**Annex 2**

**Major Habitat/ Vegetation Types**

**Marine and Coastal**

***Permanent Shallow Marine Waters*:**

Between Barra Point and Buniada 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 Buniada Point where sand bars extend up to 2km to the west. There appears to be little sub tidal vegetation though the occasional presence of eel grass cymodocea nodosa along the shoreline which suggests there may be beds within the confines of the park.

# Sand Shores:

The sand shoreline between Barra and Buniada on the island of Jinack is backed by a clearly zoned dune system. The front dune is stabilized with *Ipomoea pes-capra*e, *Cyperus maritimus* and *Cenchrus biflorus*. Backing this raised pioneer zone the same species occur in a more species rich belt with a mean height of 75cm. *Canavalia rosea*, *Chloris sp*, *Leptadenia hastata* and occasional *Microstachys glomerata* were apparent during the site visits (a number of other forbes were notes to be present but in an unidentifiable condition) this herbaceous dominated zone extends inlands for c10-15m where it is abruptly terminated by an evergreen shrub zone composed of *Maytenus senegalensis* and *Scaevola plumieri*. This shrub layer generally commences at the limit of the canopy formed by a belt of *Acacia seyal* which reaches 7-8m. *Adansonia digitata* occurs singularly or in copses throughout this coastal zone. The parasitic *Cassytha filiformis* forms dense mats over some of the Acacia-Maytenus belt. Further inland from this belt, the ground dips slightly to a seasonally flooded strip which is dominated by *Tamarix senegalensis*. This belt varies in width and in the northern end of the island extends into a mosaic of Tamarix fringed seasonally flooded pans. The tamarix belt reaches a height of ca 4m and is interspersed with *Sporobulus spp*, *Crotalaria retusa* and *Sesbania bispinosa*.

# Estuarine Waters:

The northern tip of Jinack Island forms as estuary for the outflow of a number of bolongs, some of which derive from the Delta du Saloum. The Mansarinko bolong is the main water body within the Niumi National Park and rises as two streams c1km inland. The freshwater flow on these bolongs is negligible during the dry season and they are brackish to saline through out the year. The habitat 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 relic gallery forest.

# Inter Tidal Sand and Mud Flats:

The northern tip of Jinack island forms the estuary for a number of bolongs with seasonal freshwater flow. The bolongs are tidal for their entire dry season length and resultantly have extensive fringes of halophytic vegetation. The combined tidal outflow of these bolongs meeting the northerly currents arising from the river Gambia have resulted in a sand bar formation of Buniada 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 Mansarinko and Niji Bolongs, Numerous mud banks become exposed during low water. No vegetation is associated with these mud banks possibly due to the tidal surge within

the bolons. Backing the mangrove fringe of the bolons 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 *Sesuvium portulacastrum* , *Philoxerus vermicularis*, *Paspalum vaginatum*, and *Sporobolus spp*.

# Inter Tidal Marshes:

Halophytic vegetation associated with salt pans has been referred to above and the same complex of species is also association 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 and evaporation following 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 are also subject to periodic flooding during spring tides. Salt marshes are generally fringed by *Tamarix senegalensis* with occasional *Avicennia Africana*, *Adansonia digitata* occurs on slightly elevated land fringing the marshes.

# Inter Tidal Forests:

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

## Rhizophora harissionii

* *Rhizophora racemosa*
* *Rhizophora mangle*
* *Laguncularia racemosa*
* *Avicennia nitida*
* *Conocarpus erectus*

All 6 species occur within the Niumi mangroves though the distribution of Rhizophora species has not been investigated in detail. Sukardjo (1995) has outlines four mangrove communities types found in The Gambia based on lugo and Sndaker’s (1974) criteria. The communities identified are fringe forest, riverine forest, basin forest and scrub or dwarf forest. According to this criterion however it appears a fifth mangrove community occurs within the Tanbi Wetland complex overwash forest. The fringe mangrove forests are found along waterways where the shoreline elevation is slightly higher than the mean high tide level and the salinity remains fairly constant through out the year. 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 bolongs within Niumi National Park. All three 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. Scrub 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 Mansarinko and Niji Bolongs. The north – east tip of Jinack Island and the Mbankama spit have extensive stands of this forest type which is backed by scrub forest and bare tannes. Stands of riverine mangrove forest are found in the mid and upper tidal reaches of the Mansarinko Bolong, reaching heights o up to 12m though generally less than 10m. On the spits opposite and to the south of Bakindik Koto, this forest type occurs on a peat deposit which sporadically in the

Gambia as thin beds within the fluvial marine sequence (White and Russell, 1988). Here also, the forest grades to scrub mangrove in the inland reaches.

# Coastal Lagoons:

A single coastal lagoon occurs at Buniada 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 Rive Gambia. The sediments form a spit which runs north – west from Buniada 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 *Ipomoea pes-caprae*, *Sesuvium portulacastrum* , *Cenchrus biflorus* and *Cyprus spp*. Occasional Avicennia shrubs occur on the southern edge which grades into Dichrostachys thicket with emergent *Adansonia digitata*.

**Inland Wetlands**

***Permanent Creeks:***

Niumi National Park has two main creek systems running through it. The Niji bolong 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 subject 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 Mbankama to form the Keur Jatta and Duniajoe bolons. These bolons 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 bolons is predominantly mangrove where there is a gentle gradient on the banks. Elsewhere, the vegetation rangers from woodland to grassland. There appears to be no associated aquatic vegetation within the bolons with the exception of the mangrove complex.

# Seasonal Creeks:

The upper reaches of Keur Jatta and Duniajoe bolons have seasonal freshwater follow. There are a number of other small bolons both on the island of Jinack and on the mainland which are rain fed but due to small catchment areas are more prone to rapid salinisation through a combination of evaporation and intrusion. The Keur Jatta and Duniajoe bolons have an associated floating / emergent freshwater vegetation dominated by *Nymphaea lotus* and *N. micrantha*, Typha and *Cyprus spp*, with *Marsilea sp*, *Ageratum sp*, *Urena lobata* and various graminae. The areas have relic gallery forest fringing the bolons which in some areas has been cleared underneath for rice cultivation and seasonal vegetable gardening. The freshwater stretches of these bolons currently lies outside of the proposed park boundary though their inclusion is due to be negotiated with the neighboring communities in the near future.

# 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 have ceased, the subsequent drying of these water bodies primarily through evaporation results in increasing saline concentration. The associated vegetation is essentially halophytic in nature with *Sesuvium portulacastrum* , *Philoxerus vermiculatus*, *Sporobulus spp* and *Paspalum vaginatum*,

the shrubby *Tamarix senegalensis* occurs on the fringes along with occasional *Elaeis guineensis*

and *Avicennia Africana*.

# 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 halopytic species and various cyperaceae. As the dry season commences these areas undergo progressive desiccation and the vegetation cove 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 Keur Jatta and Duniajoe bolons. 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 exists ca 1km west of Mbollet Bah, and a smaller are 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 bolons 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 bolons. 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 *Anthostema senegalensis* and *Dialium guineense* (c,f Lykke. 1994). Other notable species include *Khaya senegalensis*, *Detarium guineese*, *Alchornea cordifolia* and *Afzelia Africana*. The forest on the Duniajoe Bolong is quite degraded through a combination of clearance of the under storey 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 of greater than 8m, while wooded grassland has a canopy of 10-40%. Within *Niumi 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 *Parkia biglobosa*, *Daniellia oliveri*, *Pterocarpus erinaceus*. Shrubby species found in association include *Combretum nigricans*, *Dichrostachys glomerata*, *Guiera senegalensis* and *Ziziphus mauritiana*. 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 bushland or thicket. Dense regeneration of *Daniellia oliveri* is often found in fallow agricultural land. The under-storey in both woodland and grassed woodland is dominated by the grass *Andropogongayanus* which reaches heights of over 2m. Other grasses which occur include *Echinochloa colona* and *Chloris spp*.

On the island of Jinack and the sandier soils immediately east of the Niji Bolong, the woodland has a higher incidence of Parinari Macrophylla Macrophyall, Ficus spp and tamaarindus indica. Maytensus senegalensis is common in this woodland type.