

## 3.5 GAMBIA

### Introduction

Gambia is situated on the Atlantic coast of West Africa and, apart from its coastline, is entirely enclosed by Senegal. It occupies 10 690 km<sup>2</sup>, and with a population of 695 886 (1983), has a mean population density of 65 persons/km<sup>2</sup>. The country is long and narrow with a maximum width of only 45 km (N-S) and a length of 315 km (E-W), the latter being the distance it extends inland from the Atlantic Ocean. The country stretches from 13°04' to 13°44'N and from 13°53' to 16°50'W. Physiographically it is dominated by the estuary of the Gambia River which, seasonally, is weakly tidal almost as far as the eastern boundary. The river mouth is 4 km wide between Banjul (13°28'N/16°39'W) on the south bank and Barra on the north bank, but the estuary widens a few kilometres inland to a maximum of 14 km. Thereafter the channel narrows progressively in passing upstream, but is still 1 km wide more than 200 km from the mouth. The Gambian coastline, measured along inlets to the point at which their widths decline below 1 km, is thus disproportionately long, exceeding 550 km.

Both north and south of the Gambia River, the Atlantic coast is sandy and backed by parallel lines of dunes which carry littoral woodland and scrub. Several short coastal streams reach the sea on the Gambian coast, and the mouths of these are deflected along shore to form lagoons with sandy margins. The coast is one of submergence and the Gambia River valley is a drowned valley, set on a low sandstone plateau of Tertiary age. No part of the country exceeds 100 m asl. In the lower section, the muddy river banks slope gently into the water, but in the middle course the channel is braided, with many vegetated islands, and the outer banks are low cliffs, rising locally to 15 m in height. The river is navigable by ocean going ships, of up to 3000 tonnes, as far as Kuntaur, 250 km upstream, while smaller vessels can reach Georgetown (13°31'N/14°50'W), 283 km upstream. Above this place river boats carry cargo and passengers far beyond the Gambian border, but huge clearances for agriculture along the banks of the river in Senegal have led to serious increases in siltation which necessitate dredging operations to keep the channel open far downstream. Away from the river, in the west, the land surface comprises sandy hills separated by flat sandy plains, while in the east, higher land, mostly lateritic, prevails between tributaries of the river.

### Climate

The intertropical convergence moves across Gambia from the south, arriving in late May and moving northwestwards to cover most of the country by June. There is a short season of intense rainfall sometime between June and October, but the onset, duration and intensity of the rains is very variable. Total annual rainfall varies by as much as 500 mm (975-1475 mm) at Keneba, 80 km inland on the Bintang Bolon, a major south bank tributary of the Gambia River. The dry season is long and severe, lasting at least from November to April inclusive, during much of which time a desiccating Harmattan wind blows from the east

or northeast. Precipitation is greatest at the coast and decreases inland, as is usual in the region, but virtually the entire country receives mean annual falls in excess of 1000 mm. At both Yundum (13°23'N/16°42'W) and Banjul near the coast, mean annual precipitation is close to 1300 mm, while at Basse Santa Su (13°23'N/14°15'W) towards the eastern extremity, it is 1075 mm. The range of the mean monthly temperature over most of the country is 25°C (coolest month) to 30°C (warmest month), with the coastal region cooler than the interior and subject to longshore winds. Temperatures in the interior often exceed 40°C in March and April, with absolute minima of about 12°C having been recorded at several stations.

## **Wetlands**

At the coast, swamps and marshes occur in the swales of the dunes, and there are several lagoons and some small lakes associated with minor coastal streams. Some small rivers, e.g. the Allahein (San Pedro) River, are fringed by tidal (mangrove) swamps in their lower courses and by freshwater swamps and marshes in their upper courses. On the Gambia River, permanent tidal swamps extend in a semi-continuous belt along the lower estuary and reach nearly 200 km upstream. There are approximately 45 000 ha of mangrove swamp in Gambia. Over the middle course of the river, the floodplain is inundated only during the wet season. The depth of flooding decreases downstream, but at the eastern border it may exceed 12 m. At the height of the flood, river water backs up behind the flood tide, and tidal fluctuations are transmitted much farther upstream than in the dry season.

### **List of Wetlands Described**

1. Coastal Wetlands
2. Swamps & Marshes of the Gambia River

#### **1. Coastal Wetlands**

**General:** The left bank of the Allahein (San Pedro) River forms the southern border with Senegal for several kilometres above the river mouth. The river meanders southwestwards to the sea with mangroves extending upriver from the mouth in a continuous belt 1-2.2 km wide. On the landward sides of the mangroves there are bare saline mudflats in flanking strips 50-300 m wide, and these are fringed, at the tidal limits, by successive belts of saltmarsh herbs, halophytic grasses, and stunted trees. Among the latter, *Avicennia africana*, *Conocarpus erectus* and *Mitragyna inermis* are present. Some rice is grown on the river floodplain, to landward of the salinas in the vicinity of Kartung (13°05'N/16°45'W), but this is more common in less saline areas upstream.

Swamps extend back up the Allahein River and its affluents, almost to their sources. The mangrove forest gives way to palm and freshwater swamp forest, which may be tidal during the rains, and this in turn to herbaceous swamp land. Some 15-20 km inland, the flow of the river becomes diffuse, and the waters pass through numerous small water-

courses connecting a series of little lakes and lagoons. This whole system is encompassed by tall herb swamp with patches of forest along some watercourses. However, at the upstream end of this section the river is again a single discrete stream, and from here to its source swamps used to be almost continuous. More recently however, many have been converted for rice cultivation, which in places extends in a strip 1 km wide across the river. In 1981 a small natural swamp, 50 m wide and 4 km long, marked the final stretch below the source.

There is an open lagoon, with about 100 ha of tidal water surface, which extends into the dune swales south of Kartung, north and west of the Allahein River mouth. Farther northwards along the coast a swamp system occurs in the dune swales between Gunjur (13°11'N/16°46'W) and Sanyang (13°16'N/16°46'W). Along this stretch of coast the dunes are covered by littoral woodland and scrub, while grass swamp and swamp forest occupies a strip 100 m wide and 10 km long between the seaward dune and the next dune inshore. At the northern end of this swamp the little Kakima River crosses the dunes, and here the swamps are 800 m wide and extend back into some more landward dune swales. Still farther north there are two small lagoons, both with sandy shores, before the Tanji River is reached. This stream has been deflected northwards along the coast by a strong northerly flowing longshore current, so that the river reaches the sea at the end of a 2 km lagoon at Cape Bald. The lagoon shores are sandy, but there is a small mangrove swamp at the head of the lagoon, covering 100 ha, and tidal influence extends upstream for about 5 km. Flow in the Tanji is intermittent, but the lagoon mouth is open semi-permanently. Between this point and the Gambia River, there is another lagoon at the mouth of Kotu Stream. This is usually closed, the sand-bar at the river mouth being breached during the rains each year. This lagoon has sandy shores and supports no mangroves.

The coast to the north of the Gambia River is sandy and exposed to strong wave action, but at the northern border, a number of small rivers (or bolons as they are known locally) merge to form the Karenti Bolon. The most important affluents here are the Niji and Massarinko Bolons. A mangrove forest extends 1.7 km across the mouth of Karenti Bolon and several kilometres upstream. On this river, in Gambia, there are about 1000 ha of mangrove forest, with the swamps extending upstream into Senegal.

**Flora & Fauna:** The marshes in the dune swales support tall grasses and sedges, with patches of riverine swamp woodland along watercourses. The mangrove vegetation is as described in the regional introduction. *Cercopithecus aethiops* and *C. mona* occur in all types of swamp woodland, including mangroves, while *Colobus badius* is common in riverine forest. The small mammals typically associated with herb swamps are common, e.g. *Atilax paludinosus*, *Dasymys incomtus*, *Lutra maculicollis* and *Thryonomys swinderianus*, while *Cephalophus* spp. are the commonest larger mammals. *Trichechus senegalensis* occurs in the rivers, and the herb swamps and lagoon margins support a rich avifauna, typical of the West African coast.

**Human Impact & Utilisation:** Hunting occurs in the swamps. *Hippopotamus amphibius* no longer occurs along the coast, except perhaps in the Karenti system, and *Crocodylus niloticus* has probably vanished from most sites. The streams are fished, and locally, rice

is grown on the swamp fringes; this practice being most extensive on the middle course of the Allahein River.

**Conservation Status:** So far unprotected, but a National Park, to be known as the Gambia Saloum National Park, is proposed on the northern coast to include the Karenti Bolon system. It is planned that this will be contiguous with the Sini Saloum National Park in Senegal. The mangroves in this area, if protected, could be important to the survival of both crocodiles and manatees in Gambia.

## 2. Swamps & Marshes of the Gambia River

**General:** Peak volumetric discharges from the Gambia River are in the region of 2000 m<sup>3</sup>/sec during the flood, and 90% of the total annual discharge occurs during the 4 months from July to October. Flood waters rise by 12 m in the east, on the border with Senegal, and a great deal of land is flooded seasonally along the river, perhaps 20% of the national land surface in some years. However, the height of the flood declines towards the sea. Much of the lower estuarine floodplain is flooded every day by tidal water, and these areas are covered by mangrove vegetation. Behind this zone, on land which is flooded only very infrequently during the dry season, there are unvegetated and highly saline mudflats. These are crusted by salts during the dry season, at which time the water table has usually dropped 1 m or so below the surface. The lowness of the water table at this time of the year ensures that the waters of even very high tides do not flood the surfaces of these flats. However, by contrast, during the rains, when the water table reaches the surface, all normal high tides cause extensive surface flooding, and the depth of this is increased by the backing up of the freshwater flood coming downstream.

The lower, wide part of the Gambia Estuary is largely cloaked by mangrove forests, although there are substantial discontinuities in the mangrove belt, especially on the north side, where in places the shore is of high relief. Bare saline mudflats occur to landward of the mangroves, and at places within them, becoming progressively more extensive in passing up-estuary. The mangroves are best developed at the mouths of small affluents, while upstream on any watercourse, the tallest forest, comprising *Rhizophora* spp., occurs as a riparian strip, backed by a low open woodland of *Avicennia africana*. Far upstream, where saline influence wanes, the *Rhizophora* forests may grade into palm-pandan swamps, or into herb swamps or riverine swamp forest. Towards the estuary mouth the mangrove stands extend back from the river for 8 km or more, e.g. near Banjul, on Oyster Creek. Here, a single block of tidal forest covers 4800 ha. On this same side of the river, in passing upstream, major mangrove stands occur on Mandina Bolon, and then on Jaleh Cassa, Bulok, Pima and Payama Bolons, where the forest belt is 3 km wide and covers some 7600 ha. The principal southbank tributary is the Bintang Bolon, and swamp forests extend up this stream for 86 km and along all of its lower affluents. The mangrove belt is at first 1.5-2 km wide across this river, but this diminishes to 1 km at the 40 km mark. There may be 10 000 ha of swamp forest on this tributary system.

On the north bank of the Gambia River an extensive mangrove block occurs in the

Salikene (13°29'N/15°58'W) district, comprising a total of 8000 ha. Tall mangroves occur at the mouths of the Jurunkku, Tambana and Mini Minium Bolons in a continuous forest block which continues upstream for 30 km. Here the mangrove belt is 1-2.5 km wide along a stretch of almost deltaic river bank where many streams reach the estuary in parallel. However, the mangrove belt is backed by a broad salina 2-3 km wide, and locally 6 km wide. This is tidal only during the rainy season. Farther upstream near Japeni (13°26'N/15°26'W), the river is flanked by mangrove forests 2 km wide on both banks, with salinas 1.5 km wide behind them.

The river narrows quite sharply to the east of Mansa Konko (13°20'N/15°30'W) at the limit of the drowned part of the valley, and meanders north, east and south, in a great loop. It becomes full of islands, with patches of permanent swamp forest at convex bends, and although still tidal, saline influence is minimal and the open mudflats give way to vegetated areas dominated by *Paspalum distichum* (= *P. vaginatum*). *Phragmites* is found in permanent swamps and rice cultivation is important in this region. The river is 300-500 m wide where it passes Georgetown (13°31'N/14°50'W) on MacCarthy Island.

In the far east of Gambia, the floodplain is characterised by a seasonally flooded area, on which grasses predominate, but with many permanent swamps supporting some trees, palms and pandans, as well as *Phragmites* and *Typha*. In the Diabugu District, for example, the swamps of Prufu (13°19'N/14°12'W), Faraba (13°22'N/14°08' W), Fa jang (13°24' N/14°00' W), Jonkoto-Kubesi (13°27' N/13°59' W) and Kusum (13°26'N/13°55'W) occur along the river, each covering several hundred hectares. Many of these permanent swamps contain lakes or ponds, the largest of which are some 500 m long and perhaps 100-200 m wide. The area is deeply flooded during the wet season, at which time the ponds are in continuity with the river.

**Flora & Fauna:** The flora and fauna of the mangroves and the other floodplain wetlands are as described in the regional introduction, but the dry salinas in, and at the back of, the mangroves are a characteristic feature. They are prominent in all West African mangroves where mean annual precipitation is below 1500 mm and the dry season is severe. *Paspalum distichum*, *Sesuvium portulacastrum* and *Sporobolus virginicus* are to be found on the landward sides of these mudflats, among other species, with a fringe of trees including *Mitragyna inennis* at the extreme limit of flooding. As siltation raises the soil surface, so tidal flooding becomes less frequent, and the swamp tends to be colonised by non-mangrove vegetation. Where run-off from the adjacent high land is great, and salinity is not high, a herb swamp may develop between watercourses, generally dominated by *Phragmites* and *Typha*. Accounts of the mangroves and the mangrove soils adjacent to the Bintang Bolon at Keneba are given by Giglioli & Thornton (1965), Thornton & Giglioli (1965) and Giglioli & King (1966). In the east the floodplains are covered by typical floodplain grasses, including *Andropogon gayanus*, *Echinochloa pyramidalis*, *Panicum anabaptismum*, *Paspalum orbiculare* and *Vetiveria nigritana*, while permanent swamps, which are acid and peaty, contain *Oryza brachyantha*, the asclepiad *Adelostemma senegalense*, the legume *Bryaspis lupulina*, *Genlisea africana* (Lentibulariaceae) and *Berchemia discolor* (Rhamnaceae). *Mimosa*

*pigra* often forms thorny clumps in the centres of marshy areas. The typical spectrum of riverine trees is present.

**Human Impact & Utilisation:** The river is the principal communication route in Gambia and there has always been a deal of river traffic. The river and its affluents are fished throughout the country and there is an estuarine and offshore prawn fishery. Hunting occurs in the riverine wetlands and many species are taken, including wildfowl. *Crocodylus niloticus* and *Hippopotamus amphibius* have been hunted almost to the point of extinction and are both endangered in Gambia. *Trichechus senegalensis* also occurs in the river, but has been hunted and is now uncommon. Mangrove and other swamps along the river have been cleared for rice cultivation, but this has been a more common practice in the less saline regions upstream. Traditionally the lower estuary has been regarded as too saline for cultivation, while the middle part of the river, with its extensive freshwater floodplains, has been the principal site for agriculture. Intensified agriculture and the destruction of natural riverine wetlands, both in Gambia and upstream in Senegal, has brought with it the problem of increased erosion and siltation, which has necessitated dredging operations in order to keep the river channel open throughout most of its upper course.

**Conservation Status:** At present the only protected area on the Gambia River is the Gambia River (Baboon Island) National Park, north of Kuntaur. Here a group of 5 islands is protected. *Trichechus senegalensis* has been sighted here, together with *Hippopotamus amphibius*, and various small aquatic mammals such as *Aonyx capensis* and *Atilax paludinosus*. *Kobus ellipsiprymnus*, *Tragelaphus scriptus* and *T spekei* are other wetland species known to occur in the park. Some mangrove swamp and lagoons may be protected in the proposed Kiangs National Park on the south bank of the Gambia River, approximately 13°25'N/15°55'W.