

Protected Areas Resilient to Climate Change, PARCC West Africa



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National Data Collection Report: The Gambia



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Acronyms

ACCC	Adaptation to Coastal and Climate Change in West Africa
ANR	Abuko Nature Reserve
BFCWR	Bolon Fenyo Community Wildlife Reserve
BWR	Baobolon Wetland Reserve
DICE	Durell Institute of Conservation and Ecology
DoF	Department of Forestry
DWR	Department of Water Resources
DPWM	Department of Parks and Wildlife Management
GEF	Global Environment Facility
GHGs	Greenhouse Gases
INC	Initial National Communication of the Republic of The Gambia
IUCN PAPACO	International Union for Conservation of Nature – West and Central Africa Programme on Protected Areas
KWNP	Kiang West National Park
METT	Management Effectiveness Tracking Tool
NAPA	National Adaptation Programme of Action on Climate Change
NEA	National Environment Agency
NNP	Niumi National Park
PARCC	Protected Areas Resilient to Climate Change in West Africa
RGNP	River Gambia National Park
TBR	Tanji and Bijol Islands Bird Reserve
TNP	Tanbi National Park
UNEP WCMC	United Nations Environment Programme – World Conservation and Monitoring Centre
UNFCCC	United Nations Framework Convention on Climate Change

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Executive Summary

The Gambia is a small country that lies on the west coast of Africa. It is the smallest country on mainland Africa, covering an area of approximately 11,300 km². The country is divided into the North and South Banks by the River Gambia, which has its source in the Fouta Djallon Highlands in Guinea, 680 km away. The climate of The Gambia is sudano-sahelian, with a short rainy season from mid-June to early October and a long dry season from October to early June.

The land surface of the country was once very rich in biodiversity, with about 47% of the total area covered by dense forest. This provided habitats to different species of organisms. A total of 3335 species of organisms have been recorded in The Gambia to date. However, many of the large mammal species and some plant species have become extinct. Despite the biodiversity loss, many habitats of high ecological significance have been identified along the coastline from Buniadu Point to the Allahein River mouth. These habitats are: Toll Point to Cape Creek (Camaloo Corner), Oyster Creek Mangrove Swamp to Mandinari Point, Tanji Bird Reserve, Brufut Wood, Solifor Point, Tujereng Lagoons, River Kakima Delta-Kachuma Forest, Dua Dula to Kartong, and Kartong Point to Allahein River mouth. However, only five of these ecologically sensitive areas are under any form of protection. Protection of ecologically sensitive areas is critical to the long-term survival of biological diversity. There are eight protected areas in The Gambia. The Department of Parks and Wildlife Management (DPWM) currently manages seven protected areas namely Abuko Nature Reserve, River Gambia National Park, Niuni National Park, Kiang West National Park, Tanji and Bijol Islands Bird Reserve, Baobolon Wetland Reserve and Tanbi National Park. The eighth protected area, Bolon Fenyo Community Wildlife Reserve, is managed by the community of Gunjur, Kombo South District. These eight protected areas cover a total land area of 51,240 ha, equivalent to 4.27% of the total land area of The Gambia. The DPWM aims to have 10% of the marine and 15% of the terrestrial cover of the country under protection by 2020. The establishment and management of protected areas are not the only means of conserving biological diversity. Measures to increase the resilience of protected areas to climate change are also very important. As a low-lying country, The Gambia is vulnerable to climate change and thus attaches great importance to such issues. Climate change can cause global warming, which can lead to sea level rise. This is projected to result in the inundation of low-lying areas of the country. However, The Gambia has taken steps to address climate change issues. These include the preparation of two very important documents, namely the Gambia National Communication (INC) and the National Adaption Programme of Action (NAPA) on Climate Change.

The national Data collection consultancy focused on five thematic areas, namely protected areas, climate, species, vegetation and socio-economics. All the eight protected areas, with the exception of Baobolon Wetland Reserve, have management plans. Moreover, all the protected areas, except River Gambia National Park, have implemented Management Effectiveness Tracking Tools. There is only one protection corridor linking protected areas in the country. This is the corridor of vegetable gardens and rice fields on the outskirts of Lamin, linking Abuko Nature Reserve with Tanbi National Park. The other corridor links Bolon Fenyo Community Wildlife Reserve with the Allahein River mouth, which is not a legally protected area. Similarly, there is only one

transboundary protected area, the Niimi-Saloum, although there is the potential to have two other areas in the country. These are the Baobolon Wetland Reserve and the Allahein River mouth areas.

On the basis of the findings of this consultancy, it is recommended that the Gambia harmonize the data and information on its protected areas and more protection corridors and transboundary Protected areas be established in appropriate areas. These initiatives will not only serve as buffer for protected areas but will also increase their resilience to climate change.

1. Introduction

1.1. Context of the consultancy

The “Evolution of Protected Areas Systems with regard to Climate Change in the West Africa Region or “ Protected Areas Resilient to Climate Change in West Africa” (PARCC) is a full-size Global Environment Facility (GEF) project focusing on issues of climate change and protected areas. The four-year project (2011-2015) covers 5 pilot countries in West Africa: Chad, The Gambia, Mali, Sierra Leone and Togo. Three other countries (Burkina Faso, Cote d’Ivoire and Ghana) will participate in preparatory activities relating to transboundary conservation.

The United Nations Environment Programme World Conservation and Monitoring Centre (UNEP-WCMC) is the executing agency (Project Management Unit, PMU), while the International Union for the Conservation of Nature - West and Central Africa Programme on Protected Areas (IUCN PAPACO) is the main regional partner (Regional Management Unit, RMU). Other partners include Birdlife International, Durrell Institute of Conservation and Ecology (DICE, University of Kent), Durham University, the Hadley Centre and IUCN Species Programme.

The project aims at designing scientific tools to help make protected areas more resilient to climate change and building capacity in the countries to use these tools. In order to provide these tools, the best available data and information are necessary.

The project will offer potentially large benefits to the whole West Africa region from using the tools developed to increase the resilience of protected areas to climate change. The project will also provide the opportunity for additional transboundary conservation initiatives. The full implementation of the project at the national level was launched at the national inception workshop held in December 2011 in Banjul.

1.2. Objectives

The objectives of the consultancy on national data collection is to make available to the project all the missing data that will be needed to conduct studies on climate modeling, red-listing assessments, vulnerability assessments and development scenarios.

1.3. Methodology

In order to achieve the above objectives, first a review was made of the data holders institutions in the country. A review was also made of all available data on protected areas,

climate, species, vegetation and socio-economics. Moreover, missing data on the thematic areas needed for the project were also collected. These included updating the boundaries of Baobolon Wetland Reserve, Niimi National Park, Tanbi National Park, Tanji and Bijol Islands Bird Reserve and Abuko Nature Reserve, in collaboration with the World Database on Protected Areas (WDPA) team. Moreover, the GPS limits of Bijol Islands, part of Tanji Bird Reserve, were also determined. The final versions of all existing management plans of protected areas were collected. Management Effectiveness Tracking Tool (METT) assessments were also conducted for Abuko Nature Reserve, Baobolon Wetland Reserve, Bolon Fenyo Community Wildlife Reserve, Niimi National Park and Tanbi National Park.

1.4. Structure of the report

Chapter two gives an overview of the country background highlighting geography, environment and natural resources, protected areas, socio-economic context and political and administrative context. Chapter three explores the climate change preparedness of the country, focusing on the projected impacts as well as policies and strategies. Chapter four focuses on the available data on the five thematic areas: protected areas, climate, species, vegetation and socio-economics. Finally, Chapter five suggests recommendations on the basis of the findings of the consultancy.

2. Country background

2.1. Geography

The republic of The Gambia, a small country on the west coast of Africa lies between longitude 13.79 and 16.82 West and within latitude 13 North (NEA 2010). It covers an area of 11,300 km² (NEA 2010, Republic of The Gambia 2010) which makes it the smallest country on mainland Africa. The country is bounded by Senegal to the North, East and South and by the Atlantic Ocean to the West (NEA 2010). The Gambia, widest at its westerly end towards the ocean, is 48 km across, narrowing to about half this width at its eastern tip, 480 km inland (Republic of The Gambia 2010). The country is bisected into the North and South Banks by the River Gambia which has its source some 680 km upstream in the Fouta Djallon Highlands in Guinea (Republic of the Gambia 2010, 2011a). The natural drainage of the country is centered mainly on the River Gambia and its tributaries, namely the Bao, Bintang, Nianija, Sandougou and Sofaniama Bolons (Republic of The Gambia 1999).

The climate of The Gambia is sudano-sahelian characterized by a short rainy season from mid-June to early October and a long dry season from October to early June (NEA 2010, Republic of The Gambia 2011). The country is regularly affected by the northerly

Harmattan wind during the dry season (Republic of The Gambia 2010). Average temperatures vary, ranging from 23°C to 33°C during the rainy season and from 18°C to 30°C during the dry season (Republic of The Gambia 2010). During the rainy season, the relative humidity is generally about 77% throughout the country while during the dry season it is about 68% along the coast and 41% inland (Republic of The Gambia 2010). Average annual rainfall is in the region of 1000 mm, although it ranges from 850 mm to 1597 mm, depending on the agro-ecological zone (Republic of The Gambia 2010). Before the 1968 drought in the Sahel, average annual rainfall for the 1951-1967 period was well over 1000 mm (Republic of The Gambia 2010). However, over the past forty years, there has been a decline in mean total annual rainfall (Republic of The Gambia 2010).

2.2. Environment and natural resources

The land surface of The Gambia was once covered by dense forest, constituting about 47% of the total land area of the country (Republic of The Gambia 1999). The forest was very rich in biodiversity and provided habitats to different species of large mammals (NEA 2010). A total of 3335 species of organisms have been recorded in the country to date (NEA 2010). Many of these are now rare or locally extinct. More than 13 mammal species and a number of plant species have become extinct (NEA 2010). The extinct mammal species include the African Eeephant (*Loxodonta africana*) and the Giraffe (*Giraffa camelopardalis*).

Despite the loss of biodiversity, the coastline of The Gambia stretching from Buniadu Point in the North to the mouth of the Allahein river in the South, has many areas of high ecological significance. Nine areas of high ecological significance along the coastline have been identified (UNEP 1996, Fig. 1). The tenth area, Bijilo Forest Park, though not included in the map, is also an area of high ecological significance. These areas of high ecological significance are:

- (1) Toll Point to Cape Creek (Camaloo corner)
- (2) Oyster Creek mangrove swamp to Mandinari Point
- (3) Tanji Bird Reserve
- (4) Brufut Wood
- (5) Solifor Point
- (6) Tujereng Lagoons
- (7) River Kakima Delta-Kachuma Forest
- (8) Dua Dula to Kartong
- (9) Kartong Point to Allahen river mouth
- (10) Bijilo Forest Park



Fig.1. Areas of high ecological significance along the Gambian coastline.

2.3. Protected areas

Protection of ecologically significant areas is critical to the long-term conservation of biological diversity. However, not all the ecologically significant areas are protected. Toll Point to Cape Creek and Oyster Creek mangrove swamp to Mandinari Point form part of Tanbi Wetland Complex, a Wetland of International Importance (i.e. Ramsar site) (Bakurin

et al. 2010). Tanbi National Park is part of Tanbi Wetland Complex. Tanji Bird Reserve (Tanji and Bijol Islands Bird Reserve) is a government protected area. Brufut Wood and Kartong Point to Allahein river mouth are under some form of local community protection. However, the remaining ecologically sensitive areas are not under any form of protection.

The Department of Parks and Wildlife Management (DPWM) is the government institution responsible for the sustainable management of wildlife including the establishment of protected areas. There are eight protected areas in The Gambia, covering a total of 51,240 ha, and equivalent to 4.27% of the total land area of The Gambia (WWF 2011). The Department of Parks and Wildlife Management (DPWM) aims to have more areas under protection, including representatives of all major habitats in the country and with a proportional regional distribution. The current protected areas are: Abuko Nature Reserve (134 ha), River Gambia National Park (585 ha), Niimi National Park (7,758 ha), Kiang West National Park (11,526 ha), Tanji & Bijol Islands Bird Reserve (612 ha), Baobolon Wetland Reserve (22,000 ha) and Tanbi National Park (6,034 ha) (WWF 2011). In addition to the DPWM protected areas, there is Bolon Fenyo Community Wildlife Reserve (320 ha), the first community wildlife reserve in the country. It is managed by the local community of Gunjur, Kombo South.

2.4. Socio-economic context

The population of The Gambia is estimated to have reached 1.7 million (UN 2007). However, the 2003 national population census put the human population of The Gambia at 1.3 million with a growth rate of 2.8% (NEA 2010). At this growth rate, the population is expected to double in 2040 (NEA 2010). The country is also one of the most densely populated in Africa, with population density of 130 persons/km² (Republic of The Gambia 2007a). More than 60% of the population live in the Greater Banjul Area (GBA) because of high internal migration to this area and Western Region (now West Coast Region) (NEA 2010). A large proportion of the population is young, with over 45% under 15 years of age. Life expectancy is 59 years for women and 56 years for men (NEA 2010). The large proportion of the population being young increases the burden of providing not only adequate health and educational services but also employment opportunities (Republic of The Gambia 2011). The majority of the population is engaged in mainly subsistence agriculture (Republic of The Gambia 2011a). It currently accounts for about 40% of the Gross Domestic Product (GDP), employing more than 73% of the labour force (Republic of The Gambia 2010). The majority of the rural population depends on forest resources for construction, fodder, food, fuel, medicine and other daily needs (Republic of The Gambia 2011a).

2.5. Political and administrative context

The Gambia, a former British colony, gained full independence from Britain on 18 February, 1965 and became a republic within the Commonwealth in 1970 (Republic of The Gambia 2010). The country, a multi-party democracy, has three arms of government: the Executive, the Judiciary and Legislature. The government is headed by a President, who like the National Assembly Members, is elected every five years (NEA 2010). The President is assisted by a Vice-President together with a sixteen-member cabinet of ministers. Each ministry is headed by a senior civil servant (a Permanent Secretary), working under the political leadership of a minister (NEA 2010).

The administrative centre of the country is the Capital City, Banjul, situated on an island on the southern bank (NEA 2010). The country has also been divided into seven administrative areas or regions: Banjul, Kanifing Municipality, West Coast Region, North Bank Region, Lower River Region, Central River Region and Upper River Region (Fig. 2). The capitals of the administrative areas or regions are: Banjul, Kanifing, Brikama, Kerewan, Mansakonko, Janjanbureh and Basse, respectively. The two urban municipalities: Banjul and Kanifing, are each administered by a mayor whilst each of the other administrative regions is administered by a governor. Moreover, with the exception of Banjul and Kanifing, each region is sub-divided into districts, making a total of 40 districts nationwide (NEA 2010). Each district is administered by a Head Chief (Seyfo) and each village by a Village Head (Alkalo). The Head Chiefs (Seyfolu) and the Village Heads (Alkalolu) are appointed by the President. They constitute the District Tribunals (NEA 2010).

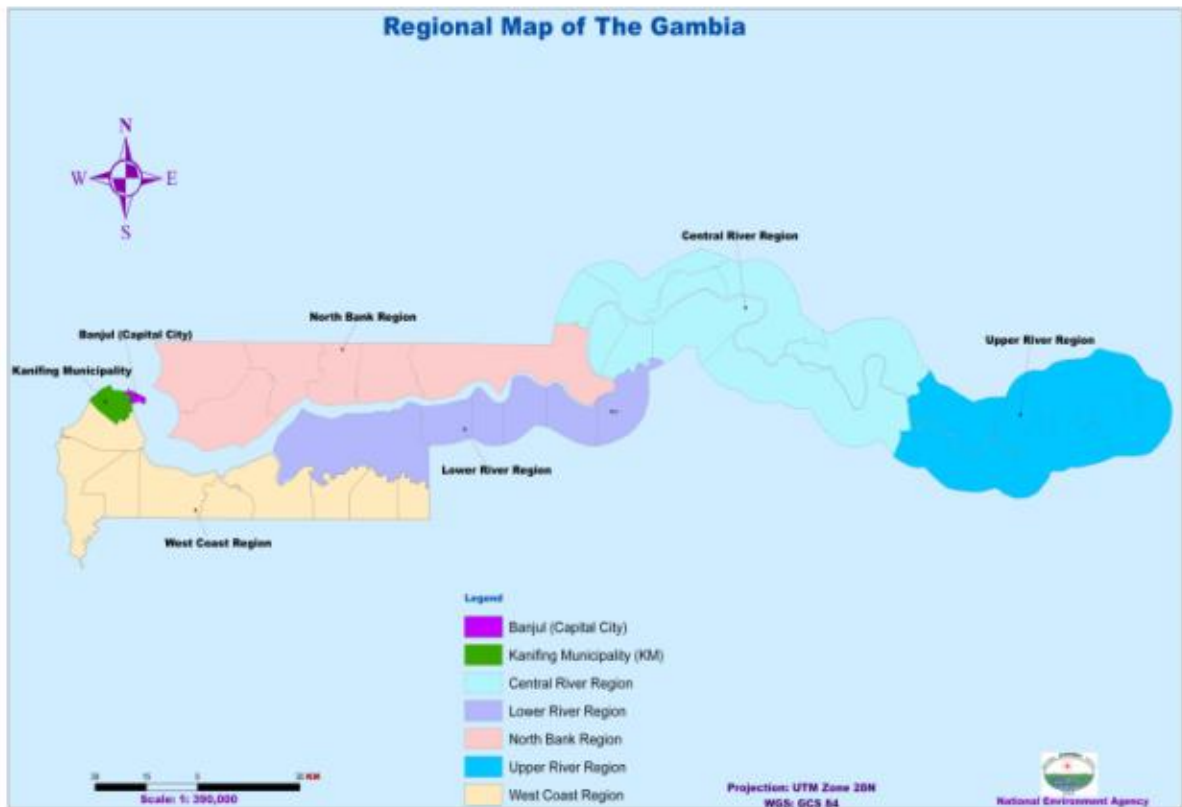


Fig.2. Regional map of The Gambia.

3. Climate change preparedness

3.1. Background

Climate change is a natural process that occurs over a broad range of time-scales, from a few years to hundreds of millions of years (Bakurin et al. 2010). The challenge faced by climate scientists is mainly about attributing changes in climate to a specific cause and making the distinction between climate variability and climate change forced by human activity (Bakurin et al. 2010). Climate can vary from place to place depending on distance to the sea, latitude, vegetation, relief, etc (Bakurin et al. 2010). Climate can also vary temporarily, from season to season, year to year, decade to decade or on much longer time-scales (Bakurin et al. 2010).

Climate change can lead to the warming of temperatures throughout the world (global warming). The mean temperature of The Gambia is predicted to increase by 3°C (30.5 to 32.0°C) on average by 2075 (Republic of The Gambia 2007a). Sea level rise is assumed to be 0.2m as a baseline, and 0.5m, 1.0m, and 2.0m by 2100 (Republic of The Gambia 2007a).

3.2. Projected impacts

Climate change poses a serious threat to low-lying countries such as The Gambia. As a low-lying country, The Gambia is vulnerable to climate change and thus attaches great importance to such issues (Bakurin et al. 2010). As indicated earlier in the report, climate change can cause global warming, which can lead to sea level rise. Analysis of the impact of sea level rise on The Gambia is difficult because of lack of data at the regional and national levels. Despite that, The Gambia is one of the top 10 countries in the world affected by sea level rise (NEA 2010). This is projected to result in the inundation of low-lying areas of the country. For instance, a 1-metre sea level rise is projected to result in the inundation of about 92km² of the coastal zone. The low-lying coastal areas around Banjul are predicted to be greatly affected by sea level rise in the future (NEA 2010). For instance, the city of Banjul is predicted to be lost because a larger proportion of it is below 1m. Mangrove systems on St. Mary's Island in Kombo St. Mary (Kanifing Municipality, Plate 1) as well as those on the north bank from Barra to Buniadu Point are also expected to be lost (Republic of The Gambia 2007a). Moreover, suitability of habitats for some species such as Osprey and Dwarf Crocodile, are predicted to be highly reduced. The Osprey may be very vulnerable since it is a migratory species requiring separate habitats for breeding, wintering and migration (Republic of The Gambia 2003a, 2007a). For rangeland and livestock, monthly total live biomass is projected to decrease by 29 to 43% and average leaf area by 31 to 45% (Republic of The Gambia 2007a). Moreover, it is projected that dry matter production will not be sustained after 2064 (Republic of The Gambia 2007a).

Not all effects of climate change are negative. For instance, average aboveground dry matter production for warm season grass is projected to increase by 35 to 69% (Republic of The Gambia (2007a). Fish productivity is expected to increase by 10%-14% over the current climate productivity of 12, 900, 000 kg/km of the river (Republic of The Gambia 2007a). A habitat Suitability Index analysis revealed that a 3°C to 5°C warming over the next century will have little or no effect on the suitability of habitat for the pelagic species of catfish and shad (Republic of The Gambia 2007a). However, for grouper, ladyfish and shrimps, the same warming level is projected to have negative impacts on their habitats (Republic of The Gambia 2007a).



Plate 1. Kotu creek, Kanifing Municipality, 2011. (Photo: Kawsu Jammeh).

3.3. Policies and strategies

The Gambia has ratified the United Nations Framework Convention on Climate Change (UNFCCC) since 1994. The UNFCCC aims at stabilizing the concentration of greenhouse gases (GHGs) in the atmosphere and member states (Parties) are obliged to take measures to mitigate greenhouse gas emissions (Republic of The Gambia 2003a). Since then the country has taken very important steps to mitigate the effects of climate change. These include the preparation of two documents namely the First National Communication of the Republic of The Gambia (INC) to the United Nations Framework Convention on Climate Change and the National Adaptation Programme of Action (NAPA) on Climate Change.

The INC is a summary of the country situation with regards to climate change. It gives an overview of the national circumstances and an inventory of greenhouse gas emissions. Inventories of greenhouse gases are necessary for monitoring reductions of GHGs by Parties and are very important components of national communications (Republic of The Gambia 2003a). The INC also assesses options to mitigate concentrations of greenhouse

gases and the vulnerability of major economic sectors and ecosystems to projected climate change.

The NAPA includes three broad sectors namely the economic sector (agriculture, fisheries and energy), the natural resources sector (water resources and forestry) and the social sector (health) (Republic of The Gambia 2007b). It critically re-examines the role of climate on societal and natural systems. The objectives of projects in the NAPA portfolio are to address urgent and significant climate threats through actions that:

- (a) “Deliver immediate adaptation benefits
- (b) Contribute to building local and national adaptive capacities
- (c) Create awareness and build foundations for maximizing long-term adaptation benefits.” (Republic of The Gambia 2007b).

The NAPA is implemented through institutional arrangements at three levels namely central, regional and community (Republic of The Gambia 2007b). It has listed ten priority projects to mitigate the effects of climate change in the country. One of these projects, a three-year climate change early warning system, is being implemented by the Department of Water Resources. The project funded by the Global Environment Facility (GEF)/United Nations Development Programme (UNDP) started in October 2011. The main objective of the project is to enhance adaptive capacity and reduce vulnerability to climate change. Another project, the Adaptation to Coastal and Climate Change (ACCC) in West Africa, has been implemented by the National Environment Agency, from 2009 to 2011. The project was funded by the Global Environment Facility (GEF), the United Nations Development Programme (UNDP) and the United Nations Educational, Scientific and Cultural Organization (UNESCO). The main objective of this project was to increase the adaptation of the coastal areas of West Africa to climate change.

4. National data collection

4.1. Protected areas and species

Background

The establishment and effective management of protected areas is one of the most important ways of conserving biological diversity. As indicated in Chapter two, the Department of Parks and Wildlife Management (DPWM), is the government institution responsible for the establishment and management of protected areas in The Gambia. Although there are eight protected areas in the country, the department is responsible for the management of seven protected areas, namely Abuko Nature Reserve, River Gambia

National Park, Niimi National Park, Kiang West National Park, Tanji & Bijol Islands Bird Reserve (Tanji Bird Reserve), Baobolon Wetland Reserve and Tanbi National Park (Fig. 3). Another protected area (Bolon Fenyo Community Wildlife Reserve) is managed by the local community of Gunjur, Kombo South District. An overview of each the eight protected areas is given below.

Five protected areas were identified in the Terms of Reference (TOR) for this consultancy as being in need of being corrected and/or updated in the World Database on Protected Areas (WDPA). Therefore, correction and/or updates were done for Baobolon Wetland Reserve, Niimi National Park, Tanbi National Park, Tanji & Bijol Islands Bird Reserve and Abuko Nature Reserve, in collaboration with the WDPA team. In addition, the GPS coordinates of Bijol Islands were determined. Maps of all these protected areas with their shape files as well as the GPS Coordinates of Bijol Islands, were provided to the WDPA team. The team confirmed the data to be of WDPA standard. In addition, Management Effectiveness Tracking Tools (METT) were conducted for five protected areas as indicated in the TOR. These were Abuko Nature Reserve, Niimi National Park, Baobolon Wetland Reserve, Tanbi National Park and Bolon Fenyo Community Wildlife Reserve (see section 4.5).



Fig. 3. Map of the protected areas of The Gambia.

Abuko Nature Reserve

Abuko Nature Reserve (ANR), gazetted in 1968, is the first protected area to be established in The Gambia. It is located at 13.41°N and 16.65°W in the West Coast Region of The Gambia (Republic of The Gambia 2011b). The reserve covers an area of 105 hectares (Republic of The Gambia 2011a). However, according to a DPWM source, the current area of the reserve is 134 hectares, which includes a 29 hectare extension to the reserve. There are five major habitat and vegetation types within Abuko Nature Reserve: gallery forest, Guinea savanna, open woodland, freshwater pool and *Raphia* swamp (Republic of The Gambia 2011b).

A wide range of vegetation types are found in association with the various ecological entities (Republic of The Gambia 2011b). Moreover, the reserve has a variety of habitat types found in close proximity to each other resulting in a rich array of ecozones (Republic of The Gambia 2011b). The reserve is very rich in biodiversity with 290 bird species, 70 tree species, 33 amphibian species, 57 butterfly species, 34 mammal species and 15 reptile species (Republic of The Gambia 2011b). A Department of Parks and Wildlife Management (DPWM) checklist showed that 54 bird species, 71 tree species and 18 mammal species have been recorded from the reserve (DPWM 2012). However, Barnett 2005 listed 255 bird species, 132 plant species, 21 amphibian species, 86 butterfly species, 54 moth species, 41 mammal species and 39 reptile species. Barnett (2005) listed all the species while the Republic of The Gambia (2011b) did not. Therefore, Barnett (2005) will be used for the purpose of this report (Annex 1).

All the three species of monkeys in The Gambia, namely Callithrix Monkey (*Chlorocebus sabeus*), Red Colobus Monkey (*Piliocolobus badius temmincki*) and Red Patas Monkey (*Erythrocebus patas*), are found in Abuko Nature reserve. All of these species are threatened in the country. Reptiles common in the reserve include African Rock Python (*Python sabae*), Agama Lizard (*Agama agama*), Bosc's Monitor (*Veranus exanthematis*), and Nile Monitor (*V. niloticus*) (Republic of The Gambia 2011b). Amphibian species found in the reserve include Common African Toad (*Bufo regularis*) and Savanna Toad (*Bufo xeros*) (Republic of The Gambia 2011b).

River Gambia National Park

River Gambia National Park (RGNP), which covers an area of 585 hectares, was gazetted in 1978 (National Resource Consulting (NACO) 2011). The park is located in the Central River Region, on the south bank of the River Gambia, at 13°35'North, 14°58'00 West (NACO 2011). The park is situated approximately 300 km by road from Banjul (NACO 2011).

The park, a complex of five islands, at an altitude of less than 5 m above sea level, is one of the last refuges of the threatened Hippopotamus (*Hippopotamus amphibious*) within

The Gambia (NACO 2011). A Chimpanzee (*Pan troglodytes*) Rehabilitation Project (CRP) was established in 1979. The CRP is a private organization that takes care of chimpanzees caught during illegal trade, by providing a natural life for them. There are currently 62 chimpanzees living on three islands including 18 that were originally released on the islands (NACO 2011). Moreover, a Department of Parks and Wildlife Management (DPWM) checklist showed that 17 bird species, 14 mammal species and 30 tree species have been recorded from the park (DPWM 2012).

Niumi National Park

Niumi National Park (NNP), gazetted in 1986, is located on the north bank of the River Gambia, in the North Bank Region, at 13°31' North, 16°31' West (Republic of The Gambia 2011c). The park occupies the coastal strip north of the River Gambia, covering an area of 7758 hectares (Republic of The Gambia 2011c). The park also encompasses the southern tip of the Sine-Saloum Delta (Republic of The Gambia 2011c) and is contiguous with Parc National du Delta du Saloum (Delta du Saloum National Park) and Biosphere Reserve in Senegal. These two parks form the Niumi-Saloum transboundary protected area.

Niumi National Park was designated as a Ramsar Site in February 2009 (Republic of The Gambia 2011c). The park encompasses a mosaic of vegetation-habitat types ranging from mangrove forest, through coastal grass/scrubland, forested/woodland, salt marsh, freshwater marsh, freshwater lagoon, and intertidal mudflats, to estuarines and sand beaches (Republic of The Gambia 1997). Thus the park supports a diversity of species: 300 bird species, 4 amphibian species, 46 mammal species, 21 reptile species and a variety of invertebrate species (Barnett 2000) (See annex 1). A Department of Parks and Wildlife Management (DPWM) checklist showed that 20 bird species, 9 mammal species and 26 tree species have been recorded from the park (DPWM 2012). However, according to Republic of The Gambia 2011c, the park supports 130 plant species, 32 butterfly species, 22 Odonta species, 43 mammal species, 28 reptile species and 13 families of fish. That report did not contain a list of all these species. Therefore, as indicated earlier, Barnett 2000, which contains a list of all the species, will be used in this report.

Mammal species found in the park include Bushbuck (*Tragelaphus scriptus*), Common Warthog (*Phacochoerus africanus*), Leopard (*Panthera pardus*), Spotted Hyena (*Crocuta crocuta*) and Western Red Colobus Monkey (*Piliocolobus badius temmincki*). Threatened mammals such as the West African manatee (*Trichechus senegalensis*) and the African Clawless Otter (*Aonyx capensis*), are also found in the bolons (tributaries) (Republic of The Gambia 2011c). Reptile species that are commonly found in the park include the Bosc's Monitor (*Veranus exanthematicus*), Nile Crocodile (*Crocodylus niloticus*), Nile monitor (*V. niloticus*), Bell's Hinged Tortoise (*Knixys belliana*), Green Turtle (*Chelonia mydas*) (threatened) and Olive Ridley Turtle (*Lepidocelys olivacea*). The most abundant fish species found in the park is Tilapia spp and Mugil spp (Republic of The Gambia 2011c). However,

juveniles of African red snaper (*Lutianus agennes*), Giant African threadfin (*Polydactylus quadrifilis*) and shad (*Ethmalosa fimriata*) are also found in the park (Republic of The Gambia 2011c).

Kiang West National Park

Kiang West National Park (KWNP), established in 1987, covers an area of approximately 11,526 ha (115 square kilometers) (Republic of The Gambia 2011b). It is located on the south bank of the River Gambia in the Lower River Region, Kiang West District, at 13°23' North, 15°55' West, 145 km from Banjul (Republic of The Gambia 2011d).

The major part of the national park is dry deciduous woodland and guinea savanna although there are also extensive stretches of mangrove creeks and tidal flats (Republic of The Gambia 2011d).

Kiang West National Park is one of the most important reservoirs of wildlife in The Gambia (Republic of The Gambia 2011b). The park is very rich in biodiversity with 250 species of birds recorded (Republic of The Gambia 2011d). However, a Department of Parks and Wildlife Management (DPWM) checklist showed that 133 bird species, 36 mammal species and 40 tree species occur in the park (DPWM 2012).

The rare West African Manatee (*Trichechus senegalensis*) and the Nile Crocodile (*Crocodylus niloticus*) occur in the mangrove creeks of the park (Republic of The Gambia 2011d). Occasional sightings of leopards (*Panthera pardus*) in the park have also been reported (Republic of The Gambia 2011d).

Tanji & Bijol Islands Bird Reserve

Tanji and Bijol Islands Bird Reserve (Tanji Bird Reserve, TBR), covering an area of 612 hectares, was gazetted in 1993 (Republic of The Gambia 2011e). The reserve is located in the West Coast Region, Kombo North District, at 13°22' North, 16°48' West (Republic of The Gambia 2011d). It is located on the Atlantic coast, 1 km from Brufut and 15 km south-west of the tourist centres of Bakau and Fajara (Republic of The Gambia 2011e).

Tanji Bird Reserve comprises a wide diversity of habitat types including coastal scrub woodland, dry woodland savanna, freshwater, estuarine and marine (Republic of The Gambia 2011e). The Bijol Islands, the only offshore island in the country, located about 2 km offshore, provide an important breeding ground for waterbirds and marine turtles (Republic of The Gambia 2011e, Plate 2).

The reserve supports a high biological diversity with 304 bird species recorded (personal observation). However, a Department of Parks and Wildlife Management (DPWM) checklist showed that the reserve supports 176 bird species and 17 mammal species (DPWM 2012).

Mammals of global conservation concern such as the Western Red Colobus monkey (*Piliocolobus badius temmincki*), the rare Mediterranean monk seal (*Monachus monachus*) and dolphins (*Sousa teuzil*) occur in the surrounding waters (Republic of The Gambia 2011e). The Nile Crocodile (*Crocodylus niloticus*) also occur in the permanent water pools. Other reptiles that occur in the reserve include African Rock python (*Python saba*) and the Royal Python (*P. regius*) (Republic of The Gambia 2011e). Tanji & Bijol Islands Bird Reserve is considered the richest site for birds in The Gambia, measured by the number of bird species recorded in the country (Republic of The Gambia 2011e). The mouth of the Tanji river and the Bijols Islands are the most important areas in the country for most species of gulls and terns (Republic of The Gambia 2011e). The Bijol Islands are the only known breeding site in The Gambia for Grey-headed Gull (*Larus cirrocephalus*), Caspian Tern (*Sterna caspia*) and Royal Tern (*S. maxima*) (Republic of The Gambia 2011e).



Plate 2. The Bijol Islands, April 2012. (Photo: Amadou S. Camara).

Baobolon Wetland Reserve

Baobolon Wetland Reserve (BWR) is located in the North Bank Region at 13°31' North, 15°52' West, about 100 km from the mouth of the River Gambia (Barnett 2000, Plate

3). The reserve is named after the Baobolon tributary which rises in Senegal and enters the River Gambia south-east of Katchang (Barnett 2000). The area was proposed as a protected area in 1990. The reserve which covers an area of about 21, 900 ha, extends from the River Gambia north to the Senegalese side of the border along the Baobolon tributary (Barnett 2000).

Baobolon Wetland Reserve comprises a rich mosaic of habitat types with a rough zonation from the high mangroves of the River Gambia through permanent salt marsh, bare tannes, seasonal freshwater marsh, to wooded grassland (Barnett 2000).

Baobolon Wetland Reserve is the first area to be designated as a Wetland of International Importance (i.e., Ramsar Site) in 1996. The reserve is ecologically significant in that three distinct ecosystem types: mangrove forest, salt marsh and savanna woodland occur in very close proximity to each other at many locations (Barnett 2000). This resulted in a mosaic of habitat types, giving rise to a high incidence of ecotones, with high associated biodiversity (Barnett 2000). The reserve supports 222 bird species, 68 plant species, 1 amphibian species, 22 butterfly species, 11 odonta (insect) species, 3 crustacean species, 1 gastropod species, 32 mammal species, 9 reptile species and 9 fish species (Barnett 2000) (See annex 1). However, a Department of Park and Wildlife Management (DPWM) checklist showed that 10 tree species, 10 mammal species and 10 tree species have been recorded from the reserve (DPWM 2012). However, this checklist seems incomplete and in the process of being developed. Therefore, Barnett 2000 will be used for this report.

Large mammals such as Bushbuck (*Tragelaphus spekei scriptus*), Sitatunga (*Tragelaphus spekei*), Spotted Hyena (*Crocuta crocuta*) and Leopard (*Panthera pardus*) occur in the reserve. Primates recorded from the reserve include Guinea Baboon (*Papio papio*), Callithrix Monkey (*Cercopithecus sabeus*) and Patas Monkey (*Cercopithecus patas*) (Barnett 2000). Aquatic mammals such as the West African manatee (*Trichechus senegalensis*) and the African Clawless Otter (*Aonyx capensis*) also occur in the bolons (tributaries) (Barnett 2000). Reptiles found in the reserve include Nile Crocodile (*Crocodylus niloticus*), Bell's Hinged Tortoise (*Knix belliana*), Agama lizard (*Agama agama*), Nile monitor (*Varanus niloticus*), Bosc's monitor (*Varanus exanthematicus*) and African rock python (*Python sabae*) (Barnett 2000). Fish species belonging to at least six families have been recorded from the reserve. However, the most abundant species were Shads (*Ethmalosa fimriata*), Tilapia (*Tilapia spp.*) and Mulletts (*Mugil spp.*) (Republic of The Gambia 1997).



Plate 3. Baobolon Wetlands, 2011. (Photo: Kawsu Jammeh).

Tanbi National Park

Tanbi National Park (TNP), covering an area of 6,034 hectares was established in 2007 (Republic of The Gambia 2008, Plate 4). The national park is located within the administrative regions of Banjul, Kanifing and West Coast, at 13°26' North, 16°38' West (Republic of The Gambia 2008a). The national park is lowland with a mean altitude 1 m (Republic of The Gambia 2008a).

Tanbi National Park has been designated as a Ramsar Site in 2002. The area is an estuarine and intertidal forested wetland, mainly of low mangrove forest, with a complex of vegetation types on its northern boundary and along the mangrove fringing the mainland (Republic of The Gambia 2008a). It provides an important fish breeding ground.

The park is very rich in biodiversity with 362 bird species from 66 families recorded (Republic of The Gambia 1997). However Barnett (2000) reported that the park supports 362 bird species, 1 amphibian species, 135 insect species, 6 crustacean species, 2 gastropod species, 30 mammal species, 23 reptile species and 24 fish species. Moreover, a Department of Parks and Wildlife Management (DPWM) checklist showed that the park supports 78 bird species, 10 mammal species and 40 tree species (DPWM 2012). This checklist appears to be incomplete and needs to be updated. Therefore, Barnett (2000) will be used for this report.

Rare and endangered mammal species such as the West African Manatee (*Trichechus senegalensis*) and the African Clawless Otter (*Aonyx capensis*) occur in the bolons (tributaries) (Republic of The Gambia 2008a). Bell's Hinged Tortoise (*Knixys belliana*) has also been recorded from the coastal strip (Republic of The Gambia 1997). Fish belonging to at least five families have been recorded from the park and the most abundant of these is the *Tilapia spp.* (Republic of The Gambia 2008a).



Plate 4. Tanbi National Park, Lamin, April 2012. (Photo: Amadou S. Camara).

Bolon Fenyo Community Wildlife Reserve

Bolon Fenyo Community Wildlife Reserve (BFCWR), covering an area of 320 hectares, was gazetted as a protected area in 2008. The Reserve is located along the Atlantic coast, in the West Coast Region, Kombo South District, 35 km from Banjul (Republic of The Gambia 2008b). The central coordinates of the reserve are 16°46'West-13°09'North (Republic of The Gambia 2008b).

The area has exceptionally high habitat diversity for its comparatively small area. These habitats include marine, estuarine, fresh water marsh, coastal dune, mangrove, woodland/savanna and thicket (Republic of The Gambia 2008b). The reserve is also in very

close proximity to another area of high ecological significance, Dua Dula to Kartong. This area serves as a corridor linking Bolon Fenyo Community Wildlife Reserve with the ecologically significant Allahein River mouth.

The reserve which includes 400 meters of coastline and open beach, has a high diversity of avifauna and is an important roosting and feeding area for gulls, terns and other species (Republic of The Gambia 2008b). It also has a high diversity of plant species, with 41 plant species recorded from casual observation of Rangers (Republic of The Gambia 2008b). Moreover, a total of 74 bird species from 61 families, 16 mammal species and 11 reptile species, have been recorded from the reserve (Republic of The Gambia 2008b). However, a Department of Parks and Wildlife Management (DPWM) checklist showed that the reserve supports 100 bird species, 6 mammal species and 70 tree species (DPWM 2012). There is no official record on the status of amphibians and fish within the reserve. Although there has been no investigation of the diversity of invertebrates, a sporadic study of the Lepidoptera yielded 31 species (Republic of The Gambia 2008b).

Mammal species recorded from the reserve include Gambian Epauletted Fruit Bat (*Epomophorus gambiensis*), Western Red Colobus Monkey (*Ptilocolobus badius temmincki*), Calithric Monkey (*Cercopithecus sabaeus*), Senegal Bush Baby (*Galago senegalensis*), Bushbuck (*Tragelaphus scriptus*), Red flanked Duiker (*Cephalophus rufilatus*), Clawless Otter (*Aonyx capensis*), Porcupine (*Hystrix cristata*) and Spotted Hyena (*Crocuta crocuta*) (Republic of The Gambia 2008b). Reptile species include African Rock and Royal Pythons (*Python sabaes* and *Python regius*), Puff Adder (*Bitis ariens*), Nile Monitor (*Varanus niloticus*), Nile Crocodile (*Crocodylus niloticus*) and Leatherback and Green turtles (*Dermochelys coriacea* and *Chelonia mydas*) (Republic of The Gambia 2008b). Offshore fauna recorded from the area include Hump-backed and Bottlenose Dolphins (*Souza teuzil* and *Tursiops truncatus*), Pilot and Minke whales (*Globicephala macrorhynchus* and *Balaenoptera acustorostrata*) (Republic of The Gambia 2008b).

Forest protected areas

The Department of Forestry (DoF) is the government agency responsible for promoting the rational management of forest resources and the active participation of local communities. In addition to the wildlife protected areas, DoF manages 66 forest reserves spread over all the regions of the country and covering 32,734.8 hectares (Schindele 1986) (Table 1).

Table 1: List of Forest Parks of The Gambia

Region	Serial number	Forest Park	Notificati on	Size (hectares)
West Coast Region	1	Finto Manereg Forest Park	1952	1106.6
	2	Katilenge Forest Park	1952	406.8
	3	Bama Kuno Forest Park	1952	1092.0
	4	Nyambai Forest Park	1952	202.0
	5	Kabafita Forest Park	1952	243.0
	6	Furuya Forest Park	1952	488.8
	7	Bamba Forest Park	1952	389.0
	8	Salaji Forest Park	1952	312.0
	9	Bijilo Forest Park	1952	51.5
North Bank Region	10	Lohen Forest Park	1952	93.7
	11	Kasaywa Forest Park	1952	155.7
	12	Kumadi Forest Park	1952	304.0
	13	Marike Forest Park	1952	175.0
	14	Dobo Forest Park	1952	0
	15	Jalobiro Forest Park	1952	59.6
	16	Pakala Forest Park	1954	941.4
	17	Ngeyen Forest Park	1954	527.1
Lower River Region	18	Berikolon Forest Park	1952	1468
	19	Tabaning Sita Forest Park	1952	
	20	Tambajang Forest Park	1952	
	21	Sutukung Bani Forest Park	1952	6.9
	22	Jambangkunda Forest Park	1954	358.6
	23	Se-Ulumbang Forets Park	1954	554.1

	24	Nyanaberi Forest Park	1952	112.5
	25	Jabisa Forest Park	1952	16.4
	26	Kaiaf Forest Park	1952	28.5
	27	Konoworo Forest Park	1952	0
	28	Jollofin Forest Park	1954	447.8
	29	Mutaro Kunda Forest Park	1952	803.0
	30	Brikama Forest Park	1952	357.0
	31	Faba Forest Park	1952	517.3

Table 1: List of Forest Parks of The Gambia (continued)

Region	Serial number	Forest Park	Notification	Size (hectares)
Central River Region	32	Belel Forest Park	1952	449.2
	33	Jumo Yaka Forest Park	1952	214.5
	34	Njama Forest Park	1954	16.4
	35	Njau Forest Park	1954	467.0
	36	Kahi Badi	1954	1181.7
	37	Niani Maru Forest Park	1952	604.0
	38	Gassang Forest Park	1952	57.8
	39	Sibikuroto Forest Park	1952	32.2
	40	Ngongonding Forest Park	1954	1410.0
	41	Tanu Forest Park	1954	2178.2
	42	Dobo Forest Park	1952	35.4
	43	Kata Forest Park	1952	5.1
	44	Kiberi Forest Park	1952	382.1
	45	Samba Tumang Forest Park	1952	52.3

	46	Sao Forest Park	1954	702.9
	47	Bankuba Forest Park	1952	794.3
	48	Kaolong Forest Park	1952	2454.2
	49	Kunkiling Forest Park	1952	144.4
	50	Madina Demba Forest Park	1954	2270.7
	51	N'Jassan Forest Park	1952	2240.0
	52	Jamara Forest Park	1954	575.3
	53	Sikunda Forest Park	1952	505.2
	54	Sallo Kuto Forest Park	1952	3.2
	55	Pilabi Forest Park	1954	219.9
	56	Mamato Konko Forest Park	1954	601.1
	57	Sakaru Dalla Forest Park	1954	316.1
	58	Humdalai Forest Park	1954	87.9
Upper River Region	59	Sibikuroto Forest Park	1952	32.2
	60	Helakunda Forest Park	1952	241.2
	61	Gambissara Forest Park	1952	277.9
	62	Sabbi Forest Park	1952	94.0
	63	Jeloki Forest Park	1954	872.5
	64	Jundala Forest Park	1952	357.3
	65	Koina Forest Park	1952	12.2
	66	Kusun Forest Park	1952	432.5

Source: (Schindele 1986).

Protection corridors and transboundary protected areas

There are no adequate protection corridors among the protected areas in The Gambia. The only wildlife corridor linking protected areas is that linking Abuko Nature Reserve and Tanbi National Park. The other wildlife corridor is Dua Dula to Kartong which

links Bolon Fenyo Community Wildlife Reserve with the Allahein River mouth. Both Dua Dula to Kartong and the Allahein River mouth have been identified as areas of high ecological significance (see Chapter two). Despite their importance the two corridors are not under any formal protection.

There is only one transboundary protected area, the Niimi-Saloum between The Gambia and Senegal. However, other potential areas for the establishment of transboundary protected areas include the Baobolon Wetland Reserve and the Allahein River mouth areas. There is a forest reserve on the Senegalese side of Baobolon and a national park on their side of the Allahein River mouth.

List of data on protected areas collected

The data on protected areas collected during the consultancy is listed below. List of other data collected is provided in the annex 1.

Plant species recorded in Niimi National Park (Barnett 2000)

Animal species (invertebrates, fish, amphibians, reptiles, birds and mammals) recorded in Niimi National Park (Barnett 2000)

Plant species recorded in Baobolon Wetland Reserve (Barnett 2000)

Animal species (invertebrates, fish, amphibians, reptiles, birds and mammals) recorded in Baobolon Wetland Reserve (Barnett 2000)

Plant species recorded in Tanbi National Park (Barnett 2000)

Animal species (invertebrates, fish, amphibians, reptiles, birds and mammals) recorded in Tanbi National Park (Barnett 2000)

Animal Species (invertebrates, fish, amphibians, reptiles, birds and mammals) checklist for Abuko Nature Reserve (2005)

Checklist of birds, mammals and tree species for all the eight protected areas (DPWM 2012)

4.2. Climate

Monitoring weather is very crucial to climate change adaptation. The Gambia Meteorological Service has been monitoring weather patterns since 1943 (DWR 2012). However, only data on rainfall, temperature (minimum and maximum), relative humidity (minimum and maximum) and maximum wind speed for the 1981 to 2010 period is available for this study.

There were fifteen weather stations covering all the regions in the country, and in 1994, Jambanjelly, Kiang-Karantaba, Saresofi and Yallal were upgraded to meteorological stations (DWR 2012). In the year 2008, the meteorological services stopped the measurement of

climate elements at the following stations Jambanjelly, Kiang-Karantaba, Kuntaur and Saresofi and maintained only the measurement of rainfall (DWR 2012). Two rainfall stations namely Farafenni MRC and Jason were closed in 1999. Currently, there are ten meteorological stations (Fig. 4) and 26 rainfall stations (DWR 2012). Five of the meteorological stations are located close to protected areas, namely Banjul Halfdie/Marina (Tanbi National Park), Jenoi (Kiang West National Park), Yundum International Airport (Abuko Nature Reserve) and Sapu (River Gambia National Park). Details on data collected on climate are provided in the annex.

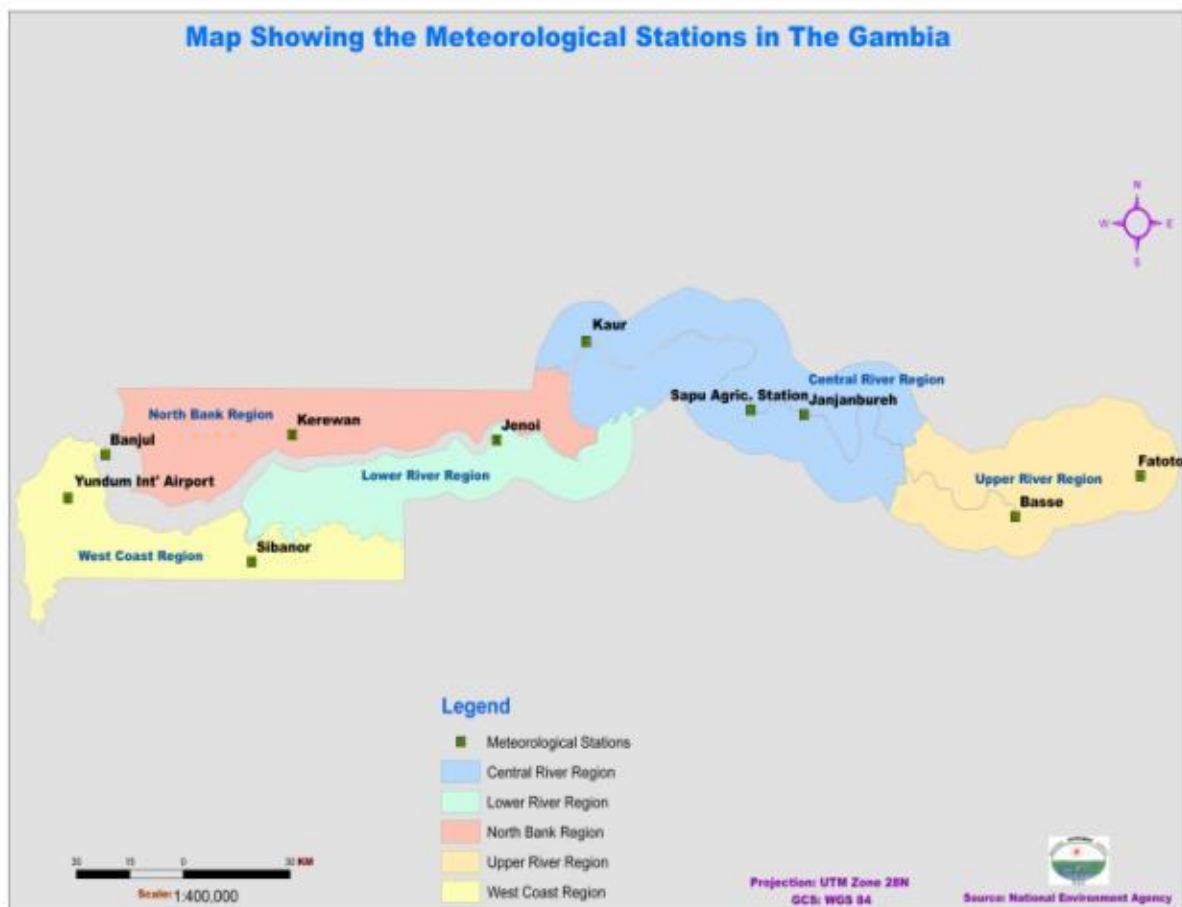


Fig.4 Map showing meteorological stations in The Gambia.

4.3. Vegetation and fire

The Gambia is situated in the dry sahel region which is very vulnerable to droughts. The surface area of the country comprises 26.6% forest, 10.9% other woodland, 52.1% other land and 10.5% inland water (Republic of The Gambia 2011a) (Fig. 5). The National Forest Assessment (NFA 2008-2010) results show that most of the forest is either deciduous (53.2%) or semi-deciduous (29.2%) while only 4.9% is evergreen (Republic of The Gambia

2011a). Mangroves constitute nearly 12% of the forest area while less than 1% is palm (Republic of The Gambia 2011a). However, the National Environment Agency land use/cover classification that 40.7% of the land area of the country consist of woods, 17.6% of forest, 12.1% of swamp, 11.1% of grassland and 8.8% of mangrove (Table 2, Fig. 5, NEA 2003).

Table 2. Land use/cover categories of The Gambia.

Land use/cover category	Area (km²)	Proportion (%)
Rice fields	227.26	3.0
Cultivation	295.01	4.0
Palms	40.23	0.5
Plantations	67.61	0.9
Forest	1317.54	17.6
Woods	3038.44	40.7
Mangrove	654.75	8.8
Grassland	829.02	11.1
Swamp	905.76	12.1
Plain ground	93.44	1.3

Source: Land use/land cover map 2003, National Environment Agency.

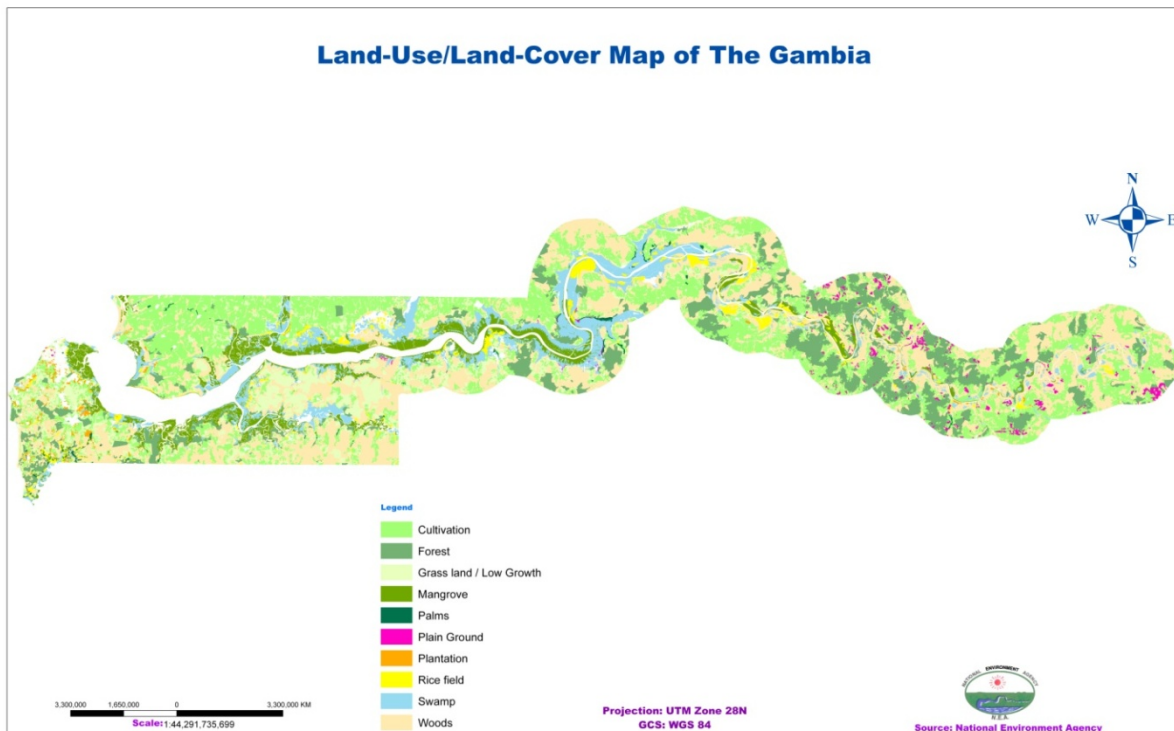


Fig. 5. Land use/land cover map of The Gambia.

Bushfires in The Gambia are assumed to be mainly caused by the clearing of new land. Hunting, border controls and clearing of weeds are other assumed causes (Republic of The Gambia 2011a). The NFA 2008-2010 results indicate that more than half of the forest of The Gambia got burnt (Table 3) (Republic of The Gambia 2011a). The results also show that 79% of the area of forest affected by fire once or more times every year, 12% once every two years, 8% once every five years and 1% once every ten years (Republic of The Gambia 2011a).

Table 3. Areas burnt per land use.

Land use	Total area (hectares)	Area burnt (hectares)	Percentage burnt
Forest	300000	151000	50
Other wooded land	123000	55000	45
Other land	589000	105000	18

(Source: NFA 2008-2010)

4.4. Socio-economic data

Protected areas and areas close to them provide a range of socio-economic values to the local communities. Therefore, the local communities are engaged in various socio-economic activities, ranging from agriculture and animal husbandry, through whole sale and retail, community, social and personal services, manufacturing, transport, storage and communication, to mining and quarrying (Table 4). The specific activities of the local people include cultivation of rice and other cash crops, fishing, oyster collection, collection of firewood, harvesting timber and thatch grass for fencing and construction, vegetable gardening, grazing livestock, watering livestock. The details of the socio-economic activities of settlements close to each protected area are explained below.

Table 4 Employed persons by industry in settlements close to protected areas

Industry					Total	
	Male		Female		Number	Percent
	Number	Percent	Number	Percent		
Agriculture and animal husbandry	28580	11.7	44288	18.1	72868	29.8
Fishing	3986	1.6	914	0.4	4900	2.0
Mining and quarrying	666	.3	77	0	743	3
Manufacturing	18253	7.5	3008	1.2	21261	8.7
Electricity, gas and water	1495	.6	118	0	1613	.7
Construction	14223	5.8	314	.1	14537	5.9
Wholesale and retail	29909	12.2	22268	9.1	52175	21.3
Hotels and restaurants	5263	2.2	3403	1.4	8666	3.5

Transport, storage and communication	16080	6.6	1338	.5	17418	7.1
Finance, insurance and business	4078	1.7	1421	.6	5499	2.2
Community, social and personal services	24606	10.1	18119	7.4	42725	17.5
Not stated	1135	.5	1073	.4	2208	.9
Total	148274	60.6	96339	39.4	244613	100.0

Source: 2003 population census

Abuko Nature Reserve

Abuko Nature Reserve is surrounded by three peripheral villages namely Abuko, Lamin and Yundum (Republic of The Gambia 2011b). The 2003 population census put the population of these villages at 143, 873, with a growth rate of 2.7% (Republic of The Gambia 2011b). The population of Kombo North District where Abuko Nature Reserve is located has been put at 166,493, comprising 50.6% male and 49.4% female (Republic of The Gambia 2003, Table 1 of Annex 1). The proportions of economically active persons employed were 59.8% of males and 31.1% of females (Republic of The Gambia 2003, Table 2 of Annex 1). The occupations of the population are as follows: 15.8% subsistence agriculture, 1.9% fishery workers, hunters and trappers and 82.3% engaged in other occupations (Table 3 of Annex 1 Republic of The Gambia 2003).

In the past only ripe fruits were harvested and no branches removed to take fruits. Dead trees and branches were left rotten, which ensured the survival of the life supporting system of the fauna (Republic of The Gambia 2011b). However, such utilization practices are no longer used today, resulting in the degradation of the habitats within the reserve (Republic of The Gambia 2011b). Various materials are collected from Abuko Nature Reserve, including grass for thatching and fencing and dry sticks for firewood (Republic of The Gambia 2011b). Crocodiles have been subject to considerable hunting pressure in the past. Although the pressure may have been reduced, there is evidence that some hunting continues outside the reserve (Republic of The Gambia 2011b).

River Gambia National Park

The 2003 population census put the population of Niamina East and Fulladu West Districts at 91,486 people, comprising 48.3% male and 51.7% female (Republic of The Gambia 2003, Table 1 of Annex1). The proportions of economically active persons employed were 49.4% of males and 48.7% of females (Republic of The Gambia 2003, Table 2 of Annex 1). The population is engaged in various occupation types ranging from subsistence agriculture (81.2%), fishery workers, hunters and trappers (0.9%) and other occupations (17.9%) (Republic of The Gambia 2003, Table 3 of Annex 1).

The local communities around River Gambia National Park consist mainly of subsistence farmers and fishermen. Thus they depend on the natural resources for their livelihoods (NACO 2011).

Niumi National Park

Niumi National Park is used by eleven peripheral villages (Republic of The Gambia 2011c). One village (Bakindik Koto) is located within the mainland area of the park while Jinack Niji and Jinack Kajata are located on the north-east end of Jinack Island (Republic of The Gambia 2011c). The 2003 population census put the population of the villages at 33, 146, with a growth rate of 2.7% (Republic of the Gambia 2011c). The 2003 population census put the population of Lower Niumi District at 24, 959 people, comprising 49.4% male and 50.6% female (Table 1 of Annex 1, Republic of The Gambia 2003,). The proportions of economically active persons employed are 43.8% of males and 55.5% of females (Table 2 of Annex 1, Republic of The Gambia 2003,). Different proportions of the population are engaged in different occupations, ranging from subsistence agriculture (80.6%), to fishery workers, hunters and trappers (3.4%) and other occupations (16.0%) (Table 3 of Annex 1, Republic of The Gambia 2003).

The villages within the park and those on its periphery depend on the park for the production of groundnuts, millet and rice as well as for fishing and oyster collection, livestock grazing, provision of timber and wood for cooking and construction purposes (Republic of The Gambia 2011c). The communities derive various materials from the wetland environment, such as mangrove poles for roofing and grasses for thatching and fence construction (Republic of The Gambia 2011c). The unregulated utilization of these resources may have a negative effect on the ecological integrity of the park.

Kiang West National Park

Kiang West National Park is surrounded by five villages namely Dumbuto, Batelling, Bajana, Kuli Kunda and Jali. According to the 2003 population census, the population of Kiang West District is put at 14,610, consisting of 46.2% male and 53.8% female (Table 1 of

Annex 1, Republic of The Gambia 2003). The proportions of economically active persons employed are 37.1% of the male population and 62.4% of the female population (Table 2 of Annex 1, Republic of The Gambia 2003). The population is engaged in various occupations ranging from 77.2% subsistence agriculture, 2.0% fishery workers, hunters and trappers, to 20.8% engaged in other occupations (Table 3 of Annex 1, Republic of The Gambia 2003).

These communities around Kiang West National Park depend on the park and its buffer zone for their socio-economic needs (Republic of The Gambia 2011d). The swamps along the periphery of the park are used for rice cultivation while the terrestrial site is used for livestock grazing. The depressions holding freshwater during the rainy season are used for watering animals (Republic of The Gambia 2011d). Other activities in the periphery of the park include collection of fuelwood, wild fruits and honey, harvesting timber (including mangrove) and thatch grass for fencing and house construction, illegal hunting of wild animals and birds (Republic of The Gambia 2011d).

Over the past four decades, there have been dramatic changes in the land use because of prolonged drought and climate change effects. These changes in land use could be attributed to several factors, including natural and man-made ones. The most noticeable of these is the salt intrusion into rice fields which has resulted in increased salinity and acidification of rice fields. This has led to the abandonment of many rice fields and a downward trend in rice production in the swamps (Republic of The Gambia 2011d).

Tanji & Bijol Islands Bird Reserve (Tanji Bird Reserve)

Tanji Bird Reserve is surrounded by four villages namely Brufut, Ghana Town, Tanji and Madiana. Since Tanji Bird Reserve is located in Kombo North District, the proportion of economically active persons employed as well as the occupations of the population are the same as those for Abuko Nature Reserve, indicated earlier.

The communities around Tanji Bird Reserve comprise mainly fishermen and subsistence agriculturalists. They depend on the swamps around Tanji village for rice cultivation during the rainy season. They also harvest minor forest products such as oysters and mangrove wood for firewood or construction materials (Republic of The Gambia 2011e). The demand for firewood is met by tree-felling and the cutting of the roots of mature trees. Ungulates are hunted on the mainland, while offshore turtles are or killed as by-catch (Republic of The Gambia 2011e). The Bijol Islands, an important breeding ground for the green turtle, may be visited only for research purposes. However, the islands are regularly visited by tourists as well as fishermen who collect gull and tern eggs (Republic of The Gambia 2011e). Moreover, the communities also graze their livestock in the buffer zone and even within the reserve.

In the past collection of Non-Timber Forest Products (NTFP) were done by collecting only mature and ripe products which guaranteed sustainable use of forest resources from

the reserve. The harvesting of oyster was done during the dry season and the roots of mangroves were not cut. However, these resource utilization methods are no longer used, which is not sustainable for the future generations (Republic of The Gambia 2011e).

Baobolon Wetland Reserve

There are 24 villages at the periphery of Baobolon Wetland Reserve (Barnett 2000). The peripheral communities have been there for at least 500 years according to oral history handed down generations (Barnett 2000).

The 2003 population census put the population of the Upper Baddibu District at 70045, with 47.1% male and 52.9% female (Republic of The Gambia 2003b) (Table 1 of Annex 1). Proportions of the economically active population employed are 49.1% male and 48.4% female (Republic of The Gambia 2003b) (Table 2 of Annex 1). The occupations of the peripheral population are 68.7% subsistence agriculture, 1.0% fishery workers, hunters and trappers and 30.3% engaged in other occupations (Table 3 of Annex 1, Republic of The Gambia 2003b).

The peripheral communities considerably depend on Baobolon area for rice cultivation (Barnett 2000). There is also cattle grazing, though this tend to be confined to the drier areas fringing the elevated land during the rainy season while the herds move further into the reserve as the dry season progresses (Barnett 2000). Fishing activities within the reserve are mainly for subsistence (Barnett 2000). Many of the peripheral villages also depend on Baobolon for the provision of firewood and thatch grass (Barnett 2000). Other socio-economic activities include hunting as well as harvesting of wild fruits and other plant parts for consumption, medicinal purposes, etc (Barnett 2000). Waterfowl including pelicans seem to be the main group affected by hunting (Barnett 2000). This activity is not compatible with the objectives of the area and may have negative effects not only on the waterfowl populations but also those of mammals and reptiles.

Tanbi National Park

The area around Tanbi National Park has been settled by humans for centuries (Republic of The Gambia 2008). However, the population has increased drastically since independence due to a high growth rate (4.2%) and migration (Republic of The Gambia 2008). Activities such as fishing, mangrove cutting and rhun palm uses have also increased along with the population increase (Republic of The Gambia 2008). These activities if not properly regulated may result in the degradation of the mangrove ecosystem.

The 1993 population census put the total population of the twelve peripheral settlements at 128,994 with an annual growth rate of 2.7% (Republic of The Gambia 2008). The population of the area could be divided into two: one that does not depend on Tanbi

resources and the other that relies directly or indirectly on the wetland resources (Republic of The Gambia 2008). The latter is involved in a lot of activities such as mangrove cutting for men, oyster collection for women, rice cultivation, shrimp fishing and vegetable growing (Republic of The Gambia 2008).

The 2003 population census put the population of the peripheral settlements of Tanbi at 340, 249, with 51% male and 49% female (Table 1 of Annex 1, Republic of The Gambia 2003b). The proportions of economically active persons employed are 59.4% male and 29.1% female (Table 2 of Annex 1). The occupation of the population are 2.8% subsistence agriculture, 1.0% fishery workers, hunters and trappers, and 96.1% engaged in other occupations (Table 3 of Annex).

Bolon Fenyo Community Wildlife Reserve

The 2003 population Census put the population of Kombo South District at 61, 615 people, comprising 50.1% male and 49.9% female (Table 1 of Annex 1, Republic of The Gambia 2003). The proportions of economically person employed are 51.8 % of males and 42.6% of females (Table 2 of Annex 1). The occupations of the population ranged from subsistence agriculture (42.6%), fishery workers, hunters and trappers (8.4%) and engaged in other occupations (49.0%) (Table 3 of Annex 1).

In the past the swamp areas of Gunjur were used for the cultivation of rice and other cash crops. Other forms of past land use included fuelwood collection, horticulture, palm leaf gathering, palm wine tapping, oyster collection, palm nut extraction for palm oil, hunting, grazing and access to and from fishing pirogues (Republic of The Gambia 2008b).

Present land use includes limited cattle grazing and access to and from fishing areas (Republic of The Gambia 2008b). In addition a fishing center and an ice plant are located nearby for the processing and marketing of fish and other products. However, the proliferation of beach bars and lodges in the area is becoming a concern (Republic of The Gambia 2008b). The longterm viability of the reserve will depend on effects of the surrounding human activities which have a bearing on the area (Republic of The Gambia 2008b).

4.5. Management effectiveness of protected areas

Effective protected area management is very important to enhancing climate change resilience. A number of tools have been developed to assess protected area management practices. The Management Effectiveness Tracking Toll (METT) is a new tool used to measure the effectiveness of protected area management based on context, planning, inputs, processes, outputs and outcomes (WWF 2007). The assessment is done by completing two datasheets and an assessment form. The higher the final score, the more

effective the management. Management Effectiveness Tracking Toll was conducted for five protected areas in 2012 (Table 5). The METT results for the protected areas revealed slight improvements in the management of Baobolon Wetland Reserve and Tanbi National Park, and big improvement in that of Bolon Fenyo Community Wildlife Reserve, comparing 2012 to 2007 (Table 5). The results also showed that management effectiveness was high for Tanji Bird Reserve (83.3% in 2011), Kiang West National Park (75.3% in 2011) and Bolon Fenyo Community Wildlife Reserve (61% in 2012), medium for Tanbi National Park (55% in 2012) and Niumi National Park (51% in 2012), and low for Abuko Nature Reserve (48% in 2012) and Baobolon Wetland Reserve (45% in 2012) (Table 5). Details of the results are provided in the respective METT results (see annex 1).

Table 5. Management Effectiveness Tracking Tools results for the protected areas.

Protected area	2007	2011	2012
Abuko Nature Reserve			48%
Niumi National Park			51%
Kiang West National Park		75.3%	
Tanji & Bijol Islands Bird Reserve		83.3%	
Baobolon Wetland Reserve	43.01%		45%
Tanbi National Park	52.1%		55%
Bolon Fenyo Community Wildlife Reserve	45%		61%



Plate 5. METT session at Abuko Nature Reserve, April 2012. (Photo: Amadou S. Camara).

5. Recommendations

Climate change is one of the most serious environmental threats facing low-lying countries such as The Gambia, as indicated earlier in Chapter three. The Gambia, therefore, attaches great importance to such issues. The country has already formulated The Gambia National Communication (GAMNC) and the National Adaptation Programme of Action (NAPA). However, despite these successes, there is a need for the DPWM to harmonize the data and information on its protected areas as well as the potential for the establishment of protection corridors and new transboundary protected areas.

The data and information on the seven DPWM protected areas and the community reserve is sometimes conflicting. Different reports indicate different data on the name and the surface area of some protected areas. So it is imperative for the country to come up with a single document containing the official and accurate data and information on all the eight protected areas.

There are no adequate protection corridors for wildlife species among the protected areas. Currently, the only protection corridor is that of gardens and rice fields linking Abuko Nature Reserve with Tanbi National Park. However, this is not full corridor as it is cut off by the Serrekunda-Brikama highway near Abuko Nature Reserve. There is a need to have protection corridors among the protected areas in the country, to ensure gene flow and reduce catastrophic effects of epidemics. In the same vein, Dua Dula to Kartong is not only an area of ecological significance but also a protection corridor linking Bolon Fenyo Community Wildlife Reserve and Allahein River mouth.

There is only one transboundary protected area between The Gambia and Senegal, the Niimi-Saloum transboundary protected area. Although this is working on very well, there is the potential to establish more such protected areas especially where protected areas are located near the border of the countries. Possible areas include Baobolon Wetland Reserve and the forest reserve on the Senegalese side as well as the Allahein River mouth and the national park on the Senegalese side of the border. Efforts can be made to harmonize the management of these ecologically important areas by establishing transboundary protected areas to protect their ecological integrity. Although the Allahein River mouth is not protected, efforts can be made to have it under protection.

The establishment of protection corridors and transboundary protected areas will not serve as buffers for the protected areas and wildlife, but will also increase their connectivity and their resilience to climate change.

6. Conclusion

The Gambia national data collection consultancy was generally carried out without much problems. The only problem encountered had to do with difficulty getting data from some institutions. Some people did not seem very willing to provide data for the report. However, very important data were collected during the consultancy. The data collected can be useful to conduct studies on climate modeling, red-listing, vulnerability assessments and development scenarios.