Ibama itself.⁸³

12. The valuation study in Paraíba will consider the links between mangroves and water resources they depend on to determine the costs incurred through loss of ecological services if water classifications do not take into account mangroves.

13. In Bahia, the valuation study will be concerned with establishing criteria for appraising the potential damage to mangroves and related water and land resources associated with major coastal investments (roads, industries, tourism infrastructure, power facilities, etc.). Such criteria were recently developed by Ibama related to environmental compensation for damages within UCs affected by the presence of communications facilities, associated with loss of recreational use areas, visitation and environmental services. It is proposed that similar criteria be developed based on valuation of potential losses to mangrove goods and services.

Revenue sources

14. A number of initiatives in the project baseline have provided an initial picture of options for alternative sources of revenues and cooperation with other agencies and enterprises. The National Forum on Protected Areas and the ARPA program are engaged in prognoses of the potential for ecosystem

⁸¹ Grasso, M. 1998; Grasso, M. & Schaeffer-Novelli, Y. 1999; Medeiros, C.P.S., 2000.

⁸² See for example, Patrik Rönnbäck (1999); Edward Barbier, (2000).

⁸³ M. Glaser & M. Grasso, 1998.

service payments and other funding mechanisms to overcome the fundamental funding gap in public protected area support. A Working Group on Protected Area Financial Sustainability (“GT-Sustentabilidade”) carried out a series of studies and discussions over an 18-month period in 2005-06, to estimate budgetary shortfalls in the federal protected area system as well as to identify specific opportunities to generate additional resources in support of the SNUC (Forum Nacional, 2006). With regard to financing options, the following existing and potential funding sources were explored by the Forum:

<u>Existing sources</u>	<u>Potential revenues</u>
<ul style="list-style-type: none"> • Federal budget • Environmental compensation • International donors • Protected Area Fund • Visitation 	<ul style="list-style-type: none"> • Forest concessions • Payment for ecosystem services • Fund for diffuse rights • “Ecological ICMS” • “Green” State Participation Fund • Bioprospecting and extractivism • Co-Management

15. Of the existing sources, the federal budget is the most significant in absolute terms, although estimation of actual amounts dedicated to PA management are difficult to arrive at. Budgetary destination was estimated from executive Pluriannual Plans (PPAs) over the period 2000-2005, in which it was possible to identify those programs oriented toward conservation units and their protection, as well as related support and research facilities. Personnel estimates were obtained from listings of staff assigned to PAs and their related support staff at state and federal levels, and the approximate budgetary allocation interpolated from general personnel payrolls and associated benefits. From these sources, it was then estimated that the total annual federal budget allocation to the SNUC was on the order of R\$ 184.2 million in 2005, of which slightly less than half (R\$ 83.1 million) dedicated to personnel (Ibama) and the remainder to specific programs associated with the SNUC. These resources account for slightly over 82% of all resources available for PA management in Brazil at present (see table 2).

16. Besides the federal budget itself, the federal government contributes to PA investment through the environmental compensation requirements of Art. 36 of the SNUC, under the allocation framework and methodology defined by Conama (Resolution No. X, April 2006). Through this instrument, all major public or private undertakings must compensate their unmitigated impacts through a contribution of at least 0.5% of their gross investment cost to the SNUC, with funds allocated for investment to the nearest strict protection PA(s), although there is now some leeway in this requirement to permit Ibama to redirect such funds to their highest and best use. Although most of these funds have so far been managed by the undertakings themselves, a federal Environmental Compensation Fund is in the planning stage within the Federal savings bank Caixa Econômica Federal. This fund would receive monies from companies or government agencies implementing major impacting projects, and would disburse these toward investments in affected PAs.

17. Due in part to the slow rate of disbursement of compensation resources under Article 36 to date (table 2), there is an accumulated backlog of over R\$ 250 million that is already destined to specific affected PA projects. With the compensation fund in place, and more experience in management of these funds, it is anticipated that investments on the order of R\$ 40 million could be absorbed each year. It is notable is that this estimate does not include funds potentially generated by oil and gas industry compensation, of particular interest to mangrove conservation. Since most O&G exploration in Brazil is directed toward offshore drilling operations, this represents an important potential source of revenues for mangrove-related PAs. Paradoxically, this considerable source of environmental revenue is reliant on continuing growth and associated negative impacts.

Table 2: Current and potential SNUC funds from existing sources (based on 2005 data)
R\$ million

	Annual Revenues	Funds Guaranteed for Coming Years	New Resources Anticipated
IBAMA			
- personnel	83.1		
- PA-related programs	67.4		
MMA			
- PA-related programs	33.7		
SUBTOTAL	184.2		
FNMA			
- PA-related grants	2.2		
ENVIRONMENTAL COMPENSATION			
- executed	4.0		
- accumulated		250.0	
- prospective			40.0/yr*
INTERNATIONAL COOPERATION	19.4	38.8	In negotiation
PROTECTED AREA FUND			20.0
VISITATION (2004)	14.3		
TOTAL	224.1		

Source: National Forum (2006). Obs.: * Not including petroleum-related compensation.

18. Another source of funds for innovative management actions and research support at the federal level is the National Environmental Fund (FNMA), which contributed R\$ 2.2 million through targeted grant competitions in 2005. Such funding is by no means guaranteed for the future, however, since most of the funds managed by the FNMA depend on international funding.⁸⁴ Additional support from six major international cooperation projects has been committed, at a level of R\$ 19.4/yr for the 2005-2007 period, with future periods under negotiation. The majority of these funds (at least 70%) is dedicated to ARPA. A smaller share (about 8%) has been committed by the European Community toward extractive reserves, some of which are located in mangrove areas. Finally, the Inter-American Development Bank has a portfolio of investments in ecotourism (\$200 million in Legal Amazonia) and tourism infrastructure (\$670 million in the Northeast), which affect and may support associated investments in mangrove-related PAs.

19. As part of ARPA, a specific fiduciary fund was created to provide a channel for private donations and international support toward the Amazon protected area system. This Protected Area Fund has already been capitalized at \$6.7 million, toward a total of \$29 million required to capitalize ARPA's first phase (sufficient to cover 50% of the maintenance costs of PAs included in the program). Its funds represent an endowment to contribute toward maintenance of protected area investments through ARPA.

20. Finally, park visitation was afforded considerable attention as a major potential and underexploited source of revenue for protected area management in Brazil. Of federal parks in existence, only 23 (35%) were open to visitation in 2005. Of 2.2 million paying visitors in that year, nearly 2 million visited Iguacu (982,000), Tijuca (706,000) and/or Brasilia (274,000) national parks; the remainder each received an average of only 15,000 visitors. Many visitors paid nothing to use the facilities. However, it is apparent that more parks are being allowed to charge for use of facilities (for which they must have a management council and plan in place). Overall visitation revenues are growing at a rate of approximately 35% per year, since 2002, when the SNUC came into force, but this revenue growth has been restricted primarily to Iguacu (Figure 1).

⁸⁴ The FNMA is funded in part from 10% of the fines collected for environmental crimes, and from a quota on petroleum sales. The remainder comes from international and private donors.

21. The Working Group took pains to project potential growth in revenues from entrance fees, with a proposal for differentiated fees for national and international visitors. However, such projections were limited solely to national parks. Visitation to mangrove-related parks is not registered or these are not yet open to visitation, and it is thus difficult to project potential revenues from this source. Since most mangrove-related areas are destined toward sustainable use rather than recreation, it is unlikely that entrance fees can be considered a substantial source of future revenue. However, this is one of the potential sources of finance for mangrove-related federal and state parks, that should be tied into proposals for local tourism development (see Figure 1, below).

22. Royalties paid to municipal and state governments associated with oil and gas exploitation could constitute an important share of protected area revenues in coastal states. These current or potential revenues were not analyzed by the Working Group. The primary difficulty associated in analysis of royalties and other compensation payments not specifically earmarked for PAs is that of identifying the destination of such resources. There is no clear requirement in law that funds obtained from natural resource extraction royalties be used to conserve endangered ecosystems.

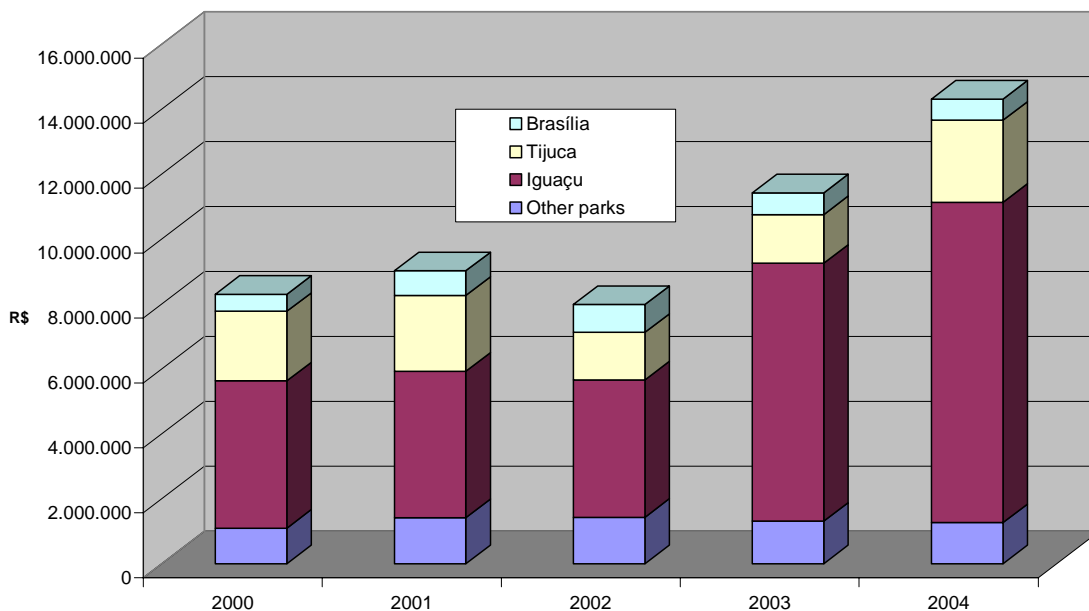


Figure 1. Park visitation revenues in the Iguazu, Tijuca, Brasília and 13 other federal parks open to visitation (2000-2004). Source: National Forum (2006).

Potential sources of revenue

23. The National Forum Working Group on Financial Sustainability undertook preliminary appraisal of a number of potential future sources of revenue for protected area management, including ecosystem service payments and associated tax reform schemes (ICMS, FPE), as well as sustainable use charges such as forest concessions. In the below analysis, we examine in some detail the opportunities associated with a subgroup of those investigated by the Working Group. It is the opinion of the project team that the remaining options investigated will be of more restricted feasibility for adoption in the case of mangrove-related protected areas.

Ecosystem service payments and ICMS Ecológico

24. Ecosystem service payment schemes (PES) establish instruments to motivate conversion to or maintenance of conservationist land use practices that assure continuous provision of life support services. In the case of mangroves, for example, these include the flow of nutrients necessary to nourish economically important marine species, and the provision of natural nurseries for such species, as well as storm protection against loss to property and improvements.

25. The principal problems in implementing PES approaches lie in identifying the proportionate contribution of a protected area to the provision of needed services, as well as targeting those who will pay for such provision. Negotiation between protected area managers and those who demand such services could generate a flow of compensatory payments. Presence of communications facilities in protected areas has served as a basis for such negotiation in the case of the Tijuca Park and Ipanema National Forest (Ibama, 2003).

26. Alternatively, such payments may be derived from contributions imposed on users. A promising opportunity for PES related to protected areas is that associated with financial contributions by water users, required by Article 47 of the SNUC, which specifies that both direct and indirect beneficiaries of water supplies derived from protected areas should contribute toward their maintenance. This article has not yet been regulated, and is the subject of discussion as to how best to integrate this provision with existing water charges provided for under the national water resource management system through Federal Law 9433, instituted in 2005 in four federal watersheds (May et al., in press). In regard to estuarine waters where mangroves occur, protected areas are not frequently used as water sources for human consumption, but may be affected by abstraction for cooling or used for disposal of effluents. In either case, water use charges could be imposed where institutional arrangements for river basin management are in place and part of such funds designated for protected area management.

27. The Ecological ICMS⁸⁵ (ICMS-E) implemented in 10 Brazilian states, is a revenue-neutral mechanism to compensate for the opportunity costs associated with protected area restraints on conventional sources of value-added revenues. In Paraná, the instrument has been fine-tuned over the years to make better use of its flexibility to promote improvement in protected area management. The adoption of a series of “conservation quality indices” as part of the weighting scheme used to allocate such revenues has stimulated additional efforts by managers and their municipal counterparts to improve facilities and services in protected areas, as well as the benefits they provide to properties in their buffer zones (Loureiro, 2002).

28. With particular reference to mangrove-related protected areas in the buffer zone of the Superagüi National Park in the Guaraqueçaba APA in Paraná, a Working Group has been formed involving technicians from Ibama, the state environmental agency (IAP) and the Federal University of Paraná to develop innovative approaches to channel ICMS-E resources to improve management of PAs in the cluster. This Working Group has an agenda focused on reorganizing the process of evaluation of the conservation quality of the PAs. This so-called “*Alavanca*” (Leverage) project has as one of its aims to build local capacity to participate in this process.⁸⁶ Engagement by local government officials is expected to engender greater commitment; through this process, they can find avenues to improve on the quality variables used to evaluate conservation performance to better reflect local conditions, and thereby improve the financial results associated with allocation of ICMS-E resources toward local needs.

⁸⁵ ICMS = value-added tax on goods and services. “Ecological” refers to the allocation scheme adopted by each state government for the 25% of ICMS revenues that is returned to the municipalities of origin, weighted by different criteria, as permitted by the 1988 Federal Constitution.

⁸⁶ A proposal for creation of a local NGO called “*Alavanca* Institute for Protected Area Improvement” has been adopted by the Group, to facilitate these aims.

29. The Alavanca Project has identified the following tools to be developed and tested in the cluster, related to improvement in the allocation of ICMS-E revenues:

- Construction of an evaluation framework based on management plans and local socio-environmental community needs in the areas surrounding existing PAs;
- Carry out additional valuations (after simulation) to appraise financial benefits generated by appropriate management practices in existing PAs;
- Technical assistance toward creation of additional RPPNs (generating additional revenues to local governments and commitment toward private conservation);
- Alterations in the ICMS-E regulatory instrument so as to give additional weight to protection of mangroves through zoning.

30. Development of this agenda will also require an appraisal of the effectiveness and needs for improvement in the ICMS-E process in São Paulo, which does not incorporate a conservation quality index to weight resource allocations. These activities will be more fully detailed and costed in the next version of this annex.

Tourism

31. Potential sources of financing to build sustainable funding for protected area maintenance associated with coastal tourism include:

- Receipts from licensing of commercial recreational activities in coastal areas (e.g., sports fishing, vessel rentals or mooring fees, diving equipment, etc.);
- Concessions on kiosks, hotels, restaurants, etc, located within protected areas, and/or certification of tourism facilities for excellence in socio-environmental practices beneficial to protection of local natural assets; and
- Receipts from value-added taxes on products extracted from direct use areas in mangrove areas (fish, shrimp and shellfish, crafts, medicinal and ornamental plants).⁸⁷

32. International experience linking recreation and tourism with protected area financing has been considerable, as documented by recent compilations (Emerton, et al. 2006). The use of entrance fees and concessions as a basis for park financing is widespread in developed countries such as the US, and in process of adoption in developing countries (Brown, 2001). In Brazil, however, experience with entry fees has been restricted to a small number of national parks, as described above. Concessions and licensing also have not been used effectively as a means to generate revenues or restrain use within carrying capacity. These options represent areas for practical trial of alternative instruments, eg., flat rate concessions vs. revenue sharing, catch-based or seasonal sports fishing licenses, etc.

33. A national “sustainable tourism certification” scheme has been initiated in Brazil, to provide standards and norms for facilities and services associated with ecotourism destinations. The scheme involves the definition and publication of norms by industry affiliates (Hospitality International), under the auspices of the program for sustainable tourism certification (PCTS), financed by the Inter-American Development Bank and the Brazilian Export Promotion Agency-APEX (Instituto de Hospitalidade, 2004). These norms provide criteria for tourism enterprises to plan and manage their socio-environmental

⁸⁷ Value-added taxation on extractive activity is rare, since most such activity is informal. The allocation of ICMS from formal activities to compensate municipal governments for hosting protected areas is provided for in those states which have enacted ICMS-E legislation.

impacts and provide support for the protection of natural resources and PAs which are among their principal attractions (see Annex X.2). They do not however contain explicit reference to means of contribution to sustainability of PAs in their radius, simply stating that they should either create a protected area of their own, or otherwise provide support to those nearby. Despite the lack of specificity, certification could provide an avenue for a share of tourism proceeds to be destined toward protected area management.

Other financing options investigated by the Working Group

34. Forest concessions – In 2006, the Public Forest Law came into force, providing for the concession of government owned forests to private enterprise subject to plans for sustainable use of timber or non-timber products or services. Sustainable management of mangroves could conceivably be carried out under concession, though it appears that the preferred modality for such management in Brazil is under the rubric of Extractive Reserves. The formulation of criteria for eventual concession of mangrove goods and services could assist in defining a benefits distribution approach in the context of a PES scheme. It appears however that this option will not be available for use in mangrove areas in the near future, as it was devised and is in immediate application primarily in Amazon forests.

35. Carbon trading – The Clean Development Mechanism now in force under the Climate Change Convention, provides for financing of projects in developing countries to help achieve emissions targets in Annex I (OECD and transitional) countries. In principal, such projects may include efforts to restore degraded lands through reforestation, and discussions are underway as to how to include efforts to reduce deforestation and protect standing forests within project finance in this realm. The tremendous uncertainties associated with land use and forest-related projects for climate mitigation suggest that the use of carbon credits to assist in financing protected mangroves would be untenable within the current regulatory context. There may be further space for joint benefits from carbon sinks, biodiversity protection, marine resources and associated social benefits to be perceived of interest by so-called “non-Kyoto” climate financiers. This is the case, for example, with the three RPPNs managed by SPVS in the Guaraqueçaba region of Paraná, financed by major US energy and automobile industries through TNC as a hedge against their future climate change mitigation responsibilities.

36. Fund for Diffuse Rights – This fund, administered by the Ministry of Justice, provides small grants to NGOs, sometimes for the purposes of projects associated with protected areas. Annual funding of such projects is miniscule, however, and would not serve the objectives of long-term PA maintenance.

37. “Green” State Participation Fund (FPE) – Similar to the Ecological ICMS, this fund would provide for a reallocation of current federal revenue-sharing with the states so as to place greater emphasis on the share of state territories under protected status. In theory, should such criteria be adopted (it still represents a congressional proposal), state governments would then have the wherewithal to allocate more of their budgets toward protected area maintenance and investment. Since it is still in the form of proposed law, having been voted favorably in the Senate, its potential cannot be readily appraised.

38. Extractivism and Bioprospecting – Since the primary economic activity associated with mangrove use is extractivist, the potential for such activity to contribute to the management of mangrove-related protected areas seems appropriate. However, given the extremely low incomes of those extractivists that depend on such revenue flows and foodstuffs for their livelihood, it seems inequitable at best to consider this source as a potential answer to funding requirements for protected area maintenance. The potential for tourism related use of such resources is more appropriate, and has been described in a previous section. Efforts by protected areas managers to assist mangrove-based communities to improve their incomes and diversify products may justify that part of such revenues generated return to protected areas in the form of tax revenues, such as through the Ecological ICMS (see footnote 34, above).

39. The use of mangroves as an object of bioprospecting may be of interest, but the uncertainties still present in the law for access and benefits sharing makes this a tenuous prospect as a source of long-term revenues for protected areas. The ubiquity of mangrove ecosystems would indicate that unique compounds or extracts may not be readily found, and if found, would be difficult to attribute to a specific source. Research authorization payments may be a more readily adopted means to generate revenues for protected areas than the eventual royalties associated with bioprospecting “hits”.

40. Co-Management – The option of entering into co-management agreements with NGOs or local governments may be a suitable means to reduce operating costs to the responsible federal or state agency, but requires the ability to monitor and control the effective protection afforded by such a strategy. The Working Group did not detail specific experiences with co-management. In Brazil, the cases of Mamirauá and Serra de Capivara spring to mind as favorable experiences with this approach. Co-management of fisheries resources and related conflict resolution is being adopted as a strategy in licensing of offshore petroleum activity in Brazil that should be of considerable importance to mangrove areas.

Table 3. Listing of Mangrove-related Protected Areas included in MICOSYS sample.

	CATEGORY	STATE	AREA (ha)
Federal Protected Areas			
Corumbau	RESEX	BA	92,388
Lençóis Maranhenses	PARNA	MA	159,446
Cururupu	RESEX	MA	187,576
Delta do Parnaíba	APA	MA, PI	286,944
Parnaíba	RESEX	MA, PI	27,622
Arai-Peroba	RESEX	PA	11,672
Caeté taperaçu (Bragança)	RESEX	PA	42,674
Chocoaré-Mato Grosso	RESEX	PA	2,786
Maracanã	RESEX	PA	30,843
Gurupi-Piriá	RESEX	PA	74,788
Mãe Grande de Curuçá	RESEX	PA	43,160
Marinha de Soure	RESEX	PA	15,346
São João da Ponta	RESEX	PA	3,215
Tracuateua	RESEX	PA	27,357
Barra do Rio Mamanguape	APA	PB	15,733
Manguezais da Foz do Rio Mamanguape	ARIE	PB	6,085
Guaraqueçaba	ESEC	PR	5,382
Guaraqueçaba	APA	PR, SP	242,984
Superagüi	PARNA	PR, SP	34,003
Cananéia-Iguape-Peruíbe	APA	SP	210,889
Ilha Ameixal	ARIE	SP	361
Mandira	RESEX	SP	1,183
State Protected Areas			
Baía de Camamu	APA	BA	118,000
Caraíva / Trancoso	APA	BA	31,900
Coroa Vermelha	APA	BA	4,100
Costa de Itacaré/ Serra Grande	APA	BA	14,925
Tinharé / Boipeba	APA	BA	43,300

Pratigi	APA	BA	49
Lagoa Encantada	APA	BA	11,800
Ponta da Baleia / Abrolhos	APA	BA	34,600
Santo Antônio	APA	BA	23
Estadual Guaraqueçaba	APA	PR	191,596
Estadual de Guaratuba	APA	PR	199,597
Guaraguaçu (Sema Pró-Atlântica)	ESEC	PR	1,150
Ilha do Mel	ESEC	PR	2,241
Palmito	FLONA	PR	530
Ilha do Cardoso	PARNA	SP	14

ANNEX 7: PROJECT MONITORING AND EVALUATION PLAN

Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures and will be provided by the project team and the UNDP Country Office (UNDP-CO) with support from UNDP/GEF. The Logical Framework Matrix in the main project document provides performance and impact indicators for project implementation along with their corresponding means of verification. These will form the basis on which the project's Monitoring and Evaluation system will be built.

The following sections outline the principal components of the Monitoring and Evaluation Plan and indicative cost estimates related to M&E activities. Adaptive management will be an essential ingredient in PA management plans as well as in the PA and individual performance evaluation systems that will be instituted through the project. This will increase the chance of M&E results being fed back and implemented on the ground. The project's Monitoring and Evaluation Plan will be presented and finalized at the Project's Inception Report following a collective fine-tuning of indicators, means of verification, and the full definition of project staff M&E responsibilities.

Monitoring and Reporting.

Project Inception Phase

- 1) A Project Inception Workshop will be conducted with the full project team, relevant government counterparts, co-financing partners, the UNDP-CO and representation from the UNDP-GEF Regional Coordinating Unit, as well as UNDP-GEF (HQs) as appropriate.
- 2) A fundamental objective of this Inception Workshop will be to assist the project team to understand and take ownership of the project's goals and objectives, as well as finalize preparation of the project's first annual workplan on the basis of the project's logframe matrix. This will include reviewing the logframe (indicators, means of verification, assumptions), imparting additional detail as needed, and on the basis of this exercise finalize the Annual Work Plan (AWP) with precise and measurable performance indicators, and in a manner consistent with the expected outcomes for the project.
- 3) Additionally, the purpose and objective of the Inception Workshop (IW) will be to: (i) introduce project staff with the UNDP-GEF *expanded team* which will support the project during its implementation, namely the CO and responsible Regional Coordinating Unit staff; (ii) detail the roles, support services and complementary responsibilities of UNDP-CO and RCU staff vis a vis the project team; (iii) provide a detailed overview of UNDP-GEF reporting and monitoring and evaluation (M&E) requirements, with particular emphasis on the Annual Project Implementation Reviews (PIRs) and related documentation, the Annual Project Report (APR), Tripartite Review Meetings, as well as mid-term and final evaluations. Equally, the IW will provide an opportunity to inform the project team on UNDP project related budgetary planning, budget reviews, and mandatory budget rephasings.

The IW will also provide an opportunity for all parties to understand their roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff and decision-making structures will be discussed again, as needed, in order to clarify for all each party's responsibilities during the project's implementation phase.

Monitoring Responsibilities and Events

- 4) A detailed schedule of project reviews meetings will be developed by the project management, in consultation with project implementation partners and stakeholder representatives and

incorporated in the Project Inception Report. Such a schedule will include: (i) tentative time frames for Tripartite Reviews, Steering Committee Meetings, (or relevant advisory and/or coordination mechanisms) and (ii) project related Monitoring and Evaluation activities.

Day to Day Monitoring

- 5) Day to day monitoring of implementation progress will be the responsibility of the Project Coordinator based on the project's Annual Workplan and its indicators. The Project Team will inform the UNDP-CO of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely and remedial fashion.
- 6) The Project Coordinator will fine-tune the progress and performance/impact indicators of the project in consultation with the full project team at the Inception Workshop with support from UNDP-CO and assisted by the UNDP-GEF Regional Coordinating Unit.. Specific targets for the first year implementation progress indicators together with their means of verification will be developed at this Workshop. These will be used to assess whether implementation is proceeding at the intended pace and in the right direction and will form part of the Annual Workplan. The local implementing agencies will also take part in the Inception Workshop in which a common vision of overall project goals will be established. Targets and indicators for subsequent years would be defined annually as part of the internal evaluation and planning processes undertaken by the project team.
- 7) Measurement of impact indicators related to global benefits will occur according to the schedules defined in the Inception Workshop and tentatively outlined in the indicative Impact Measurement Template at the end of this Part. The measurement, of these will be undertaken through subcontracts or retainers with relevant institutions or through specific studies that are to form part of the projects activities.

Periodic Monitoring

- 8) Periodic Monitoring of implementation progress will be undertaken by the UNDP-CO through quarterly meetings with the project proponent, or more frequently as deemed necessary. This will allow parties to take stock and to troubleshoot any problems pertaining to the project in a timely fashion to ensure smooth implementation of project activities.
- 9) UNDP Country Offices and UNDP-GEF RCUs as appropriate, will conduct yearly visits to projects that have field sites, or more often based on an agreed upon schedule to be detailed in the project's Inception Report / Annual Workplan to assess first hand project progress. Any other member of the Steering Committee can also accompany, as decided by the SC. A Field Visit Report will be prepared by the CO and circulated no less than one month after the visit to the project team, all SC members, and UNDP-GEF.

Annual Monitoring

- 10) Annual Monitoring will occur through the *Tripartite Review (TPR)*. This is the highest policy-level meeting of the parties directly involved in the implementation of a project. The project will be subject to Tripartite Review (TPR) at least once every year. The first such meeting will be held within the first twelve months of the start of full implementation. The project proponent will prepare an Annual Project Report (APR) and submit it to UNDP-CO and the UNDP-GEF regional office at least two weeks prior to the TPR for review and comments.
- 11) The APR will be used as one of the basic documents for discussions in the TPR meeting. The project proponent will present the APR to the TPR, highlighting policy issues and recommendations for the decision of the TPR participants. The project proponent also informs the participants of any agreement reached by stakeholders during the APR preparation on how to

resolve operational issues. Separate reviews of each project component may also be conducted if necessary.

Terminal Tripartite Review (TTR)

- 12) The terminal tripartite review is held in the last month of project operations. The project proponent is responsible for preparing the Terminal Report and submitting it to UNDP-CO and LAC-GEF's Regional Coordinating Unit. It shall be prepared in draft at least two months in advance of the TTR in order to allow review, and will serve as the basis for discussions in the TTR. The terminal tripartite review considers the implementation of the project as a whole, paying particular attention to whether the project has achieved its stated objectives and contributed to the broader environmental objective. It decides whether any actions are still necessary, particularly in relation to sustainability of project results, and acts as a vehicle through which lessons learnt can be captured to feed into other projects under implementation of formulation.

Project Monitoring Reporting

- 13) The Project Coordinator in conjunction with the UNDP-GEF extended team will be responsible for the preparation and submission of the following reports that form part of the monitoring process. In the following list, items (a) through (e) are mandatory and strictly related to monitoring, while (f) through (g) have a broader function and the frequency and nature is project specific to be defined throughout implementation.

a) Inception Report (IR)

- 14) A Project Inception Report will be prepared immediately following the Inception Workshop. It will include a detailed First Year/ Annual Work Plan divided in quarterly time-frames detailing the activities and progress indicators that will guide implementation during the first year of the project. This Work Plan would include the dates of specific field visits, support missions from the UNDP-CO or the Regional Coordinating Unit (RCU) or consultants, as well as time-frames for meetings of the project's decision making structures. The Report will also include the detailed project budget for the first full year of implementation, prepared on the basis of the Annual Work Plan, and including any monitoring and evaluation requirements to effectively measure project performance during the targeted 12 months timeframe.
- 15) The Inception Report will include a more detailed narrative on the institutional roles, responsibilities, coordinating actions and feedback mechanisms of project related partners. In addition, a section will be included on progress to date on project establishment and start-up activities and an update of any changed external conditions that may effect project implementation.
- 16) When finalized the report will be circulated to project counterparts who will be given a period of one calendar month in which to respond with comments or queries. Prior to this circulation of the IR, the UNDP Country Office and UNDP-GEF's Regional Coordinating Unit will review the document.

b) Annual Project Report (APR)

- 17) The APR is a UNDP requirement and part of UNDP's Country Office central oversight, monitoring and project management. It is a self -assessment report by project management to the CO and provides input to the country office reporting process and the ROAR, as well as forming a key input to the Tripartite Project Review. An APR will be prepared on an annual basis prior to the Tripartite Project Review, to reflect progress achieved in meeting the project's Annual Work

Plan and assess performance of the project in contributing to intended outcomes through outputs and partnership work.

18) The format of the APR is flexible but should include the following:

- An analysis of project performance over the reporting period, including outputs produced and, where possible, information on the status of the outcome;
- The constraints experienced in the progress towards results and the reasons for these;
- The three (at most) major constraints to achievement of results;
- AWP, SAC and other expenditure reports (ERP generated);
- Lessons learned;
- Clear recommendations for future orientation in addressing key problems in lack of progress

c) Project Implementation Review (PIR)

19) The PIR is an annual monitoring process mandated by the GEF. It has become an essential management and monitoring tool for project managers and offers the main vehicle for extracting lessons from ongoing projects. Once the project has been under implementation for a year, a Project Implementation Report must be completed by the CO together with the project. The PIR can be prepared any time during the year (July-June) and ideally prior to the TPR. The PIR should then be discussed in the TPR so that the result would be a PIR that has been agreed upon by the project, the executing agency, UNDP CO and the concerned RC.

20) The individual PIRs are collected, reviewed and analysed by the RCs prior to sending them to the focal area clusters at the UNDP/GEF headquarters. The focal area clusters supported by the UNDP/GEF M&E Unit analyse the PIRs by focal area, theme and region for common issues/results and lessons. The TAs and PTAs play a key role in this consolidating analysis.

21) The focal area PIRs are then discussed in the GEF Interagency Focal Area Task Forces in or around November each year and consolidated reports by focal area are collated by the GEF Independent M&E Unit based on the Task Force findings.

d) Quarterly Progress Reports

22) Short reports outlining main updates in project progress will be provided quarterly to the local UNDP Country Office and the UNDP-GEF regional office by the project team.

Periodic Thematic Reports

23) As and when called for by UNDP, UNDP-GEF or the Implementing Partner, the project team will prepare Specific Thematic Reports, focusing on specific issues or areas of activity. The request for a Thematic Report will be provided to the project team in written form by UNDP and will clearly state the issue or activities that need to be reported on. These reports can be used as a form of lessons learnt exercise, specific oversight in key areas, or as troubleshooting exercises to evaluate and overcome obstacles and difficulties encountered. UNDP is requested to minimize its requests for Thematic Reports, and when such are necessary will allow reasonable timeframes for their preparation by the project team.

Project Terminal Report

24) During the last three months of the project the project team will prepare the Project Terminal Report. This comprehensive report will summarize all activities, achievements and outputs of the Project, lessons learnt, objectives met, or not achieved, structures and systems implemented, etc.

and will be the definitive statement of the Project's activities during its lifetime. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the Project's activities.

Technical Reports

25) Technical Reports are detailed documents covering specific areas of analysis or scientific specializations within the overall project. As part of the Inception Report, the project team will prepare a draft Reports List, detailing the technical reports that are expected to be prepared on key areas of activity during the course of the Project, and tentative due dates. Where necessary this Reports List will be revised and updated, and included in subsequent APRs. Technical Reports may also be prepared by external consultants and should be comprehensive, specialized analyses of clearly defined areas of research within the framework of the project and its sites. These technical reports will represent, as appropriate, the project's substantive contribution to specific areas, and will be used in efforts to disseminate relevant information and best practices at local, national and international levels.

Project Publications

26) Project Publications will form a key method of crystallizing and disseminating the results and achievements of the Project. These publications may be scientific or informational texts on the activities and achievements of the Project, in the form of journal articles, multimedia publications, etc. These publications can be based on Technical Reports, depending upon the relevance, scientific worth, etc. of these Reports, or may be summaries or compilations of a series of Technical Reports and other research. The project team will determine if any of the Technical Reports merit formal publication, and will also (in consultation with UNDP, the government and other relevant stakeholder groups) plan and produce these Publications in a consistent and recognizable format. Project resources will need to be defined and allocated for these activities as appropriate and in a manner commensurate with the project's budget.

Independent Evaluation

27) The project will be subjected to at least two independent external evaluations as follows:-

Mid-term Evaluation

28) An independent Mid-Term Evaluation will be undertaken at the end of the second year of implementation. The Mid-Term Evaluation will determine progress being made towards the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.

Final Evaluation

29) An independent Final Evaluation will take place three months prior to the terminal tripartite review meeting, and will focus on the same issues as the mid-term evaluation. The final evaluation will also look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. The Final Evaluation should also provide recommendations for follow-up activities. The Terms of Reference for this

evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.

Audit Clause

30) An annual audit of the financial statements relating to the status of UNDP (including GEF) funds according to the established procedures set out in the Programming and Finance manuals will be conducted. The Audit will be conducted by a commercial auditor engaged by the Government.

MONITORING AND EVALUATION WORK PLAN AND CORRESPONDING BUDGET

Table 1: Monitoring and Evaluation Work Plan and Corresponding Budget

Type of M&E activity	Responsible Parties	Budget US\$ <i>Excluding project team staff time</i>	Time frame
Inception Workshop (IW)	<ul style="list-style-type: none"> ▪ Project Coordinator ▪ UNDP CO ▪ UNDP GEF 	None	Within first two months of project start up
Inception Report	<ul style="list-style-type: none"> ▪ Project Team ▪ UNDP CO 	None	Immediately following IW
Measurement of Means of Verification for Project Purpose Indicators	<ul style="list-style-type: none"> ▪ Project Coordinator will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members 	To be finalized in Inception Phase and Workshop. Indicative cost: US\$100,000 of which \$50,00 is cofunding and will including the Outcome indicators	Start, mid and end of project
Measurement of Means of Verification for Project Progress and Performance (measured on an annual basis)	<ul style="list-style-type: none"> ▪ Oversight by Project GEF Technical Advisor and Project Coordinator ▪ Measurements by regional field officers and local IAs 	To be determined as part of the Annual Work Plan's preparation but that will form part of the above budget.	Annually prior to APR/PIR and to the definition of annual work plans
Conduct METT	<ul style="list-style-type: none"> ▪ PMU and consultant 	None	Mid-term and end
APR and PIR	<ul style="list-style-type: none"> ▪ Project Team ▪ UNDP-CO ▪ UNDP-GEF 	None	Annually
TPR and TPR report	<ul style="list-style-type: none"> ▪ Government Counterparts ▪ UNDP CO ▪ Project team ▪ UNDP-GEF Regional Coordinating Unit 	None	Every year, upon receipt of APR
Steering Committee Meetings	<ul style="list-style-type: none"> ▪ Project Coordinator ▪ UNDP CO 	None	Following Project IW and subsequently at least once a year
Periodic status reports	<ul style="list-style-type: none"> ▪ Project team 	None	To be determined by Project team and UNDP CO

Technical reports	<ul style="list-style-type: none"> ▪ Project team ▪ Hired consultants as needed 	None	To be determined by Project Team and UNDP-CO
Mid-term External Evaluation	<ul style="list-style-type: none"> ▪ Project team ▪ UNDP- CO ▪ UNDP-GEF Regional Coordinating Unit ▪ External Consultants (i.e. evaluation team) 	US\$30,000	At the mid-point of project implementation.
Final External Evaluation	<ul style="list-style-type: none"> ▪ Project team, ▪ UNDP-CO ▪ UNDP-GEF Regional Coordinating Unit ▪ External Consultants (i.e. evaluation team) 	US\$50,000	At the end of project implementation
Terminal Report	<ul style="list-style-type: none"> ▪ Project team ▪ UNDP-CO ▪ External Consultant 	None	At least one month before the end of the project
Lessons learned	<ul style="list-style-type: none"> ▪ Project team ▪ UNDP-GEF Regional Coordinating Unit 	None	Yearly
Audit	<ul style="list-style-type: none"> ▪ UNDP-CO ▪ Project team 	US\$10,000 (average US\$2,000 per year)	Yearly
Visits to field sites (UNDP staff travel costs to be charged to IA fees)	<ul style="list-style-type: none"> ▪ UNDP Country Office ▪ UNDP-GEF Regional Coordinating Unit (as appropriate) ▪ Government representatives 	US\$20,000 (average 2 visits per year)	Yearly
TOTAL INDICATIVE COST			
<i>Excluding project team staff time and UNDP staff and travel expenses</i>		US\$ 210,000	

ANNEX 8: BIBLIOGRAPHY

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SIGNATURE PAGE

Country: _____

UNDAF Outcome(s)/Indicator(s):

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Expected Outcome(s)/Indicator (s):

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Implementing partner:

(designated institution/Executing agency)

Other Partners:

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