



## THE REPUBLIC OF THE GAMBIA DEPARTMENT OF PARKS & WILDLIFE MANAGEMENT

NIUMI NATIONAL PARK MANAGEMENT PLAN 2020-2025



Gestion durable des Zones humides pour le renforcement de la Sécurité alimentaire et de la Résilience des écosystèmes en Afrique de l'Ouest  
(GDZHAO)



Sustainable Wetland Management for Enhancing Food Security  
and Ecosystem Resilience in West Africa  
(GDZHAO)



Project funded by  
the EUROPEAN UNION

## SUMMARY

Compiling a management plan of a protected area is no easy task, but its obvious usefulness overrides the difficulty of the undertaking. It is difficult because it entails gathering, compiling and shifting through a daunting mass of information and data, as well as verifying their accuracy, since the future development and indeed, survival of the rich biodiversity of the Niimi National Park and Marine Protected Area is at stake. It is useful because it touches upon such a wide range of topics. History and culture are in dissociable from environment and the flora and fauna.

We wish to commend and thank the men and women who have contributed in many ways to the compilation of this management plan, and we are convinced that such a high professional, accurate, and informative work will be an excellent guide for the noble and exciting mission which the DPWM staff under the support of "Supporting food Security and ecosystem resilience for sustainable management of wetlands in West Africa through the earth observation data (GDZHAO" has to fulfill in a new millennium full of hopes and challenges.

In updating this management plan, many people have been of immense assistance. We wish to acknowledge our indebtedness to the Government of The Gambia, the Ministry of Forestry and the Environment, Department of Fisheries and the Department of Parks and Wildlife Management. Their support has been a constant and unflinching source of encouragement.

Sincere appreciation is expressed to the Directors of Parks and Wildlife Management and Fisheries Departments, the warden of Niimi National Park and his Management team and the fisher folks for their valuable support and responsibilities.

Finally, we wish to leave on record our heartfelt thanks to our family members, friends and colleagues, and all those who help in one way or the other for the implementation of this task, for the unfailing support and unlimited patience throughout this time demanding period.

Prepared by and for Department of Parks and Wildlife Management

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## SECTION I: DESCRIPTION OF ECOLOGICAL AND SOCIAL FEATURES



### **Background**

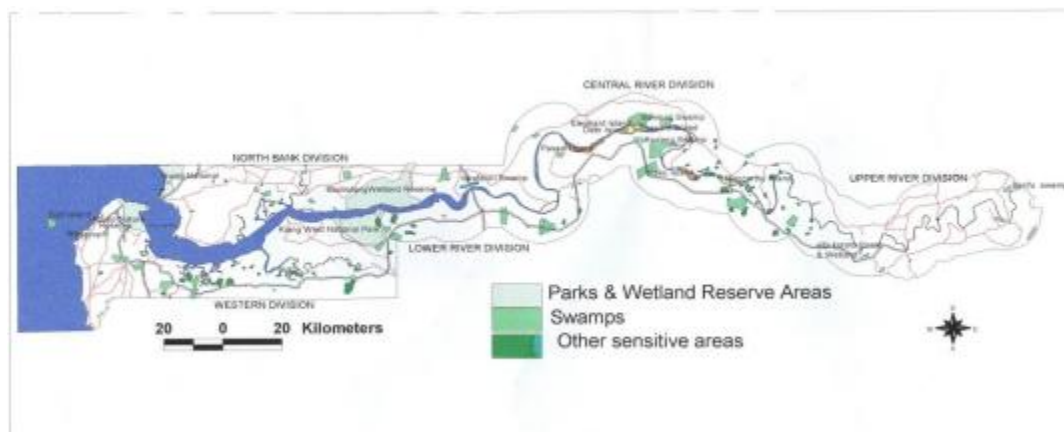
The need for the conservation and sustainable use of biodiversity and environmental protection in general, was not a high priority for The Gambia government until the early 1970s when the country was faced with serious drought coupled with increasing human population pressure. Hitherto, the country was still covered with vast areas of closed canopy forests with healthy wildlife habitats supporting numerous wildlife species. The level of natural resource destruction was insignificant as the human population was very low. The population was able to satisfy their domestic needs from the environment and its resources without necessarily destroying it. However, by the mid- 1970s the situation had started to change from bad to worse. By 1977 the Government had started giving serious attention to

environmental issues, and biodiversity in particular. For example, as a sign of commitment, the president in February 1977 made a declaration on biodiversity, popularly known as the Banjul Declaration.

***The Banjul Declaration of 18 February 1977.***

*It is a sobering reflection that in a relatively short period of our history most of our larger wildlife species have disappeared together with much of the original forest cover. The survival of the wildlife still remaining with us and the setting aside of protected natural habitats for them is the concern of all of us. It would be tragic if this priceless natural heritage, the product of millions of years of evolution, should be further endangered or lost for want of proper concern. This concern is a duty which we owe to ourselves, to our great African heritage and the world. Thus, I solemnly declare that my government pledges its untiring efforts to conserve for now and posterity as wide a spectrum as possible of our remaining flora and fauna.*

To further strengthen its commitment, the Government established and strengthened the departments responsible for the conservation and sustainable use of biodiversity, including the Departments of Parks and Wildlife Management, Forestry and Fisheries under a Separate ministry – Ministry of Natural Resources and the Environment. In addition, the National Environment Agency (NEA) was created under the office of the President. Environmental policies were developed and national policy orientation took place with a focus on environmental protection and sustainable use of natural resources.



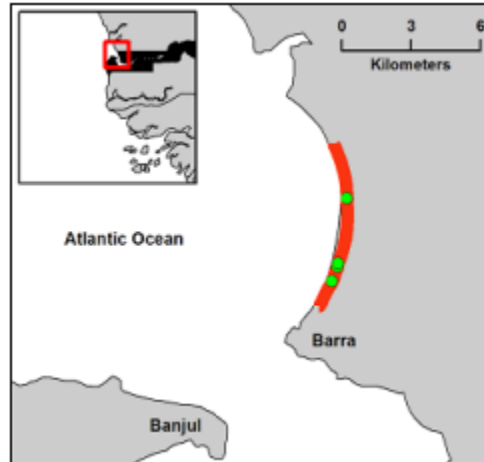
Map of the protected areas of the Gambia

## 1. General Information

Niumi National Park encompasses the southern tip of the Sine-Saloum Delta. The wetland complex is primarily coastal in nature with seasonal variation in the hydrological regime of the inland component. The fauna of the area is diverse though not exceedingly abundant and includes the West African Manatee (*Tricheus senegalensis*) and Atlantic Humpbacked Dolphin (*Sousa teuszii*). Niumi National Park occupies the coastal strip of the north bank of the River Gambia and covers approximately 7758 ha of which 4940 ha of terrestrial and 2818 ha of marine waters. The park extends northwards to the Senegalese border where it joins with the Delta du Saloum National Park. Eleven communities (Barra, Essau, Madina Kanuma, Mayamba, Kanuma, Mbollet, Mbollet Ba, Jamageng, Mbankam, two more) are located along the periphery of the park. Three communities are located within the Park area namely: Bakindi Kikoto, Jinack Niji and Jinack Kajata. The resident and peripheral villages are dependent on the park for numerous activities including the production of rice, millet, cashew and groundnuts, fishing and oyster collection, wild fruit collection, provision of timber and wood for cooking and construction purposes, grazing of stock (cattle, sheep and goats) and seasonal collection of salt.

### a. Location, Site Definition, Boundaries

Niumi National Park is centered on coordinate 13°31'N, 16°31'W on the north bank of the River Gambia, in Lower Niumi District of the North Bank Region. The Park boundary extends from Barra Point at the mouth of the River Gambia north to the border covering the low sandy island of Jinack, then East along the Masarinko Bolong to the upper limit of saline intrusion.



Location of the Niumi National Park

Niumi National Park, gazetted in 1986, occupies the coastal strip North of the River Gambia and extends around two Nautical miles in the Atlantic Ocean. The landscape part contains very sparse wildlife population though a wide diversity of habitat types exist, while the wetland component serves as an important fish breeding and nursery ground. Niumi National Park is a continuum of ecological complex shared with the Delta du Saloum national park and Biosphere Reserve making it the first African Transboundary Ramsar Site and proposed Transboundary Biosphere Reserve. The international character of the Delta as one ecological entity with vital and incalculable environmental value to the region and its

people triggered the Gambia and Senegal, to recognize that the protection and management of this life support system and its resources.

## **b. Land Tenure**

In communities around the Niumi National Park, agricultural land is generally held in communal ownership with allocations as required being granted by the village "Alikalo or Chief". Cultivation of agricultural land is done on a plot basis with a reciprocal approach to labor (Ramsar Wetland Study The Gambia, 1977).

## **2. Socio-economic characteristics**

**2.1 The Socio – Economic Importance of Niumi Wetlands** The communities peripheral to and within Niumi National Park are composed primarily of subsistence farmers and fishermen, and resultantly they are dependent on natural resources for the maintenance of their livelihoods. The wetland areas of the park are of considerable importance in these subsistence economies such as for wet season rice cultivation and dry season market gardening, provision of dry season grazing for livestock, fishing and shellfish harvesting such as oysters and clams. Various materials are also derived from the wetland environment including mangrove poles for roofing and grasses for thatching and fence construction.

The dependence on natural resources by local communities places them in a key role position in the management of the park. Their dependence on these resources for basic needs can only be continued sustainably if there is no significant increase in demand and deterioration in utilization practices.

Unfortunately, with the human growth rate of The Gambia exceeding 3.2% and the increasing environmental degradation resulting from inappropriate techniques such as excessive use of firewood, over grazing by livestock, etc.

The recognition of the ecological value of the Niumi wetlands and a better understanding of its functioning enable a more balanced direction to be taken in the management of its resources. In the case of Niumi the functions of the wetland include fish breeding and nursery grounds for fish and fisheries species as well as regulation of saline intrusion and the protection of the coastal zone. Additional functions that could be tapped include the development of tourism, recreation and educational services.



## **2.2 Current Socio- Economic Activities**

### **2.2.1 Agriculture**

Seasonal production of early millet and groundnuts is confined to the plateau areas of the park where traditionally the crops were periodically rotated onto fresh ground in a shifting pattern. Natural vegetation was allowed to regenerate during the fallow periods, and mature trees left upon clearance for cultivation. This system has essentially broken down as the demand for land has increased and the more intensive cropping in combination with the practice of burning off crop residues prior to cultivating the land has led to a deterioration of soil fertility.

In the rain fed swamps and upper freshwater reaches of the creeks (bolongs), seasonal rice cultivation is conducted using labor intensive methods, mostly by women. Some construction of earthen bunds has been conducted to either retain freshwater in the case of rain fed swamps or to prevent saline intrusion in the upper creeks (bolongs). A number of villages outside of the parks utilize these wetlands with the consent of the Alkalo (Village chief) under whose jurisdiction the land falls.

Crop yields are quite variable due to rainfall patterns and husbandry techniques employed. Most rice is home consumed though invariably there is exchange through bartering and distribution among the extended family.

### **2.2.2 Market Gardening.**

In the same areas utilized for rice cultivation dry season market gardening is carried out availing of the organic soils and the high water table. Hand dug wells are used for watering of tomatoes, peppers, cabbage, onions and bitter tomatoes. As with rice cultivation, the majority of people involved in horticulture are women who operate on a collective and co-operative basis locally referred to as a "kafo". Much of the produce is sold at the local level raising a small income for the women involved, and the balance of the crops are consumed in the household thereby improving nutrition intake.

### **2.2.3 Fishing.**

Despite the good fishing grounds within the creeks (bolongs) and in the inshore waters, fishing activities are primarily at the subsistence level within Niimi National Park. A few individuals from each of the villages close to the creeks(bolongs) are involved in gill netting on a part- time basis and fish traps are also utilized on the upper creeks (bolongs) towards the end of the rains as the waters are subsiding. The catches are generally home consumed or bartered at the village level for other goods or services. On the Senegalese end of Jinack Islands, the villages of Barra and Diatako are more commercially oriented in their fishing activity which reaches the market of the larger towns.





Women are engaged in the harvesting of oysters, clams and whelks in the Masarinko and NijiBolong. The oysters are harvested from the roots of mangroves, and shellfish are collected from the mud flat during spring tides. Again these activities are primarily at subsistence level though that is not to underscore their importance in the local economy and in nutrition.



#### **2.2.4 Building Materials and Firewood**

The timber of mangrove is valued for its resistance to insect damage and it is used primarily for cross timbers and laths in roofing. As the amount of timber available in the dry woodland diminishes through over – exploitation and excessive use of fire, mangroves are now used as an alternative for fuelwood and fencing posts. However, alternatives are necessary to discourage the use of mangroves for such purposes.

The elephant grass (*Andropogon gayanus*) is harvested after the rainy season when it reaches full maturity with stout and strong straw up to 2.5m in length. The grass is used in roofing of houses and is also woven into 3m long sections used in fencing.

### 2.2.5 . SAND MINING

The closed canopy dry woodland located between Mbollet Ba and Kanuma, has been affected by sand mining. The excavation has left numerous trees standing on pedestals of soil 2m above the current ground level. Efforts are being made to control this activity through the cooperation of the Department of Parks and Wildlife Management, Geological Unit and the National Environment Agency. The site has become a Man-made wetland which inhabits lot of waterbirds and crocodiles amongst others.

### 2.2.6. Livestock Grazing

Within Niimi National Park, sheep, cattle and goats utilize the area for grazing. Small ruminants are seen generally grazing close to villages and are corralled within compounds overnight, cattle are corralled by tying to stakes in areas peripheral to the villages.

Livestock numbers are seasonally augmented during the dry season as cattle are brought to the coastal area to avail of the better grazing. On the island of Jinack, the number of cattle appears to double during the dry season and they are ranged over the entire island. In recognition of the impact that small stock were having on the regeneration of trees on the island the communities of Niji and Kajata have regulated the numbers of small stock. The impact of cattle on regeneration is less obvious but there is an indication that through browsing and trampling damage to young saplings is occurring and the sensitive coastal vegetation (i.e the pioneer zone of plants on the dune fringe) is being degraded thereby exposing the stabilized dunes to erosion.

There is quite clearly a need to determine an appropriate stocking density for the various ecological zones of the park and to regulate grazing to a sustainable level.

### 2.2.8. Other Activities

The harvesting of wild fruits is widespread throughout the park and forms an important supplement to local diets and incomes where children often sell their harvest to raise funds for school books and fees. Numerous species are harvested including *Detarium senegalensis*, *Adansonia digitata*, *Ferdabia albidia*, *Ziziphus mauritiana* and *Saba senegalensis*. Excessive harvesting of wild fruits can lead to feed shortages for wild primates and other frugivorous species and in certain instances damage to the tree by unscrupulous cutting of branches to access fruits.



## Management Infrastructure

Since it was gazetted, Niimi National Park has had major intervention from the DPWM and Sub regional funding partners through the RAMPAN network. From 1993 a cadre of honorary rangers was established with the aim of providing some monitoring and control on activities taking place in the park. Presently staff personnel (21 rangers and 1 warden) have been established for the management of the Park.

A Site Management Committee (SMC) was formed for the Park in June 1996. It was made up of community representatives, relevant stakeholders and DPWM staff following a series of meetings with the local communities.

A building has been constructed to serve as Park headquarters and shelters for meetings and accommodation. It is located near the boundary of the Park along the track from Kanuma to the crossing point for Niji and Kajata.



## 3. Environmental Information

### 3.1. Physical

#### a. Climate: *The climate of The Gambia*

The Gambia has a Sudano-Sahelian type of climate characterized by a distinct rainy and dry season - a long dry season from October to early June and a short rainy season from mid-June to early October. Monsoon circulation over West Africa, correlated to Sea Surface Temperature (SST) in the Gulf of Guinea and modulated by the strength and location of the African Easterly Jet (AEJ), determines the character of the unimodal rainy season lasting from June to October. Annual rainfall decreases roughly from South to North, with insignificant geographical differences in variability. Temperatures on the other hand increase with distance from the Atlantic coast. Seasonal Northeast trade winds, known as Harmattan, also have an associative relationship with atmospheric circulations and are notable for their chill factor, and significant amounts of dust picked up from the margins of the Sahara Desert.

## **b. Hydrology:**

The bolongs of Niumi National Park are subject to the daily rhythm of the tides, which have a maximum range of 2m in equinoxal springs. During the rains from May/June to October/November, the salinity of the bolongs decreases in the upper reaches.

Low-lying areas on Jinack Island and on the mainland flood during the rains creating generally linear ponds and seasonal marshes in the salt pans and Tamarisk, *Tamarix senegalensis* scrub. The degree of flooding is a function of the extent of the rainfall, and in low-rainfall years flooding may be limited to relict bolongs. Flooded areas gradually recede as the dry season sets in and salinity of the water increases through evaporation (Ramsar Wetland Study The Gambia, 1997). The ground water table on the island of Jinack fluctuates between 3 and 5m depending on the season. The complexity of the aquifer in this area has not been thoroughly surveyed, but in places where freshwater is present at 3 to 4m depth in less than 100m away from the shoreline (Ramsar Wetland Study The Gambia, 1997).

## **c. Geology:**

Niumi National Park occupies the southern portion of the Sine-Saloum Delta and has a surface geology greatly influenced by the formation of a Ria (drowned river valley) within the Niji Bolong during the Nouakchottian transgression. During this transgression sea level rose 3 to 4m, flooding much of what is now Niumi National Park, resulting in sequences of unconsolidated sand, silts and clay. Beaches and sand dunes were subsequently left perched 4m above the existing high water mark, though they have subsequently been eroded and reworked. The sand deposits on the oceanic coast are referred to as Coastal Beach Complex. The Continental Terminal Series abuts onto this complex at Niumi with occasional exposure to laterite boulders as in the escarpment east of the Masarinko Bolong.

The Nouakchottian shoreline is evident along the Ker Saniang Bolong where it forms low eroding cliffs. Jinack island and the mosaic of islands to the north which form the Sine-Saloum Delta, are essentially shifting shoals of sand which have stabilized through colonization by vegetation though still maintain a degree of dynamism evident in the erosion/deposition occurring at the channel mouths eg Baniada Point (Ramsar Wetland Study The Gambia, 1997).

## **d. Geomorphology**

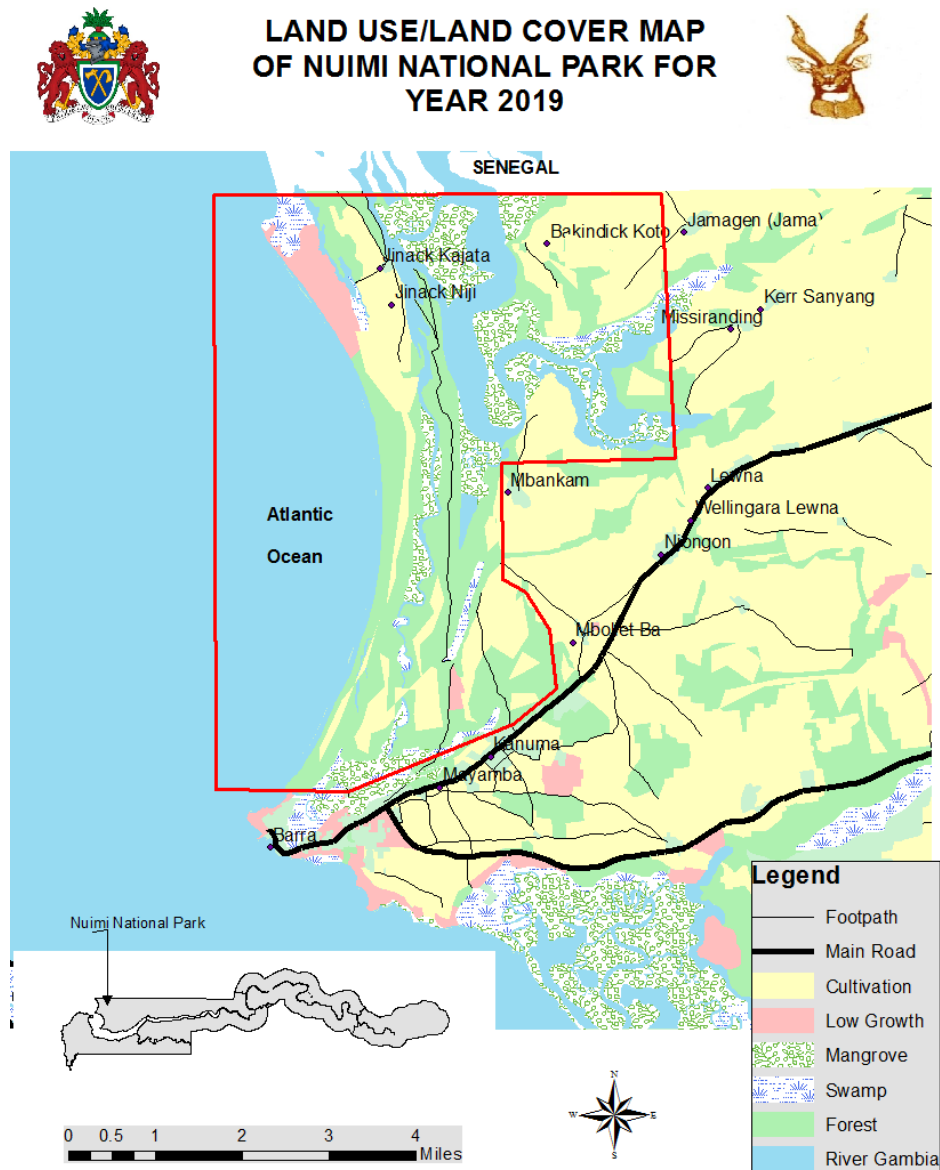
The average elevation within the park is less than 5m, with a maximum of approximately 15m. The high ground occurs primarily along the Masarinko Bolong where a sandy escarpment fringes what presumably was an ancient shoreline.

## **e. Soils**

A detailed soil survey (Ramsar study, 1996) as conducted in the vicinity of Kajata and Niji on Jinack islands as part of a program to rehabilitate rice fields that have been subject to saltwater intrusion over the last decade. The survey area was confined to two broad physiographic units: the elevated sand dune complexes and the low-lying flood plain area. The sand dune complexes are composed of relatively young underdeveloped, coarse textured soils that are low in nutrients and available water. The soil is unsuitable for most crops with the exception of coconuts (*cocos nucifera*). The low-lying flood plain is loaded with sodium salts, though the soils are moderately drained and contain appreciable amount of

nutrients. The problem of excessive sodium could be overcome if sufficient water is available to leach it out (Ramsar Wetland Study, The Gambia, 1997)

### 3.2. Ecological information



**a. Flora:** The distribution of vegetation types within the park is presented in figure 2B and follows the classification of vegetation types according to the Ramsar Convention for Wetland types, and Whyte (1993) for dry vegetation types (Wetland Ramsar The Gambia, 1997).



Table 2a **Classification of Vegetation-Habitat Types**

**Habitat Type**

**Symbol**

Mangrove	M
High Mangrove	Mh
Low Mangrove	MI
Coastal Grass/Scrubland	Cb
Grassland	Cg
Scrubland	Cs
Bush Scrubland	B
Forest/Woodland	F
Open Forest	Fo
Closed Forest	Fc
Mitragyna Woodland	My
Salt Marsh	Sm
Brackish Lagoon	Sl
Tamarisk Marsh	St

Salt Pan	Sp
Swamp Grassland	Sg
Freshwater Marsh	Fm
Freshwater Lagoon	Fl
Shallow marine waters	Ws
Intertidal mudflats	Im
Estuarine waters	We
Sand Beaches	Bs
Hort/Agricultural	H
Rice Cultivation	Hr
Industrial/Commercial	I
Existing Industrial	Ie
Proposed Industrial	Ip
Hotels	Ho
Institutions	In
Urban Development	U

## b. Major Habitat and Vegetation Types



### Permanent Shallow Marine Waters:

Between Barra Point and Banyada Point the coastal profile is a gently shelving sand embayment with a predominantly northerly current. The depth of water at high tide is in the region of 5 meters up to 2km offshore. There is considerable movement of sediments in the vicinity of Banyada Point where sand bars extend up to 2km to the west. Much of this sand deposition is the result of erosion further south along the shoreline of Jinack Island. Anecdotal information suggests that the beach in front of Madiyana Camp has been eroded more than 15m in the past years. There appears to be little sub-tidal vegetation though the occasional presence of eel grass (*Cymodoceanodos*) along the shoreline which suggests there may be beds within the confines of the park (Ramsar Study, 1996).

### Sand Shores:

The sand shoreline between Barra and Banyada on the island of Jinack is backed by a clearly zoned dune system. A herbaceous dominated zone extends inland for 10-15m where it is abruptly terminated by an evergreen shrub zone backed by a belt of taller trees. Further inland from this belt, the ground dips slightly to a seasonally flooded strip. This varies in width and in the Northern end of the island --- extends into a mosaic of shrub fringed, seasonally flooded pans. The clearly zoned dune system is comprised of the front dune, which is stabilized with Beach Morning Glory *Ipomea pes-caprae*, *Cyperus maritimus*, Seaside Purslane *Sesuvium portulacastrum* and *Cenchrus biflorus*. Behind this raised pioneer zone the same species occur in a more species-rich belt with a mean height of 75cm. The rich herb-layer composes in the main River Bean *Sesbaniabispinosa*, *Ipomoea heterotricha*, *Ruspolia hypocrateriformis*, Glofy Lily *Gloriosa superba*, the locally common Fireball Lily *Scadoxus multiflorus* and African Arrowroot Lily *Tacca leontopetaloides*, *Asystasia gangetica*, *Amorphophallus aphyllus*, Yellow Arum A. flavovirens, Star Thistle *Tephrosia platycarpa* and Rattle Box *Crotalaria retusa*. The next zone consists mainly of Thirsty thorn.

### Estuarine Waters:

The Northern tip of Jinack Island forms an estuary for the outflow of a number of creeks (bolongs), some of which derive from the Delta du Saloum. The Masarinkobolong is the main water body within the Niimi National Park and rises as two streams of 1km inland. The freshwater flow on these creeks



(bolongs) is negligible during the dry season and they are brackish to saline throughout the year. The habitats associated with these water bodies includes mangrove forest, inter tidal mudflats and salt marsh. In their upper reaches freshwater pools persist into the dry season but ultimately dry completely. Rice is cultivated on the upper flood plains of the rivers under the canopy of relict gallery forest.

#### **- Inter Tidal Sand and Mud Flats:**

The bolongs are tidal for their entire dry season length. Their combined tidal outflow of these bolongs meeting the northerly currents arising from the river Gambia have resulted in a sand bar formation of Banyada Point. The spit is covered on high tides and resultantly has no associated vegetation, though it is a regular roosting site for a variety of terns, gulls, waders and herons. Along the Masarinko and NijiBolongs, numerous mud banks become exposed during low water. No vegetation is associated with these mud banks possibly due to the tidal surge within the bolongs. Backing the mangrove fringe of the bolongs, extensive areas of salt pan (bare tannes) occur where hyper-saline conditions limit the growth of plants. Colonization by halophytes is generally limited to the peripheries of these pans and consists mainly of *Sesuviumportulacatrum*, *Philoxerusvermicularis*, *Paspalumvaginatum*, and *Sorobolus spp.*

#### **- Inter Tidal Marshes:**

Halophytic vegetation associated with salt pans has been referred to above and the same complex of species is also associated with inter tidal marshes and seasonally flooded areas. On the island of Jinack the low lying nature of the island (essentially a vegetation spit) subjects a large portion of the island to seasonal flooding through rainfall. The salinity of these areas steadily rises due to residual salts from evaporation during the end of the rains and the dominant vegetation is essentially halophytic in nature. Rainfall swamps occur on the eastern side of the island and are utilized for rice cultivation.

Part of the seasonally flooded areas is also subjected to periodic flooding during spring tides. Salt marshes are generally fringed by *Tamarixsenegalensis* with occasional *Avicenniaafricana*. *Adansoniadigitata* occurs on slightly elevated land fringing the marshes.

#### **- Inter Tidal Forests:**

Mangrove forest dominates the creeks (bolongs) fringes within the Niumi National Park. The total area of mangrove within the park is approximately 800ha. five woody species are found within the mangrove belt, namely.

- *Rhizophoraharissionii*
- *Lagunculariaracemosa*
- *Avicennianitida*
- *Conocarpus erectus*
- *Rhizophora mangle*

All 5 species occur within the Niumi National Park, though the distribution of *Rhizophora* species has not been investigated in detail. Sukardjo (1995) has outlined four mangrove community types found in The Gambia based on lugo and Sndaker's (1974) criteria.

This forest is composed of monotypic stands of *Rhizophora mangle* in the outer estuary of the River Gambia and in the Upper stretches of the creek (bolongs) within Niumi National Park.

All two *Rhizophora* species are found in this zone and tree height can reach more than 10m. Basin mangrove forests occur in areas subject to tidal inundation during spring tides only and with correspondingly high soil salinity levels. This forest type is dominated by *Avicennia nitida* and tree height may get up to 20m. Shrub or dwarf forests are to be found in areas with limited tidal inundation and high salinity levels, often backing the fringe forest. *Avicennia* predominates but may be accompanied by *Rhizophora* and *Laguncularia*.

Fringe Mangrove forest is predominant within Niumi and is found along the Masarinko and Niji Bolongs. The north – east tip of Jinack Island and the Mbankam spit have extensive stands of this forest type which is backed by shrub forest and bare tannes. Stands of riverine mangrove forests are found in the mid and upper tidal reaches of the Masarinko Bolong, reaching heights up to 12m though generally less than 10m. On the spits opposite and to the south of Bakindiki Koto, this forest type occurs on a peat deposit which sporadically (occurs) in the Gambia as thin beds within the fluvial marine sequence (White and Russell, 1988). Here also, the forest grades to shrub mangrove in the inland reaches. The Northern aspect of the park is demarcated by a labyrinth of *Rhizophora* mangrove creeks and channels that are presently not well researched in seasonal terms.

At low tide in January extensive mud flats are exposed harboring a diverse range of feeding shorebirds that reflect the avifaunal content of the Bund Road area (Tanbi Wetland National Park). African Fish Eagle (*Haliaeetus vocifer*) and Goliath Heron (*Ardea goliath*) are commonly seen but not numerous. Ble-cheeked Bee Eater (*M. persicus*) is particularly abundant also in January. The creek systems are used by a variety of kingfisher species both resident and regionally migrant.

#### **- Coastal Lagoons:**

A single coastal lagoon occurs at Banyada Point on the north Shore of Jinack Island occupying an area of ca 2ha. The lagoon is maintained by the accumulation of sediments arising from the outflow of the Mansarinko Bolong and the Northerly currents from the mouth of the River Gambia. The sediments form a spit which runs north – west from Banyada point for a distance of ca 1km. the lagoon is periodically inundated by the sea on spring tide through a channel on the north east side, though in recent months tidal surges have pushed over the westerly bank and there is a possibility this will ultimately form a breach. The seaward fringe of the lagoon is vegetated with a pioneer community of *Ipomea pes-caprae*, *Sesuvium portulacastrum*, *Cenchrus biflorus* and *Cyperus* spp. Occasional *Avicennia* shrubs occur on the southern edge which grades into *Dichrostachys* thicket with emergent *A. digitata*.

#### **- Permanent Creeks:**

Niumi National Park has two main creek systems running through it. The Nijibolong connects to the ocean immediately north of Barra point and to the Mansarinko Bolong at the Senegalese border thereby forming the island of Jinack. This bolong is subjected to the regular diurnal tidal cycle and as it has a small catchment area there is relatively little seasonal variation in salinity. The Mansarinko bolong divides north of Mbankam to form the Ker Jatta and Duniajoes bolongs. These creeks (bolongs) have a combined catchment in the region of 100km square and resultantly have a marked seasonal variation in salinity. During the dry season hyper – saline conditions exist in the upper reaches due to limited tidal

flushing and high evaporation rates. As the rains commence dilution occurs and the salinity levels reduces progressively. The associated vegetation with these bolongs is predominantly mangrove where there is a gentle gradient on the banks. Elsewhere, the vegetation ranges from woodland to grassland. There appears to be no associated aquatic vegetation within the bolongs with the exception of the mangrove complex.

#### **- Seasonal Creeks:**

The upper reaches of Ker Jatta and Duniajoebolongs have seasonal freshwater flow. There are a number of other small creeks (bolongs) both on the island of Jinack and on the mainlands which are rains fed but due to small catchment areas are more prone to rapid salinization through a combination of evaporation and intrusion. The Ker Jatta and Duniajoebolongs have an associated floating / emergent freshwater vegetation dominated by *Nymphaea lotus* and *N. micrantha*, (atypha) and *Cyperusspp*, with *Marsileasp*, *Ageratum sp*, *Urenalobata* and various *graminae*. The areas have relict gallery forest fringing the bolongs which in some areas has been cleared underneath for rice cultivation and seasonal vegetable gardening.

The freshwater stretches of these creeks (bolongs) currently lies outside of the proposed park boundary though their inclusion is due to be negotiated with the neighboring communities in the near future for the proposed Niumi Biosphere Reserve initiative.

#### **- Seasonal Saline Flats:**

The saline flats which are found within Niumi National Parks are distributed primarily on the landward side of the mangrove belt. On the island of Jinack however low lying areas are seasonally flooded by rainwater forming temporary shallow lakes. After the rivers receded, the subsequent drying up of these water bodies primarily through evaporation results in increasing salt concentration. The associated vegetation is essentially halophytic with *Sesuviumportulacatrum*, *philoxerusvermiculatus*, *sporobuluspp* and *Paspalumvaginatum*, the shrubby *Tamarixsenegalensis* occurs on the fringes along with occasional *Elaeisqueensis* and *Avicenniaafricana*.

#### **- Seasonal Saline Marshes:**

Areas peripheral to and often part of the saline flats and backing the mangrove forest in places develop as seasonal saline marshes with a combination of halophytic species and various *cyperaceae*. As the dry season commences, these areas undergo progressive desiccation and the vegetation cover dies back.

#### **- Seasonal Freshwater Marshes:**

With the overall low-lying topography of Niumi National Park, considerable areas are subject to flooding through freshwater runoff during the rainy season. Many of these areas are utilized for seasonal rice cultivation such as the headwaters of Ker Jatta and Duniajoebolongs. On the island of Jinack there are extensive areas immediately west of the villages of Kajata and Niji which flood through rainfall and support an essentially freshwater marsh plant community. These areas form the main rice fields on the island. A similar linear flood plain exist ca 1km west of Mbolletba, and a similar area is found to the west of Kanuma. In the dry season some vegetable production is conducted in these areas with irrigation from shallow hand dug wells.

The head waters of the various creeks (bolongs) both large and small support seasonal fresh water marshes. As the dry season advances most of these areas desiccate entirely or undergo an increase in salinity through evaporation and saline intrusion. The vegetation associated with these seasonal freshwater marshes is similar to that referred to under seasonal creeks above.

#### **- Gallery Forest:**

Gallery forest is found in relic patches in the upper (freshwater) reaches of the creeks (bolongs). These relic forest patches are comparable in composition and structure to the Fathala forest within the adjacent Delta du Saloum National Park with the most abundant woody species being *Anthostemasenegalensis* and *Dialiumguineense* (c,fLykke. 1994).

Other notable species include *Khayasenegalensis*, *Detariumsensgalensis*, *Alchoreacordifolia* and *Afzeliaafricana*. The forest on the Duniabolong is quite degraded through a combination of clearance of the understorey for rice cultivation, selective felling and fire damage.

#### **- Dry Woodland and Wooded Grassland:**

Woodland is defined as having a canopy cover of more than 40% and reaching a height greater than 8m, while wooded grassland has a canopy of 10-40%. [Within Niimi National Park land elevated above the seasonally flooded areas and valley bottoms falls within one or the other of these categories with the exception of some cleared agriculture land.] The dominant species found within these vegetation types are *Parkiabiglobosa*, *Danielliaoliveri*, and *Pterocarpuserinaceus*. Shrubby species found in association include *Combretumnigricans*, *Dierostachysglomerate*, *Guierasenegalensis* and *Ziziphusmauritiana*. These species are more dominant in locations where there has been clearance for agriculture in the past or a high incidence of fire damage to the vegetation giving rise to bush-land or thicket. Dense regeneration of *Danielliaoliveri* is often found in fallow agricultural land. The understory in both woodland and grassed woodland is dominated by the grass *Andropogongayanus* which reaches heights of over 2m. Other grasses which occur include *Echinochloacolona* and *Chloris spp*. On the Island of Jinack and the sandier soils immediately east of the NijiBolong, the woodland has a higher incidence of *Parinarimacrophylla*, *Ficusspp* and *Tamarindusindica*. *Maytenussenegalensis* is common in this woodland type.

#### **Threats to vegetation diversity and habitats**

Niimi National Park has three resident communities within its boundaries and numerous others on its periphery. These communities depend to a large degree on resource utilization within the park area. The management of the park is based on the incorporation of the needs and views of the people to arrive at a sustainable approach to land use practices compatible with the objectives of conservation. The direct human impact on vegetation and habitat includes cultivation, logging and collection of fuelwood, fruits, foliage etc.

Traditional approaches to agriculture were based on leaving land to fallow in a rotational system which enabled regeneration of bushland in the intervening years. With increasing population the demands placed on the land have increased and clearance for agriculturalactivities constitutes a significant threat to the plateau areas of the park. The clearance of land prior to the onset of the rains is typically conducted through the use of fire, which frequently runs out of control.



The impact of fire is most prevalent on forest area where young regeneration is often killed or severely set back and mature trees suffer successive damage. The impact fire has on forest composition and structure has been studied in depth in the neighboring Senegalese fathala forest and plateau woodlands, it was concluded that fire was probably the most destructive single factor affecting vegetation (Lykke, 1996).

Vegetation types associated with human occupation are profoundly altered and are characterized by a high percentage of introduced species most notably neem trees (*Azadirachta indica*) which have the habit of forming dense monotypic stands.

### **3. 3. Invertebrates (Ramsar Study, 1996)**

#### **- Terrestrial Invertebrates:**

Due to the very large number of invertebrates that are likely to be found in Niumi National Park, and the consequent difficulties of identification, only main groups of terrestrial insects were sampled, to give an overall indication of the diversity of invertebrates present. Of 75 currently known species of Odonata (damselflies and dragonflies) recorded from The Gambia, at least 22 species are known to inhabit Niumi National Park. The sites that contain the richest assemblage of these insects are those habitats that are associated with fresh or brackish water, as all species of Odonata are reliant for the larval stage of their life cycle on the presence of water-bodies.

Of the estimated 160 species of butterfly (Lepidoptera) recorded from The Gambia, at least 32 species are known to occur within Niumi National Park.

Unlike the dragonflies, the butterflies are associated much more closely with terrestrial habitats; especially dry woodland, grassland and gallery forest.

Of the Orthoptera (grasshoppers and crickets) several species were identified in Niumi. These include grasshoppers of the families Catantopidae (*Eyprepocnemis spp.*) and Acrididae (*Acrida spp.*), bush crickets of the family Tettigoniidae, a mole-cricket of the family Gryllotapidae (*Gryllotalpa africana*), true crickets of the family Gryllidae (*Acheta spp.*) and [groundhoppers] of the family Tetrigidae (*Tetrix spp.*). Bugs of the order Hemiptera were very common. Species identified belong to the families Pentatomidae – shield –bugs (especially of the subfamily Pentatominae), Coreidae-squash-bugs (*Leptoglossus gonagra*, *Phyllomorpha spp.*, and *Anoplocnemis curvipes*), Lygaeidae-seed-bugs (*Lygaeus spp.*) and Reduviidae-assassin-bugs (*Periates spp.*) The largest order of insects is the Coleoptera (beetles).

Species identified at Niumi National Park include *Cicindela spp.* of the family Cicindelidae, and many species of the family Scarabaeidae (including the subfamilies Cetoniinae – flower chafers, Melolonthinae – leaf – chafers, Scarabaeinae- scarabs, Onthophagus spp. and Dynastinae-rhinoceros beetles, Oryctes spp.) Bledius spp. and Paederus spp. were recorded from the very large family known as the Staphylinidae-rove-beetles and Agriotes spp. from the Elateridae –the click beetles. Other beetles identified included members of the families Chrysomelidae, Bostrychidae, Lycidae-net-winged beetles, Meloidae-blister and oil beetles (especially Mylabris spp.), Tenebrionidae – darkening beetles and Caraabidae- ground beetles (Harpalus spp.)

The Hymenoptera (ants, wasps, bees and related species) are represented in Niumi by members of the families *Vespidae*-social wasps (especially *Belongaster spp.*), *Ichneumonidae*-ichnumon wasps (*Osprynchotus violator*), *Braconidae*(*lphiaulax spp.*), *Chrysididae*-gold wasps (*Chrysisspelendens* group – probably *C. minuta*, and *C. gabbula*), *Formicidae* – ants, *Sphecidae* – solitary and digger wasps (*Bembix spp.*) and *Pompilidae*-spider-hunting wasps. The *Diptera* (flies) is another large order of insects. Species recorded included *Anopheles gambiae*, *Anili* and *A. funestris*, which are all malaria-carrying mosquitoes of the family *Culicidae* and *Atylotus albipalpus* and *A. agrestis* of the family *Tabanidae*-horse flies or clegs. Others include *phytomia spp.* of the family *Syrphidae*-hoverflies, *Promachus spp.* of the *Asilidae* – robber-flies, and *Cordobiaanthropophaga* (the Tumbu-fly) and *Chrysomyiabezzina* of the sub-division *Cyclorrhapha*.

### 3.4. Aquatic Invertebrates:

The aquatic invertebrate fauna is composed predominantly of crustaceans and mollusks. Very abundant species include West African Fiddler Crabs *Ucatangeri*, African Ghost Crabs *Ocypode Africana* and mangrove oysters *Grassostreatulipa* (Ramsar Wetland Study The Gambia, 1997).

### 3.5. Vertebrates

Fishes belonging to at least 13 families have been recorded in Niumi National Park. The most abundant of these species are *Tilapia spp.*, followed closely by Mulletts *Mugil spp.*, although fry and juveniles of Giant African Threadfin *Polydactylus squaridrilus*, shads, African red snapper, Sumpat grunt, *Ethmalosa firmiata* and *Flagfin Mojarra Gerres melanopterus* are also present in large numbers. A majority of the fish observed were in their early developmental stages, mostly as fry and juveniles, indicating that the waters of Niumi are very important as a nursery area (Ramsar Wetland Study The Gambia, 1997).

**Table – 7.0 Families of Fish Occurring at Niumi National Park**

Families	Mangrove	Lagoons	Seasonally Flooded Areas	Coastal Strip
Cichlidae	X	X	X	
Clupeidae	X	X		X
Carangidae	X			X
Drepanidae	X			X
Elopidae	X	X		X
Gerreidae	X	X	X	X
Lutjanidae	X			X
Mugilidae	X	X	X	X
Polynemidae	X			X
Pomadasyidae	X	X		X
Sciaenidae	X	X		
Sparidae	X			X
Tetraodontidae	X			X

NB: Sciaenidae is the only family not found in the coastal strip



### Threats to fish and aquatic invertebrates:

The use of beach seine resulting to capture of juvenile and sub-adult fish have a depletive impact on the fisheries. According to anecdotal information, some of the fish species that occur in Niimi National Park are believed to be threatened due to the use of drag and drift nets. Other marine species such as crabs, skates and sea turtles which are usually bycatches are also susceptible to this potential danger. The dynamic of Salinization in some of the water bodies require the need to monitor salinity trends and to figure out the possible impact on the piscifuna in the area. Apart from some bivalves and gastropods, animal life was virtually absent in the water bodies with salinities greater than 99ppt.

### 3.6. Amphibians:

The amphibian fauna of Niimi is largely unknown. Common African Toad *Bufo regularis*, Savanna Toad *B. xeros*, Rocket Frogs *Ptychadena spp.* and Puddle Frogs *Phrynobatrachus spp.* have been identified so far (Ramsar Wetland Study The Gambia, 1997). However, the seasonality of many species poses problem to their survey. More over surveys are not currently organized for this purpose. As such, many more amphibian species may be unknown within Niimi.

## AMPHIBIANS OF NIIMI NATIONAL PARK

### 3.7. Reptiles:

Nile Crocodiles *Crocodylus niloticus*, appear to inhabit Niimi National Park in relatively fair number, with specimens of up to 4m in length resident in Niji Bolong (Ramsar Wetland Study The Gambia, 1997). 43 Green Turtles *Chelonia mydas*, Olive Ridley turtle *Lepidochelys olivacea* and loggerhead turtle *Caretta caretta* occur on the coastline of Jinack Island, where they probably feed on the offshore sea-grass beds. They also use the 11km of beach on Jinack Island as a breeding site, but to what extent is also far unknown.

Bells Hinged Tortoise *Knixys belliana*, may be present in the coastal strip (Ramsar Wetland Study The Gambia, 1997). Marsh Terrapin *Pelomedusa subrufa*, and pan hinged Terrapin *Pelusios subniger*, are likely to occur in the upper reaches of the creeks (bolongs) in Niimi. Lizards known to occur in Niimi National Park, include the Agama *Agama agama*, Brook's House Gecko *Hemidactylus brookianulatus*, Fig-tree Gecko *Tarentola ephippiata*, Orange-sided Skink *Mabuya perrotetii*, Orange-throated Skink *M. affinis*, Senegal Chameleon *Chamaeleo senegalensis*, Bosc's Monitor *Varanus exanthematicus* and the Nile Monitor *V. niloticus*.

All of these species are relatively common, especially the smaller species. The Nile Monitor is still found in good numbers and large specimens are regularly encountered. The Chameleon *Chamaeleo gracilis* occurs. Snakes that have been recorded in Niimi include African Rock Python [ *Python S. sabae*,] African Beauty Snake *Psammophis elegans*, olive Sand Snake *P. phillipsi*, Bush Snake *Philothamnus irregularis*, Black-necked Spitting Cobra *Naja nigricollis*, Forest Cobra *N. melanoleuca*, Wolf Snake *Lycophidion semicinctum albomaculatum*, Hose Snake *Lamprophis fuliginosus*, Spotted Blind Snake *Typhlops punctatus* and Puff Ader *Bitis arietans*. Other species that are likely to be present but have not been confirmed are Burrowing Vipers *Atractaspis spp.*, Royal Python *P. regius*, Green Mamba

*Dendroaspis viridishallowelli* and Night Adder *Causus rhombeatus*. Snakes are generally killed on sight by Gambians, so very large specimens, especially of the Pythons and Cobras are rarely seen.

**TABLE 9.0. REPTILES OF NIUMI NATIONAL PARK**

SCIENTIFIC NAME	COMMON NAME
<i>Chelonia mydas</i>	Green turtle
<i>Lepidochelys olivacea</i>	Olive Ridley turtle
<i>Caretta caretta</i>	Loggerhead turtle
<i>Knixys belliana nougeyi</i>	Bells hinged turtle
<i>Pelidius subniger</i>	West African mud turtle
<i>Crocodylus niloticus</i>	Nile crocodile
<i>Tarentola ephippiata</i>	Fig- tree gecko
<i>Hemidactylus brooki angulatis</i>	House gecko
<i>Agama agama</i>	Rainbow lizard
<i>Chamaeleo senegalesis</i>	Senegal chameleon
<i>Mabuya affinis</i>	Brown-flanked skink
<i>Matuya perotettii</i>	Red-flanked skink
<i>Varanus niloticus</i>	Nile monitor
<i>Varanus exabthematicus</i>	Bosc's
<i>Python sebae sebae</i>	Rock python
<i>Python regius</i>	Royal python
<i>Lamphideion fuliginosus</i>	House snake
<i>Lycophideion semicinctum albo.</i>	Wolf snake
<i>Philothamnus irrregularis</i>	Common bush snake
<i>Atractaspis atterima</i>	Black burrowing viper
<i>Psammonphis elegans</i>	African beauty snake
<i>P. philipsii</i>	Olive grass snake
<i>Naja malanoleuca</i>	Forest cobra
<i>N. nigricallis</i>	Spitting cobra
<i>Dendroaspis viridis</i>	Green mamba
<i>Bitis arietans</i>	Puff adder
<i>Causus rhombeatus</i>	Night adder
<i>Typhlops punctatus</i>	Spotted blind snake

## THREATS TO REPTILES AND AMPHIBIANS:

The threats to the reptiles and amphibians of Niimi National Park are of a similar nature as to those described for mammals. In addition to the threats outlined previously, the following more specific threats are pertinent.

Green turtles require undisturbed stretches of sandy beaches to breed with suitable dune vegetation. These conditions exist in abundance on the Atlantic shoreline of Jinack Island. However, the eggs are a favored item for local consumption and despite their protected status, there is a risk that egg collection continues. The turtles are also at risk from entanglement in fishing nets both from drowning and from being slaughtered when encountered.

Crocodiles have been subjected to considerable hunting pressure in the past, and though the pressure appears to have been reduced, there is evidence that some hunting continues. Whether this is for consumption or sale of skins or both is uncertain, though the trade in skins is quite effectively under control within The Gambia. Within other West African nations, restriction in the trade of wildlife appears to be more lax, and poses the risk that animals and skins may be smuggled out of The Gambia for these markets. Snakes suffer continuously from the ill-founded hysteria of humans, though they resultantly remain shy and predominantly natural. The increase in human activity coupled with the reduction in vegetation cover through heavy grazing pressure and the continuing occurrence of fire makes them more vulnerable to encounters.

Fire also poses a greater threat to reptiles in general due to their often slow movement. A decrease in the results in a reduction in the extent and longevity of rain fed swamps and water bodies which will invariably impact on the associated amphibian fauna. Amphibians are also likely to suffer should the use of pesticides increase in rice cultivation, which may have knock-on effects along the food chain through bioaccumulation.

### 3.8. Birds:

The current list of bird species for Niimi National Park stands at roughly 300 species from 63 families (Ramsar Wetland Study The Gambia 1997). The survey has added the first record of the river prinia *Prinia fluvialis*, for the Gambia. Two pairs of this species were located breeding on the island of Jinack and one nest was successful. There appears to be ideal habitat present on Jinack (waterside vegetation and rice fields) for this rare species, formerly only recorded from northern Senegal, Guinea-Bissau, Niger, Chad and Cameroun (Barlow, et al, 1997). Casual rangers' observations have shown a good number of migrating flocks of turnstone (*Arenaria interpres*) and sandaling (*Calidris alba*) in February- March. Ospreys are present the year round in the site.

There is an increase occurrence of oystercatchers (*Haemaphysalis*) in the dry season. Mixed stands of gulls and terns are noted at the northern tip of the island. Large numbers of lesser black-backed gulls (*Larus fuscus*) are present throughout the dry season. Remnant flooded areas in February remain active feeding spots for a variety of waders.

Many herons and egret species are found feeding on stranded fish during the falls in the island. In brief, the variety of the avifauna is patent even if each season has its own and specific cohorts.

**Table 4.0 Avifaunal Diversity in Niumi National Park**

FAMILY	GaM	NNP	PM	Res	IAF
Procellariidae: storm-petrels	3	1	*		
Pelicanidae: Pelicans	2	1		*	*
Sulidae Gannets	2	1	*		
Phalacrocoracidae Comorants	2	2		*	*
Anhingidae: Darter	1	1		*	
Ardeidae: Herons. Egrets Bitterns.Tiger Heon	18	13	*	*	*
Scopidae: Hamerkop	1	1			
CICONIDAE: Storks	7	2			
Threskiornithidae: Ibises spoonbills	5	2		*	*
Anatidae: Ducks, Gees	14	3		*	
Accipitridae: Vultures Hawks Eagles	44	20	*	*	*
Pandionidae: Ospery	1	1	*		
FALCONIDAE: falcons	9	6	*	*	
Phasiandae: Gamebirds	6	2		*	
Rallidae: Rails	9	1		*	
Jacaniidae: Jacansa	1	1		*	
Burhinidae: Stone-Curlews	2	1		*	
Upupidae: Hoopoe	1	1	*	*	*
Phoeniculidae: Wood Hoopoes	2	2		*	*
Bucerotidae Hornbills	5	4		*	*
Capitonidae Barbets	4	3		*	
Indicatoridae: Honeyguides	3	2		*	
picidae: Woodpeckers	7	6		*	
Hirunidae: Swallows. Martins	15	8	*	*	*
Motacillidae: Wagtails Pipits	9	5	*	*	*
Laniidae: Shirkes	11	9	*	*	
Oriolidae: Orioles	2	1		*	*
Dicruridae: Drongos	2	1		*	
Sturnidae: Glossy Starlings, Oxpeckers	10	7		*	*
Pycononotidae: Bulbuls	7	1		*	

Corvidae: Crows	3	2		*	
Muscicapidae: Turdinae Chats Thrushes	17	8	*	*	*
Muscicapidae: Sylviinae warblers cisticolas	38	26	*	*	
Muscicapidae, muscipapinae flycatchers	6	3	*		
Muscicapidae: Platysterninae wattle-eye, Batis	4	2		*	
Muscicapidae: Monarch Flycatchers	4	2		*	
Paridae: Tits	1	1			
Remizidae: Penduline Tits	1	1			
Nectarinidae Sunbirds	9	6		*	
Zosteropidae: White-eyes	1	1			
Fringillidae: Canaries	2	2		*	
Plocedidae: Weavers, Sparrows Whydahs	23	19		*	*
Estrildidae: Waxbills	19	9		*	
Alaudidae: Larks	8	2		*	*

Abbreviations used in the following table are: Gam= Total of species for the family recorded in The Gambia; NNP = Recorded in Niumi National Park; PM – Palearctic Migrant; Res = species with records in every month in The Gambia; IAF = species with known African migratory populations occurring in The Gambia and these may include movements within Senegambia.

### 3.9. Mammals

The mammalian fauna of Niumi National Park is relatively rich and is influenced heavily by the fairly undistributed habitats of parts of the park, such as southern Jinack. Large mammals such as Bushbuck *Tragelaphus sscriptus*, Common Warthog *Phacochoerus africanus*, Spotted Hyena *Crocuta crocuta*, and Leopard *Panthera pardus*, are known to occur, though none of them in high numbers except for the spotted hyena whose population is reported to have increased significantly over the years (according to anecdotal information). Primates are still fairly well established; especially Callithrix Monkeys *Cercopithecus sabaues*, Patas monkeys' *C. patas* and Senegal Galagos *Galagos senegalensis*, Guinea Baboons *Papio papio* and Western Red Colobus *Piliocolobus badius temminckii* are also found but in lower numbers.

Aquatic mammals probably fare much better than those tied to the land, as Niumi National Park contains a range of good quality aquatic habitats. Both West African Manatee *Trichechus senegalensis*, and African clawless Otter *Aonyx capensis*, are known to occur in the creeks (bolongs), though probably in low numbers. Atlantic Hump-backed Dolphin *Sousa teuszii*, are frequently sighted off the coast of Jinack island, often close inshore, and appear to use this waterway to move between the River Gambia and the Delta de Saloum National Park.

**TABLE 8.0. MAMMALS OF NIUMI NATIONAL PARKS**

SCIENTIFIC NAME	COMMON NAME	STATUS
<i>Erinaceus albiventris</i>	Four-Toed Hedgehog	PO
<i>Epomophorus gambianus</i>	Gambian fruit bat	C
<i>Nycteris gambianus</i>	Gambian Slit-faced Bat	C
<i>Lavia frons</i>	Yellow-winged bat	C
<i>Galago senegalensis</i>	Lesser bushbaby	
<i>Papio Cynocephalis anubis</i>	Western Baboon	C
<i>Cercopithecus aethiops</i>	Vervet or Green Monkey	C
<i>Erythrocebus patas</i>	Patas Monkey	C
<i>Colobus badius temmincki</i>	Red Colobus Monkey	O
<i>Lepus crawshayi</i>	Crawshay's Hare	C
<i>Heliosciurus gambianus</i>	Gambian Sun Squirrel	C
<i>Euxerus erythropus</i>	Striped Ground Squirrel	C
<i>Gerbilidae</i>	Gerbils	C
<i>Muridae</i>	Mice	C
<i>Cricetomys gambianus</i>	Giant Gambia Rat	C
<i>Thryonomys Swinderiauns</i>	Cane Rat	O
<i>Hystrix cristata</i>	Crested porcupine	R / O
<i>Pedetes capensis</i>	Spring hare	R / O
<i>Tursiops truncatus</i>	Bottle Nosed Dolphin	O
<i>Sousa teuszii</i>	Humpback Dolphin	O
<i>Trichechus senegalensis</i>	West Africa Manatee	R
<i>Canis aureus</i>	Golden jackal	R/O
<i>Vulpes pallida</i>	Pale Fox	R/O



<i>Mellivora capensis</i>	Ratel	R/O
<i>Aonyx capensis</i>	Clawless Otter	R
<i>Viverra civetta</i>	Civet	O
<i>Genetta Sp.</i>	Genet	O
<i>Herpestes palidinous</i>	Marsh Mongoose	C
<i>Herpestes Ichneumon</i>	Egyptian Mongoose	C
<i>Mungos mungo</i>	Slender Mongoose	O
<i>Crossarchus obscurus</i>	Cussimanse	R/E
<i>Panthera pardus</i>	Leopard	R
<i>Felis sylvestris</i>	Leopard	R
<i>Profelis aurata aurata</i>	Serval	R
<i>Crocuta crcuta</i>	African Wild Cat	R
<i>Crocuta Crocuta</i>	West African Golden Cat	R
<i>Orycteropus afer</i>	Spotted Hyena	R/O
<i>Phacochoerus aethiopicus</i>	Aardvark	R
<i>Tragelaothus scriptus</i>	Warthog	O
<i>Redunca redunca</i>	Bushbuck	O
<i>Ourebia ourebi</i>	Oribi	R/E
<i>Cephalophus monticola</i>	Maxwell's Duciker	O
<i>Sylvicapra grimmia</i>	Grimms Duiker	

Key: A = abundant, C = common, O = occasional R = rare, PO = presumed occasional R/O = limited population, R/E = Possibly extinct

## Threats to Mammals

Habitat degradation results from diverse factors including anthropogenic (man-made) activities such as the setting of fires, clearance of land for agriculture, sand-mining and harvesting of timber. The steady reduction in rainfall has reduced the seasonal flow of the various creeks and in addition to anthropogenic factors is affecting the vegetation of the gallery forest and the extent of rain fed swamp vegetation of the associate watercourses.

Agricultural extensification reduces the availability of corridors for movement of wildlife, and increased human activity may further exacerbate this isolation factor. Should there be further expansion, many larger mammals may become restricted to enclaves which are insufficient to meet their requirements or isolate a population too small to be ecologically viable. Hunting is still one of the threats affecting the population of the ungulates though efforts have been taken to mitigate it but still, more needs to be done.

The increased fishing in the coastal waters and inland creeks (bolongs), requires regulation in terms of fishing sites, methods and engines to avoid impacting negatively on both the breeding and recruitment

stocks. A reduction in the fish populations may result in a decrease in the utilization of the area by the humpbacked and bottle-nosed dolphins.

#### **4. Cultural Informations**

##### **4.1 Archaeology:**

Recently a number of broken pots and clay cooking wares were washed ashore along one of the bolongs near to Jinack Island.

The remains were collected and taken to the national Museum in Banjul for dating. They have been estimated to be several hundred years old. The community intends to encourage further research and use the site as a tourist attraction.



#### **Evaluation of environmental and social features**

##### **1. Evaluations**

###### **1.1. Ecological:**

This section provides an assessment of the major features of the site and is applied to the foregoing description in section 1. Value judgments in this section will lead to the formulation of objectives in the following section. It ascertains the ecological value of the site in a local, national and international context, identifying and appraising the relationships between biotic and a-biotic factors, not only of plants, animals and habitats within the site, but also those in the surrounding areas that may control or have influence on the site itself.

###### **1.2. Naturalness:**

The vegetation of Niumi National Park has to a greater or lesser degree been modified through anthropogenic influences, resulting today in a combination of derived and early vegetation

typesuccession. The degree of modification varies according to the vegetation type and the proximity to settlement. On the mainland extensive clearing for agriculture has followed a shifting pattern in the past with areas left to fallow allowing subsequent regeneration.

Generally such areas are not cleared off the larger trees and these act as mother trees for natural regeneration. The incidence of fires is also most prevalent on the mainland which kills young trees while scarring and weakening mature specimens. Such modifications will result in a reduced range of species compared with freshwater wetlands and terrestrial woodlands which have been less impacted by anthropogenic activities e.g. gallery forest and savannah at Abuko Nature Reserve.

However, parts of the Park remain relatively natural. This includes the coastline, which is the least modified habitat, and a large proportion of the mangroves which have only been used on a limited scale.

### **1.5.Rarity:**

The waterways of Niumi are home to the regions rare aquatic mammals, the West African Manatee and African Clawed Otter. The Atlantic Humpbacked Dolphin also utilizes the Niumi waterways and coastal waters.

The sand shoreline between Barra and Banyada Point on the island of Jinack is used by nesting Green Turtles, a species that has suffered alarming declines in the last few decades (Eckert et al, 1999).

Nile Crocodiles are found in both permanent and seasonally flooded areas of Niumi National Park. The African Rock Python and Royal Python also occur within the Park. All of these reptiles have been hunted extensively (mainly for their skins) in West Africa and have declined in number (Pauwels and Meitre, 1996).

### **1.3.Fragility:**

Niumi National Park has three resident communities within its boundaries and numerous others on its peripheries. These communities depend to a large degree on resource utilization within the park. The management of the park is based on the incorporation of the needs and views of the people to arrive at a sustainable approach to land use practices compatible with the objectives of conservation. The direct human impact on vegetation and aquatic resources includes cultivation, logging and collection of fuel wood, fruits, foliage, fish and fisheries species, etc.

Traditional approaches to agriculture were based on leaving and fallow in a rotational system which enabled regeneration of bush land in the intervening years. With increasing populations the demands placed on the land have increased and clearance for agriculture constitutes a significant threat to the plateau areas of the park. The clearance of land prior to the onset of rains is typically conducted through the use of fire, which frequently runs out of control. The impact of fire is most present in forest areas where young regeneration is often killed or severely set back and mature trees suffer successive damage.

Lykke (1996) who has studied structure in depth in the neighboring Senegalese Fathala Forest and plateau woodlands concluded that fire was probably the most destructive single factor affecting vegetation. Vegetation types associated with human occupation are profoundly altered and characterized by a high percentage of introduced species, most notably the Neem tree (*Azadiractaindica*) that has the predisposition of forming dense monotypic stands. Uncontrolled annual

burning of the vegetation also constitutes a threat to the fauna. On Jinack Island, the potential dangers and damage of fire have been recognized (many of the houses have thatched roof), and the local law prohibits the lighting of fire on the island.

Utilization of the wetland areas for seasonal rice cultivation obviously sets back natural successions in marginal and submerged aquatic plant communities on a short term basis but due to the annual desiccation of most freshwater wetlands the long term impacts of this activity are probably insignificant.

Livestock is ranged throughout the national park with some seasonal immigration taking place during the dry season. As a result, high grazing pressure becomes a potential threat to plant variety. The communities of Kajata and Niji on the island of Jinack have observed a decrease in regeneration due to grazing/browsing by goats and sheep, and resultantly moved small livestock off the island. The trampling activity and feeding by livestock is adversely affecting the pioneer plant zone on the coastal strip thereby exposing the fringing dune to increased erosion events.

A recent increase in the amount of traffic using the national park is having a localized effect on the herbaceous vegetation in certain areas (most notably on the road from Kanuma to the crossing point of Niji or Kajata) through the use of multiple tracks to avoid deep sand or wet areas.

A number of threats hover over the fauna in addition to those described above. Specifically some fishing activities (the use of beach seines) may have a depletive effect on the young fish population in the future. By-catch may also impact on other fauna e.g. crabs, skates and sea turtles. The diversity and even presence of fish is also affected by the salinity of the water bodies. The studies in 1997 showed that animal life was virtually absent in water with salinities of greater than 55‰. The mammals and reptiles of Niumi National Park suffer from two main threats, namely illegal hunting and habitat degradation.

The management plan proposes to reduce the effect of the threats described, by addressing the underlying causes of the threats and involving the local communities in any implementation of action.

### **1.7. Typicalness:**

Niumi National Park contains a variety of wetland types as detailed above. These are typical of the wetland types occurring in the Gambia, yet unique because of the coastal location of the area.

### **1.8. Recorded History:**

There has been no recorded history of the area concerning the ecology.

### **1.9. Potential Value and Potential Improvement:**

Niumi National Park is an area of considerable ecological richness. It currently supports a great diversity of life, including intra and inter-African and Palearctic migratory species of avifauna and globally endangered fauna such as snakes and mammals. This is due to the diversity of the habitats present and their proximity to each other.

Potential improvement to the area can be envisaged through consideration of restricted zoning of the area. In some places completely restricting human activity rules while in others, the measures will allow access to restricted types of activities only. However the full potential of the area will only be realized if

the water sources remain unpolluted. Habitat enhancement would improve the area, especially if for instance certain forest areas were extended to join fragmented habitats. The interest of the reserve to visitors may also be improved by considering the re-introduction of certain antelope species e.g. *Bohor Reedbuck Reduncaredunca* and *OribiOurebiaourebi*.

It would be preferable to carry such re-introductions to the Jinack island area because it is least disturbed and there is no need to fence the area. The two species are still present in the Gambia, albeit in low numbers. It may be possible to have reasonable numbers of these animals in order to enhance chances for the visitors coming to the reserve to see them.

Due to the large threat and impact of bush fires, improved management to reduce the risk of fires within the area and increased public awareness both have effects of bush fires and legal implications and penalties associated with their occurrence

Fishing has to be regulated especially the use of appropriate mesh sizes and the fishing sites and gear types. Management measures should be in place especially the prevention of fishing close to the mangroves to avoid catching the juvenile species, since fish and fisheries spawned and nursed close to the mangroves.

In addition to the above, any potential improvement to the area is totally dependent upon an increased liaison between the communities and the Department of Parks and Wildlife Management. This in turn is dependent upon increase resources for the Department at the staffing, training, education and sensitization levels. Relations between DPWM and the communities will also be improved when the communities can understand that the park can provide alternative sources of income for them in the form of eco-tourism, and that there are alternative natural resources available other than those from the park. A substantial component of the management plan thus encompasses a strategy for community participation and involvement in the development and conservation of Niumi National Park.

#### **1.10. Socio-economic**

This wetland provides a large catalogue of resources for aesthetic, cultural, religious benefits. These include the medicinal plants found there, including “Sengeng”, *Guireasenegalensis*, *combratumspp*, *Nauclea latifolia*, sanfito and *Hanaoundulata*. Each community has a designated area that is used for meditation and prayer. The area does not have a free access, and is usually relatively pristine. Thus the areas designated as traditional/holy grounds are preserved by tradition.

#### **1.11. Recorded History**

Over the past ten years the communities around the Niumi National Park were the main beneficiaries of resources contained within the Park. During this time, the land continued to be used as it had been by previous generations. The park allows land for rice cultivation, grazing and water points for animals. Mangrove oyster harvesting was quite common as was fishing, including the illegal collection of turtle eggs around the island of Jinack.

Other activities in the area included the collection of fuel wood, timber for fencing etc., illegal hunting of wild animals and bird, Rhun Palm and Palm Oil kernel harvesting, collection of wild fruits and honey, mangrove, grass and thatch grass for fencing and house construction.

There have been some noticeable changes in the use of the land. These changes were brought about by natural and manmade factors. Perhaps the most noticeable is the salt intrusion into rice fields. This intrusion covers most of the areas close to the river and it is most destructive around Jinack and Mbangkan. This has resulted in many of the rice fields being abandoned; as a result, rice cultivation and production have declined.

Over the past 10 years the only significant events associated with the Niumi area has been the banning of charcoal making and illegal felling of trees. The only other major government policy decision related to the method of fishing, and included the introduction of fishery laws governing mesh size (the barn of drift net).

### **1.12. Education and Public Awareness**

Unfortunately there is very little public awareness of the value of the wetlands- it is rarely used as an educational resources center because of its inaccessibility from the various schools due to lack of transport. The main public awareness is centered on Jinack Island.

### **Socio-economic Evaluation of the Use of Resources in the Park**

With increase in population growth, land use practices are also changing and becoming more intense. The rotational system of farming has essentially broken down as the demand for land has increased and more intensive farming and cropping techniques are now used, including the methods of ploughing (resulting in higher soil erosion) and increased use of chemical fertilizers (resulting in run-off and pollution).

To ensure the sustainability of forest resources, only ripe fruits are collected and no branches were removed to take fruits. Dead trees and branches were only harvested for timber, and oysters only harvested during the dry season (non breeding season), mangroves that provided their breeding sites for fisheries are fully protected. A sustainable way for the communities to use their wetlands is through the development of eco-tourism and environmental friendly projects. These can be smallscale initiative to improve the livelihood of the communities.

Such projects have the potential to provide the local people with income whilst having a relatively low impact on the environment.

Potential areas for such activities within Niumi National Park include the following; bird watching, horse/donkey cart tours, pirogue and canoe creek tours, line fishing (the activity would include being taught by a local fisherman), guiding in the area and its culture, and specialist holidays and visits. Supporting activities could include tie and dye crafts related to the wetland ecosystem, the culture and the environment. Women's groups could embark in such income generating activities or horticulture/market gardening. Other possibility could be oriented towards holding accommodation facilities in the peripheral villages. Traditional drum, string or flute instruments playing could be promoted purely as public entertainment or through formal teaching.

### **1.13. Research and Study**

Ecological studies in 1996/7 and 1999 (Ramsar The Gambia, 1996) have provided information on the flora and fauna of Niumi National Park. This includes a vegetation map for the area and flora species lists

for the wet and dry season. Baseline data has also been collected on the common insects, aquatic invertebrates, fish, reptiles, birds and mammals. The African Waterfowl Census records the number of waterfowl species and their abundance during February/March/April each year. Sites within Niumi National Parks were included in the counts since 1999 and up to date under the implementation of the Wetlands International Africa Bureau in Senegal. A baseline survey of endangered species (Marine turtles, manatee, dolphins and cetaceans) was established and regular monitoring exercises are currently implemented.

The coastal area around Barra and the waters around Jinack Island (coastal and bolongs) are both monitored during the Coastal Migratory Species (CMS)-funded project which studies cetaceans in The Gambia, as part of a larger project covering West Africa. Information is gathered on species sightings through volunteers and staff from the DPWM undertaking fieldworks.

Aquatic monitoring of the creeks (bolongs) within Niumi and the adjacent estuarine area will provide a comprehensive database on the physical, chemical and biological conditions of the bolongs and how they might seasonally change as a result of the development of the Niumi area.

This research should be carried out by an experienced biologist, in collaboration with the Fisheries Department. The specialist is needed to design a routine data collection system and direct a catch assessment survey to monitor production levels.

There is a need to update the information and to further monitor fish species within the NNP. Future research and study should continue to gather basic ecological data both on biotic and abiotic factors throughout the area. This should be done in such a way to maximize the information gained. However, the monitoring carried out should also endeavor to give some indication about the healthiness of the ecosystem, and therefore also act as a warning in case of adverse effects of any reason.

Outside specialists should also be encouraged to carry out scientific research in their particular areas, and co-operate with different government departments to encourage collection of information about the area (e.g. soil sampling, water sampling, fish sampling and monitoring).

Future research and study might also cover other areas. Such subjects could include determining effective pest control methods and farming techniques (including fish pond development) as well as playing an active role for innovating sustainable levels in resource utilization in the Park area.

In participating to eco-tourism based projects, Niumi National Park also provides a fruitful ground for research and study in a variety of areas such as culture and eco-tourism itself.

#### **1.14. Confrontation of Values and Interests**

In the past, villagers within Niumi National Park were in conflict with the Department of Parks and Wildlife Management. People had the feeling of being marginalized and segregated. Presently with the establishment of the Site Management Committee which takes on board representatives of all peripheral villages and the intensive sensitization campaigns organized by DPWM and other relevant stakeholders, a better mutual understanding is created and a cooperation network between managers and the local communities has set the path for better natural resources management.



There is a high use and reliance on all the resources by communities that live in and around the Park area. Land use practices within the Park are also changing with deeper impact on the surrounding vegetation. The use of chemical fertilizers and intense farming techniques are source of conflict.

The dependence on natural resources of the local communities puts them at a key position in the management of the wetland and park. Since identified outside alternative resources for the local communities are few, it is not practical to think about implementing major constraints on the use of the within resources unless provision is made for alternatives within the management plan.



A strategy for the development of alternative community resources and land use are thus a major component of the management plan, alongside with priority conservation measures. This should go along with sensitization and educational programs to encourage the adoption of practical sustainable agriculture and natural resources exploitation practices.

## **SECTION II: EVALUATION & MANAGEMENT ACTIONS**



This area comprises the coastline from Barra to the Senegalese border, all the marine side in front of the shore (from Banyada point to Barra) and the length of the MansaringkoBolong featured in the park. These areas are very important for feeding and roosting for sea birds, breeding and habitat for oysters, clams and marine turtles. It is also an important spawning and nursery grounds for fish species. Grazing within this area is totally prohibited to ensure minimal disturbance to the flora and fauna. Intensive fishing activities are banned in the area and agreement was reached by the local communities.

Smallscale artisanal fishing is allowed to fish with hook and line for sustainability. A patrol boat is available for rapid joint patrol of the area but is not as effective as it should be.

## **ii) Controlled Zone,**

This comprises the length of the NijiBolong and surrounding wetland areas. This portion of the park is considered sensitive in terms of the likely effects of human activities (e.g. agricultural practices and cattle grazing on the wetland ecosystem). Traditional use of the zone (fishing, oyster collection and subsistence farming) is allowed, but monitored. Specific aspects that require monitoring include fish exploitation and creek productivity, with the aim of initiating program to improve the creek fisheries.

Green agriculture practices are promoted which contributes to stopping slash and burn farming methods and use of pesticides/herbicides. The use of compost and organic manure is promoted. This use of the land in the controlled zone is compatible with the current legislation (Biodiversity and Wildlife Act 2003) governing protected areas.

## **iii) Multiple used area**

This area includes the non-demarcated area (on the map) of the park and comprises shrubland, farms and small settlements. The land use patterns in this area have been mapped out, and the appropriate management measures and controls are in place to minimize any possible adverse effects (e.g. deforestation, soil erosion, agrochemical run-off) of land use practices in the wetland ecosystem. Particular efforts are made to control bush fires and encourage tree planting of indigenous species. Management should also seek to encourage agro-forestry to improve fuel wood supply outside the boundaries of the Park, thereby compensating for the restrictions on access elsewhere. Development of housing in this area would be restricted to only the immediate vicinity of existing villages within the park.

## **B. Habitat Management Prescriptions**

### **Core Area:**

No major habitat management is envisaged for this area. Research and restoration activities should be allowed in the area.

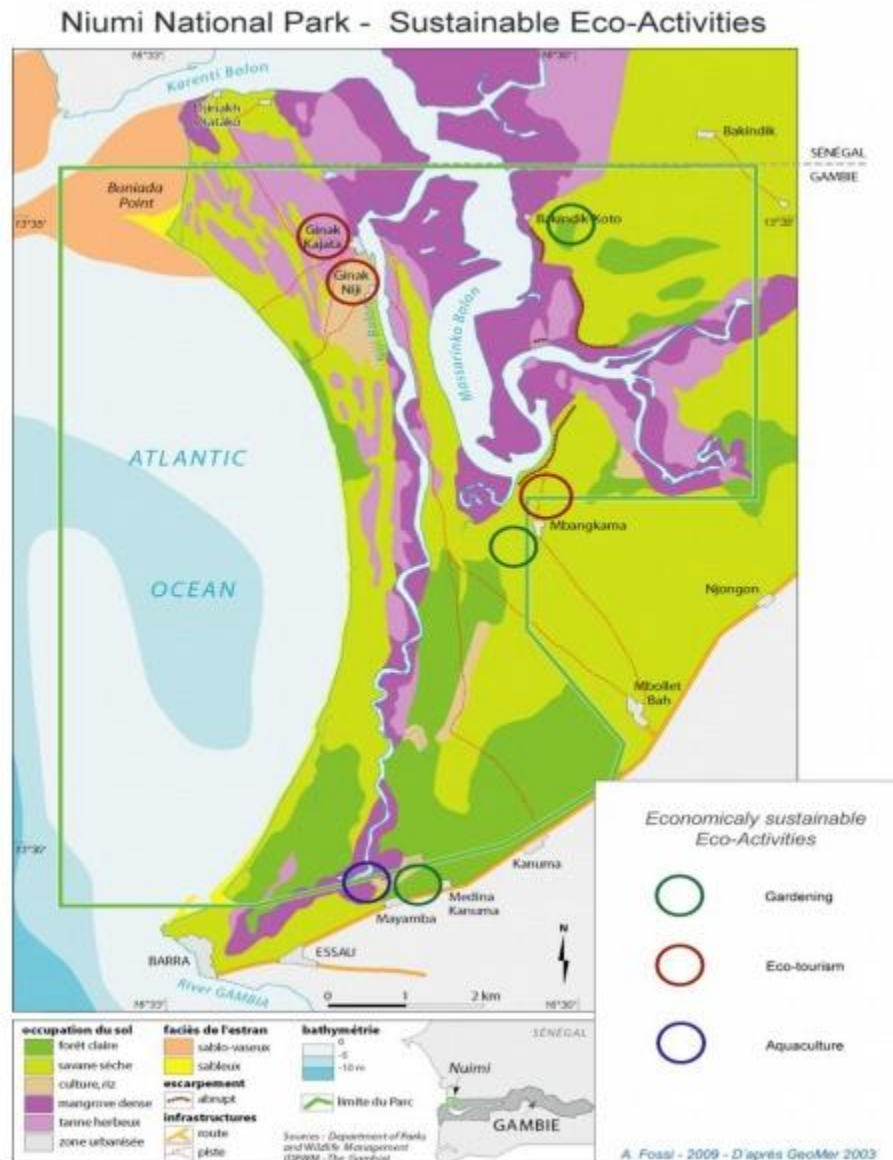
### **Controlled Zone,**

The forests within this area are been monitored and secured to prevent cattle grazing. These areas should be used as low impacting activity area like sustainable fishing (using hook and line). Consideration is given to increasing the size of these forests.

### **Land use Management Zone**

Cattle grazing and traditional use of the area should continue with monitoring on the erosion and trampling effects. Farmers in the area should be encouraged to take up agro-forestry, mix cropping, plantation and community wood lot projects, with the aim of increasing fuel wood supply and reduce pressure on trees in the area. During the current study, the communities of Mayamba, Jamagen and Mbankam have indicated that they feel that wood lots are a priority for their villages. A number of village wood lots could therefore be set up as pilot projects. A fire belt should be established and

maintained on an annual basis along the eastern perimeter of this area, A thirty meter firebreak will serve the dual function of keeping fires out of the zone and clearly demarcating the boundaries of the park. In addition zoning for tourism should restrict visitors exclusively to cleared and marked vehicle tracks and pedestrian trails and firebreaks. Tourist zoning has assist in the identification of boat landing, picnic, bird viewing and accommodation areas, (as indicated in the map below).Local communities have identified the need to develop ecotourism camps and train eco-guides in order to generate revenue and create job opportunities and *assist SMC members in their routine intervention in the management of the area.*



## **MANAGEMENT PLAN OBJECTIVES**

The management plan defines the protected area rules of management and investment to be made to protect the site. The management includes:

- Zoning
- Objective 1: Maintain Ecological Integrity of Niimi National Park
- Objective 2: Reinforce the implementation of the Ramsar Transboundary Cooperation
- Objective 3: Enhance protected area governance at site level
- Objective 4: Enhance Access and Benefit Sharing

### **Objective 1. Maintain Ecological integrity**

#### **Specific objective 1.1: Strengthen the management effectiveness Indicators**

- Prepare Standard Operation Procedure (SOP) manual
- Organize frequent training sessions on SOP
- Implement Surveillance, patrol and anti-poaching strategy
- Park infrastructure improved
- Revenue collection and sustainable financing strengthen
- Number of park staff increased
- Organize periodic meetings to evaluate monitoring and evaluation tracking tools (METT and PAMETT)

#### **Specific objective 1.2 Consolidate appropriate conservation measures**

##### **Indicators**

- Mangrove ecosystem restored and managed
- Sustainable use measures for fisheries management developed and implemented
- Monitoring system of species and research program strengthened
- Regular reporting and publishing
- Public awareness and environmental education

### **Objective 2: Reinforce the implementation of the Ramsar Transboundary Cooperation**

#### **Specific objectives 1**

##### **- Review and update Transboundary management plan**

##### **Indicators**

- Recruit international consultant
- Organize stakeholder PRA meetings
- Assess and validate data collected
- Prepare and validate management plan

#### **Specific objectives 2**

##### **- Prepare Transboundary project for implementation**

##### **Indicators**

- Organize meetings to crop project ideas
- Lobby partners to support project preparation and implementation
- Monitor and evaluate implementation

### **Specific objectives 3**

- **Prepare and implement joint Transboundary CEPA strategy**

#### **Indicators**

- Recruit consultant to prepare CEPA strategy
- Procure CEPA materials and prepare tools
- Organize outreach programs in schools and communities around Transboundary Ramsar site

### **Specific objectives 4**

- **Joint implementation of management activities**

#### **Indicators**

- Revive the existing transboundary joint management committee
- Prepare and implement management action plan
- Implement joint field species assessment (annual waterbirds census)
- Embark on Transboundary mangrove restoration programmes

### **Objective 3: Enhance protected area governance at site level**

#### **Specific Objective : Promote Co-Management**

- Site management committee strengthened
- By-laws set and implemented by communities
- Fishing regulated and controlled (joint patrol with relevant stakeholders, shifting fishing systems, biological rests, ban of bad fishing nets, etc.)

### **Objective 4: Enhance Access and Benefit Sharing**

#### **Specific objective 4.1: Develop communities' development activities**

- Communities needs and services priorities identified and supported
- NNP fishermen capacitated as volunteers
- Capacity building for wetland dependent women consolidated
- Youth and women conservation friendly entrepreneurship and skill training promoted

#### **Specific Objective 4.2: Develop Income generating activities**

- Modern beekeeping system in place and community well trained to manage it
- Organic and high yield gardening promoted
- Salt tolerant rice varieties introduced
- Oyster farming and value added production promoted
- Community ecotourism promoted
- Village banking for women established
- Wildlife farming project established and implemented
- Village woodlot initiative established

## Action Plan

<b>OBJECTIVE 1: Maintain Ecological Integrity of Nuimi National Park Wetland</b>						
<b>Specific Objectives</b>	<b>Indicators</b>	<b>Activities</b>	<b>Inputs/Tools</b>	<b>Cost USD</b>	<b>Timeframe</b>	<b>Responsible</b>
<b>1.1 Strengthen the management effectiveness of Niumi National Park</b>	- Standard Operation Procedure (SOP) Manual prepared and implemented	Develop SOP	Parks Staff, Stationery, Expert	10,000	Year 1 (first quarter)	Surveillance Unit
		Frequent training on SOP	Personnel, stationery, Resource Personnel, Facility hire			Research and Development Unit
	-Surveillance, patrol and anti-poaching strategy revised and implemented	River patrol, Land patrol, confiscation campaign, Revision of anti-poaching strategy	Motorized Boat, boots, bicycles, binocular, Vehicle 4x4 pick up, telescope, camera, GPS, Cell phones (CUG)	100,000		Surveillance Unit
	-Recruit and capacitate new staff	-Employment of new rangers -Staff training	staff training manual Personnel, field gears, stationery	350,000		Directorate
	Park infrastructure improved	Ranger posts, Observation tower, trails, and borehole	Specification, Contractors,	200,000		Directorate

	Revenue Collection and sustainable financing strengthen					
	Organize periodic meeting to evaluate monitoring and evaluation tracking tools (METT and PAMETT)					
<b>Specific objective 1.2Consolidate appropriate conservation measures</b>	-Mangrove ecosystem restored and managed	Procurement of seedling, planting exercise,	Personnel, transportation	200,000		Nuimi Manager
	Rice growing areas desalinated	Restoration of salinized areas  Salt tolerant rice varieties introduced	Desalinizing materials, Consultant, experts, personnel	50,000		Research and Development
	- Regular reporting and	Quarterly report, Checklist of species, factsheets		15,000		



	publishing					
	<p>Sustainable use measures for fisheries management, developed and implemented</p> <p>- Fishing regulated and controlled (shifting fishing systems, biological rests, ban of bad fishing nets, etc.)</p>	Confiscation of illegal fishing gears, Regular patrol,	Boats, bicycle, motorbike, vehicle, Episode production, Airtime	30,000		NNP rangers
	- Research and ,monitoring program develop strengthened	<p>Monitoring of:</p> <ul style="list-style-type: none"> <li>• Waterbirds</li> <li>• Seaturtle</li> <li>• Manatee</li> <li>• Dolphin</li> <li>• Land mammals</li> <li>• Other Key species</li> <li>• Management effectiveness</li> <li>• Economic evaluation</li> <li>• Other socio-</li> </ul>	<p>-Personnel,</p> <p>-Stationary</p> <p>-Staff</p> <p>-Research materials (such as GPS, software for data analysis, boat, fuel, etc)</p>	100,000		Directorate

		economic survey				
<b>Objective 2</b> Enhance protected area governance at site level						
<b>2.1 Promote Co-Management</b>	- Park management committee strengthened	Quarterly meetings	Personnel, Stationery, transport	10,000		Park Management
	- By-laws set and implemented by communities	Management plan familiarization meeting, Needs assessment, Development of By-laws	Personnel, Stationary, Expert, transport	100,000		Directorate
<b>Objective 3: Enhance human benefits</b>						
<b>Specific objective 3.1: Develop communities' development activities</b>	Communities needs and services priorities identified and supported	Needs assessment, Capacity building on entrepreneurship, Provision of seed money,	Personnel,	100,000		Directorate
	- NNP fishermen organized and capacitated as volunteers	Formation of fishermen association -Capacity building on resource management -Provide them	Personnel -Stationery -Transport -ID card maker	100,000		Directorate

		with voluntary identity card				
	Creating fire belt	Training communities and staff	materials (gloves, rakes, wheelbarrow, cutlass, trucks)	6,000	Annually	NNP Staff
<b>Specific Objective 3.2: Develop Income generating activities</b>	- Modern beekeeping system in place and community well trained to manage it	-Training -Provision of seed money -Identify potential market	Training manual Expert Start-up funds Markets	70,000		Park Manager
	- Village banking for women established	-Organized women groups -Training -Provide Seed money	-Funds -Experts -Bank Accounts	400,000		Park Manager
	- Organic and high yield gardening promoted	-Assessment of gardens -Raising awareness -Provision of organic manure	-Experts -Resource personnel -Funds	200,000		Research and Development Unit
<b>OBJECTIVE 4. Communication, Education and Public Awareness promoted</b>						
Specific objective 4.1 CEPA strategy develop and implemented	Public Awareness and	Develop strategy, implement key priorities,	Personnel, stationary, Airtime,	300,000		Directorate

	Environmental Education	Procure awareness tools such as T.shirts and caps, flyers, Procure awareness tools such as T.shirts and caps, flyers, posters, billboards posters, billboards, Community sensitization	Audiovisual Aid, Episode Production,			
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