Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.

1. Date this sheet was completed/updated:

2 May 2002

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Designation date | Site Reference Number

2. Country: United Republic of Tanzania

3. Name of wetland: The Kilombero Valley Floodplain

4. Geographical co-ordinates: The central point coordinates are 8°40' S and 36°10' E

5. Elevation: (average and/or max. & min.) The Ramsar Site covering the Kilombero Valley Floodplain lies between 210 and 400 m.a.s.l. with the main part of the Ramsar Site lying at 210 - 250 m.a.s.l. To the northwest rises the Udzungwa Mountains up to 2580 m.a.s.l and in southeast the Mahenge Highlands rise up to 1520 m.a.s.l. These important catchment areas lay both outside the Ramsar Site boundary.

6. Area: The Ramsar Site is 796,735 ha

7. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

The floodplain is about 260 km long and up to 52 km wide at its widest point, covering about 626,500 ha at high water. The seasonally flooded area occupies the flat floor of Kilombero Valley at 210-250 m.a.s.l. situated between the forested escarpments of the Udzungwa Mountains (up to 2580 m) at the north-western side and the Mahenge Mountains (1520 m) on the south-eastern side.

The Kilombero Valley Floodplain receives water from a number of important rivers in the south such as Ruhudji, Mnyera and Pitu and then divides into a myriad of tributaries in the central part of the floodplain, which descend only 40 m over a distance of 210 km. The seasonal change in water dynamic is huge and the plains sometimes becomes totally flooded during the wet season, while it dries up during the dry season with the exception of the rivers and river margins as well as the areas with permanent swamps and water bodies. The dry season is accompanied by extensive annual burnings of grass and bush land.

Kilombero Valley Floodplain is characterised by very high concentrations of large mammals especially Puku, Buffalo, Elephant, Hippopotamus and Lion. These animals are present in the floodplain in good numbers dependent on the season. Fishing has traditionally been the primary resource use, however, agriculture (especially rice farming) is rapidly expanding as well as an increasing number of cattle brought by immigrant pastoralists. Ifakara is the urban centre of the Kilombero Valley, situated about 5 km from the Kilombero River and along the Dar es Salaam – Mahenge road. The Kilombero Valley is about 400 km from Dar es Salaam.

8. Wetland Type (please circle the applicable codes for wetland types; in the present document, the "Ramsar Classification System for Wetland Type" is found on page 9)

Inland: Ts• M • N • Xf • Tp • L • W • P • O •

Ranked from the most to the least dominant. The Ramsar Site is an Inland Wetland

Ts= Seasonal/intermittent freshwater marshes/pools
M= Permanent rivers/streams/creeks
N= Seasonal/intermittent/irregular rivers/streams/creeks
Xf= Freshwater, tree-dominated wetlands
Tp= Permanent freshwater marshes/pools
L= Permanent inland deltas
W= Shrub-dominated wetlands
P= Seasonal/intermittent freshwater lakes (over 8 ha)
O= Permanent freshwater lakes (over 8 ha)

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9. Ramsar Criteria: (please circle the applicable Criteria);

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8

Please specify the most significant criterion applicable to the site: 1

1 = A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate bio geographic region.

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10. Map of site included? *Yes*

Two maps are attached showing the demarcated Ramsar area. One of the maps is a land cover map showing land use patterns and the other is a hydrological map. Both maps are in colours due to the fact that the electronic version of the GIS based map is in colour.

The north-western boundary of the Ramsar Site follows the Tanzania-Zambia railway line (TAZARA) from Mwaya south of Mangula in the north to Mlimpa in the south, excluding the township of Ifakara and cultivated land adjacent to the town. From Mlimpa the boundary goes south and includes the rapids on Mnyera River in west, as well as adjacent swamps to the east of the rapids and touch the Ruhudji River in the south. The boundary then follows Ruhudji and Pitu Rivers including land in the Kilombero and Ulanga Districts but excluding land in Songea District.

From the eastern side of the Pitu River in south the boundary goes north to the village of Sofi including the seasonally flooded areas south of Malinyi. On the eastern side of the Kilombero Valley Floodplain the boundary follows the road after Sofi Majiji in the south to reach the village of Lupiro in the northeast. From Lupiro the boundary goes north-east to cross the boundary of the Selous Game Reserve, and later the Kilombero River in the east, at the point where the river leaves the floodplain and goes south-east in a forested area inside the Selous Game Reserve, to later join the Ruaha River and become the Rufiji River. At the point where the boundary crosses the Kilombero River, the Ramsar boundary goes north to cross the Msolwa River and meeting the railway at Mwaya encompassing the southern part of the Msolwa floodplain.

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11. Name and address of the compiler of this form:

The Director of Wildlife, Wildlife Division, Ministry of Natural resources and Tourism, P.O. Box 1994, Dar es Salaam, Tanzania. Tel: 255 22 2866 375/408; Fax: 255 22 286 5836/3496; E-mail: wildlife-division@twiga.com

Please provide additional information on each of the following categories by attaching extra pages **(please limit extra pages to no more than 10):**

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12. Justification of the criteria selected under point 9, on previous page. (Please refer to the *Criteria for Identifying Wetlands of International Importance*)

Group A of the Criteria: Sites containing representative, rare or unique wetland types

- *Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographical region*

The Kilombero Valley Floodplain is rare and unique because it is an intact natural wetland ecosystem comprising a myriad of rivers, which make up the largest seasonally freshwater lowland floodplain in East Africa, covering approximately 7,000 km². In terms of hydrology the floodplain with its rivers supplies 2/3 of the Rufiji waters. The Kilombero Valley Floodplain is of global, national, regional and local importance in terms of its ecology and biodiversity. As an ecosystem, the Kilombero River system regulates the flow of the Rufiji River and is an important source of nutrients and sediment for downstream areas and the globally important Mafia -Rufiji mangrove, sea grass and coral reef complex. The annual flooding of the floodplain is vital for the maintenance of soil fertility and the productivity of the fisheries and the permanent water in the Kilombero is a key feature in the Selous - Kilombero seasonal wildlife migrations. Ponds and flooded grassland areas upstream are important wet season breeding sites for fish throughout the Rufiji River system. The evergreen forest areas to the north and south act as important catchments with the Miombo zone also being an integral part of the wetland ecosystem, harbouring wildlife in the wet season and acting as a source of water and nutrients for the wetland. The combination of evergreen forest, Miombo and wetland is a key feature in regulating water flow throughout the Rufiji River maintaining the characteristic slow rate of rise and fall of its water levels.

Group B of the Criteria: Sites of international importance for conserving biological diversity

- *Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered or critically endangered species or threatened ecological communities.*

The valley contains almost 75% of the world's population of the wetland dependent Puku Antelope (*Kobus vardoni*). This antelope is now only found in 18 locations in Africa and its survival, as a species, is dependent on the Kilombero Valley population (East 1998).

- *Criterion 3: A wetland should be considered internationally important if it supports population of plant and/or animal species important for maintaining the biological diversity of a particular biogeographical region*

The Kilombero Valley Floodplain holds the majority of the worlds Puku population. This species is wetland dependent although there is evidence that it undertake seasonal movements between the floodplain and the surrounding Miombo woodland. The Crocodile population of the Kilombero also links with that of the Selous, recognised as having one of the most significant populations of Nile crocodile in Africa (Games and Severe, 1999). Moreover, vulnerable populations of the endemic Udzungwa Colobus exist in two fragments of forest in the Ramsar Site (Dinesen 2001). The Ramsar Site provides and important dry season habitat for large mammals particularly Elephant and Buffalo from the important Selous ecosystem. The Kilombero floodplain is also a candidate as an Endemic Bird Area (Stattersfield *et al.* 1998). Three endemic birds are known: The Kilombero Weaver and two undescribed species of cisticolas (Baker *in litt.*). There have so far been no records of these birds outside the Kilombero Valley. Many fish species are common to all rivers in the Rufiji Basin, however, two

species *Citharinus congicus* and *Alestes stuhlmanni* are found only in the Kilombero River and further downstream in the Rufiji River (Jenkins *et al.* 2000b).

- *Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.*

In the harsh dry season the valley harbour the entire population of Puku and it is important for a number of other mammals in the Selous-Kilombero ecosystem such as Elephant, Hippopotamus and Buffalo. In the wet season it is an essential spawning area for many species of fish in the Rufiji River system of which two species *Citharinus congicus* and *Alestes stuhlmanni* are dependent on the Kilombero floodplain (see also annex 1 and 2 for noteworthy fauna, which includes a list of the estimated populations of selected mammals, the distribution of Puku and Hippo in the Selous Ecosystem and a list of counted waterbirds).

- *Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more water birds.*

There is little doubt that the Kilombero Floodplain due to its sheer size holds more than 20,000 of waterbirds in the wet season. All Tanzanian species of egrets and herons occur in the floodplain. Most of these species do not concentrate, however, the accumulated numbers of Little Bittern, Night Heron, Squacco Heron, Madagascar Squacco Heron, Cattle Egret, Green-backed Heron, Black Heron, Little Egret, Yellow-billed Egret, Great White Egret, Purple Heron, Grey Heron, Goliath Heron and Rufous-bellied Heron in the 7,000 km² of marsh in the wet season are certainly more than 3 per km². However, hard data is lacking due to the complexity of the task of censusing the swamps. The maximum numbers of some other waterbirds are: Open-billed Stork 1,877, Common Pratincole 814, (Rainey 2000, Dinesen in prep.) and the total number of e.g. White-headed Plover have been estimated at 1,800 birds (Baker 1996, see annex 2 for a list of waterbirds and the numbers counted in 1995 and 1997).

- *Criterion 6. A wetland should be internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbirds.*

This criterion applies for the African Open-billed Stork *Anastomus lamelligerus* (Temminck) 1,877 (1,000), White-headed Plover Vanellus *albiceps* (Gould) 476 (250) and African Skimmer *Rhynchops flavirostris* (Vieillot) 376 (100) (Baker 1995, Rainey 2000, Dinesen in prep.), which constitute minimum counts from the floodplain followed by the biogeographical population level in a parenthesis. Further investigation is needed although there is no doubt that these species occurs annually in important numbers. The Kilombero Valley is an important breeding site for African Skimmer and White-headed Plover in the wet season and a daily feeding site for the Open-billed Stork. Other waterbirds might also have populations above the 1% criterion however, due to the complexity of the counts in this vast inaccessible area, this has still not been verified. More systematic counts need to be undertaken to come up with clear population sizes of the different waterbirds.

- *Criterion 7. A wetland should be internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.*

A short-term study in the Kilombero Valley identified 23 types of fish, that were caught on a regular basis (Utzinger & Charlwood 1997), of which 19 species were identified belonging to 17 genera and 11 families. The most widely caught commercial fish are tilapia *Orvochromis*, catfish *Clarius* and *Bagrus*, tiger fish *Hydrocynus*, *Distichodus*, *Mormyrus*, *Schilbe*, *Citharinus* and *Alestes*. Many species are common to all rivers in the Rufiji Basin, but two *Citharinus congicus* and *Alestes stuhlmanni* are only found in the Kilombero River and further downstream. There have been recorded large seasonal differences in catches, suggesting seasonal movements within the Kilombero system. In a study by Jenkins *et al.* (2000b) 27 species were identified also based on consumption catch studies only. Although more information is needed these studies suggest an overall large biodisparity of the fish communities in the Kilombero Floodplain based on a large number of fish genera and families, a highly

seasonal dynamic situation related to flooding and the fact that the studies have been based on identification of caught fish by local fishermen only. Fishing was undertaken by hook and line, gill nets, a wide range of different traps and by spears (Utzinger & Charlwood 1997). A list of fish recorded in the Kilombero Valley is provided in annex 3: Justification of the criteria selected under point 9.

- *Criterion 8. A wetland should be internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere depend*

The Kilombero River system is of crucial importance as a breeding and nursery ground for fish in the whole of the Rufiji Basin (WWF 1992). Fish in the Rufiji River system migrate upstream to spawn, usually at the beginning of the rains in November. Peak spawning activity has been recorded in the valley in the November-December period (RUBADA, 1981). However, it has been suggested that there may be a second spawning period later (RUBADA, 1981). A WWF mission to the area in 1992 concluded, after talks with local fishermen, that there is a second spawning peak in March/April in the shallow water of the inundated floodplain (WWF, 1992). This suggests that there is a long reproductive period, a characteristic that will limit the impact of variations in water level caused by the unreliable rains. By March young fish are waiting to invade the floodplain. This allows them to take advantage of the high level of nutrients available from this productive area and provides some protection from predators. The link between floodplain productivity, large mammals, flooding and productivity of the fishery deserves further investigation. A large amount of spawning also takes place in the ponds and swampy areas of the valley.

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13. General location: (include the nearest large town and its administrative region)

Kilombero Valley Floodplain falls in Kilombero and Ulanga Districts located in Morogoro Region in southern central Tanzania. The largest town in the valley is Ifakara, which is about eight hours drive from the city of Dar es Salaam. The valley is also accessible by train and light aircraft. The Selous Game Reserve lies to the east of the Kilombero Valley and overlap with the Ramsar Site in the northeast. The Udzungwa Mountains National Park lies to the northwest adjacent to the Ramsar Site. Along the TAZARA railway in west the boundary is adjacent to different forest catchment reserves in the Udzungwa Mountain ranges. The Ramsar Site is to the south bordered by the Ruhudji and Pitu Rivers, which also constitute the district boundary between Songea District (Ruvuma Region) and Kilombero and Ulanga Districts (Morogoro Region). A major part of the Kilombero Valley water source comes from major rivers in the south, which originate in the mountain ranges of Mbeya and Iringa Regions.

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14. Physical features: (e.g., geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; catchment area; downstream area; climate)

The Kilombero Valley Floodplain is a very large natural wetland, which is flooded in the wet season (water depth then a few meters) and with the majority of the plain drying up in the wet season. The catchment area is huge and covers the Udzungwa Mountains, Mahenge Mountains and mountain ranges in Iringa and Mbeya Region.

The following description has been modified from Hughes & Hughes (1992). From south the Ruhudji River winds eastward, losing height quite rapidly, to the head of the great floodplain of the Kilombero Valley. The floodplain occupies the flat floor of the Kilombero Valley at 210-250 m.a.s.l. The valley is oriented south-west north-east, between densely forested escarpments in the Udzungwa Mountains, which raise to 2576 m.a.s.l. (7°47'S, 36°36'E) on the north-western side and the Mahenge Mountains on the southern side (8°45'S, 36°39'E). The Ruhudji receives several important tributaries and then divides on the floodplain into a number of channels, which produce a myriad network in the central part of the floodplain. Other affluents draining the mountains on opposing sides of the valley join the network so that in the central part there are ten major channels flowing roughly in parallel. A zone of permanent swamps, 45 km long, extend up to 4 km away from the west bank of

the Kihansi River. However, this river was dammed in its upstream ranges above the Kihansi Gorge about ten years ago for generating hydro-electrical power. The impact on the swamp is not known. Otherwise permanent swamps are closely restricted to the vicinity of the channels and some lagoons except a large Papyrus swamp continuous with a swamp forest located south of the village of Mofu bearing the name: Kibasira Swamp. This swamp is about 50 km² (8°19S', 36°19'E). The southern central parts of the floodplain descend 40 meters over a distance of 210 km, i.e. with a mean gradient of 1:5250. At Ifakara the valley narrows in to be about 4 km wide and the rivers are united in one main stream the Kilombero River. East of Ifakara this main stream flows through a delta of oxbow lakes and is joined on its left bank by the Msolwa River. This stream comes from the high escarpment of the Udzungwas and transverses the northern part of the floodplain, skirting another zone of permanent swampland to the west. From the point of confluence the Kilombero River swings sharply southeast and leaves the floodplain (and the Ramsar Site) on the border of the Selous Game Reserve. The Kilombero River then continuous for 65 km to confluence with the Luwegu River below which point it is referred to as the Rufji. Eventually, the Rufiji River runs into the Indian Ocean forming the Rufiji River Delta at the outlet. This Delta comprises important sea grass, coral reef and the largest mangrove forest in East Africa.

Soils of the wetland complex are mainly heavy black cotton (mbuga) or montimoronolite soils that retain water over relatively long periods with isolated patches of lighter sandy soils. Annual flooding is a crucial factor in the maintenance of the wetland habitats and the fertility of the soils for vegetation (including crops) and fisheries. Rainfall tends to be unimodal and very heavy and overall water levels in the Kilombero Valley tend to rise in November-April and fall smoothly in May and onwards. Flood peaks tend to occur during March-April but can happen as early as January and as late as May. The smooth rise and fall of the Kilombero River influences the same pattern on the Rufiji River as a whole and is important in maintaining ecological balance along the whole length of that river including its delta and the marine systems adjacent to the river mouth. Significant, permanent water flow in the Kilombero River is also a key factor in the wildlife migrations from the Selous Game Reserve during the dry season (June-October).

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15. Hydrological values: (groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.)

The Kilombero Valley Floodplain is of global, national, regional and local importance in terms of its ecology and biodiversity. As an ecosystem, the Kilombero River system regulates the flow of the Rufiji River and is an important source of nutrients and sediment for downstream areas and the globally important Mafia -Rufiji mangrove, sea grass and coral reef complex. The annual flooding of the floodplain is vital for the maintenance of soil fertility and the productivity of the fisheries and the permanent water in the Kilombero is a key feature in the Selous - Kilombero seasonal wildlife migrations. Ponds and flooded grassland areas upstream are important wet season breeding sites for fish throughout the Rufiji River system. The evergreen forest areas to the north and south act as important catchments with the Miombo zone also being an integral part of the wetland ecosystem, harbouring wildlife in the wet season and acting as a source of water and nutrients for the wetland. The combination of evergreen forest, Miombo and wetland is a key feature in regulating water flow throughout the Rufiji River maintaining the characteristic slow rate of rise and fall of its water levels.

The surrounding mountains and highlands are important catchment areas crucial to the hydrology of the wetland. Although there is no existing hydrological data for comparison, it would seem from annual rainfall figures and from the fact that Kilombero District has 37 permanent rivers compared to 5 in Ulanga District, that the Udzungwa Mountains are the principle catchment area for the northern part. These rivers flow through the evergreen forests and the Miombo woodland before entering the floodplain where they form a complex system of river channels (perennial and seasonal), oxbows, swamps, ponds and lakes supporting grassland and flood resistant woodland. The principal water source, however, is from the south where a number of large rivers meet (Ruhudji, Pitu, Furua, Mnyera) and the myriad system of water channels start. At the south-eastern extremity there is a unique braided river system (Howard *pers. comm.*) that sustains high densities of large mammals and water birds (WWF, 1992).

Recently however there have been disturbing reports of changes in this pattern with the reported drying of one once permanent feeder stream in Ulanga District and the drying up of the Great Ruaha River during the dry

season. Local communities stated that the incident in Ulanga District was the direct result of the clearing of forest in the upper reaches of the river concerned. Although the Great Ruaha River is not within the water catchment of the Kilombero it is an example of what could happen if the same conversion of forest and woodland areas to agricultural land (IUCN, *in press*) happens in the Kilombero catchment. It has been reported that significant numbers of people that once lived adjacent to the Great Ruaha River now are moving to the Kilombero Valley (Salmon, pers comm.).

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16. Ecological features: (main habitats and vegetation types)

Vegetation follows a distinct graduation from river channel to mountain. The flood plain vegetation is dominated by the 1-3 metre high *Panicum maximum* and *Pennisetum spp.* grasses. Small areas of flood resistant woodland containing species such as *Kigelia pinnata*, *Longocarpus capassa* and *Combretum spp* break the grassland. Phragmites reeds bound river channels with Papyrus (*Cyperus papyrus*) found around permanent swamps. The largest such area, Kabisira swamp, is sometimes referred to as a papyrus forest (Gorsline, T, 1997). The areas immediately bordering the floodplain consist of transitional wooded grasslands. These graduate into extensive Miombo woodland, which are more extensive on the Ulanga side. The Miombo belt is typically characterised by species such as *Brachystegia*, and *Julbernardia*. It is an open woodland habitat although trees do interconnect in many areas. The grassland layer is usually extensive and well developed. Fires sweep through the habitat every few years. In Ulanga District, within the catchment for the Kilombero River, evergreen forest is confined to patches around riverine or groundwater reserves (e.g. Nambiga Forest Reserve). More extensive areas of both ground water and rainfall dependent evergreen forest are found on the Kilombero side of the valley as it rises into the Udzungwas Mountains.

A major characteristic of the Ramsar Site is the rivers and the floodplain with highly seasonally water levels. The rivers in the floodplain provides a unique river habitat for river birds such as the African Skimmer and the White-headed Plover, which are confined to sandbanks and dependent on the rise and fall of water. Furthermore, a large population of Hippopotamus contributes to maintaining the mosaic of short and long grasses important for biodiversity. The following descriptions of the vegetation below is taken from Rainey (2000):

The short grass is generally a distinct zone with low vegetation usually between the long grass and wooded short grass habitats towards the edge of the floodplain. Vegetation is usually below knee height in the dry season. This habitat becomes inundated to a varying extent in the wet season. The grass length is probably closely related to the grazing pressure, the short grass areas being used extensively by wild herbivores and domestic livestock. These areas are probably burnt more often as there is more human activity because of grazing and most fires are lit artificially. There are many small areas of short grass within the interior of the floodplain but these tended to be patchy.

The long grass covers most of the interior of the floodplain dominated by grasses such as *Panicum*. This habitat was often composed of continuous stands of grasses above two metres in height. There were patches of short grass created by grazing herbivores such as Buffalo and Puku. Long grass areas were also by definition less likely to have been burnt. Movement is quite difficult but the habitat is extensive.

As a result of fire the wooded short grass in open woodland, often has a distinct boundary between trees and short grass This habitat is under the most pressure from man as a result of over-grazing, wood-cutting and clearance for agriculture. The swamps comprise inundated areas with thick vegetation. These swamps tended to be at the edge of the floodplain and contained trees. Therefore they probably differ greatly in their avian community composition. Movement was very difficult and only possible along paths cleared by Elephants.

Wooded long grassland in moist open woodland comprised grass being above two metres in height. Movement was difficult and again made possible by using Elephant and Buffalo paths. This habitat was quite limited. Working from the river at the centre of the valley to the edge of the valley, generally the natural habitat succession is as follows:

of the world's 218 Endemic Bird Areas only 2 % are wetlands underlining the significance of the Kilombero. The Kilombero is also an Important Bird Area (IBA) and it meets every individual IBA criteria (Starkey *et al.*, 1997). The Udzungwa Mountains and Mahenge Highlands, integral part of the ecosystem, are part of the Easter Arc recognised for its global importance for biodiversity and endemism (Lovett and Wasser, 1993). The floodplain is important for large and significant breeding populations of two river specialists: African Skimmer and White-headed Plover. The dynamic annual flooding in the Valley is essential for these species. A list of waterbirds is provided in an annex 2.

The Kilombero Floodplain is rich in fish and wildlife (Tanzania Country Study on Biological Diversity 1998). The Kilombero River supports a diverse fish population found in the main river, tributaries and in ponds, oxbows and swamp systems. Of these species, *Citharinus congicus* and *Alestes stuhlmanni* are endemic to the Rufiji River system (WWF, 1992). The Kilombero River system is of crucial importance as a breeding and nursery ground for fish in the whole of the Rufiji Basin (WWF 1992). Fish in the Rufiji River system migrate upstream to spawn, usually at the beginning of the rains in November. Peak spawning activity has been recorded in the valley in the November-December period (RUBADA, 1981). However, it has been suggested that there may be a second spawning period earlier in the year (RUBADA, 1981). The WWF mission to the area concluded, after talks with local fishermen, that there is a second spawning peak in March/April in the shallow water of the inundated floodplain (WWF, 1992).

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19. Social and cultural values: (e.g., fisheries production, forestry, religious importance, archaeological site, etc.)

Fishing

The fishery in the Kilombero Valley Floodplain is an important source of food and revenue for the inhabitants of the area and temporary immigrant fishermen and is one of the largest freshwater fisheries in Tanzania. Fish is the most common source of meat-based protein consumed by 95% of the local population. During the dry season fishing activities are concentrated around a large number of temporary and permanent camps located on the sides of the main river and its tributaries, whereas in the flood period fishing activities are dispersed throughout the floodplain as well as from permanent camps. Fishing takes place using dugout canoes or from the shore depending on the gear used. Despite its importance, quantitative data on the fishing effort and fish catch is lacking and qualitative information fragmentary. Over twenty-seven species of fish have been recorded in fish catches from permanent fishing camps (Jenkins et al., 2000b). The most important economic species in terms of their contribution to total catch weight and market value are the catfish, *Clarius gariepinus* and *Bagrus docmac* and the tilapia, *Orechromis niloticus*. These species are sold to distant markets (as far as Dar es Salaam) as well as local markets that also provide outlets for *Hydrocinus, Schilbe, Citharinus, Distichodus*, and *Alestes spp.* The biggest contributor to catch weight is Ndipi, the collective name for very small specimens of *Petrocephalus spp.*, *Hippopotamyrus spp.* and *Marcusenius spp.* These are mainly caught in nets and most of the catch is for home consumption (Monson, pers. comm.).

The number and size of fish in the river and the ease in which they can be caught is influenced by the flood and spawning cycles. Fish catches and fisher activity are traditionally highest during the April – May period with lowest catches late in the dry season (WWF, 1992; Jenkins et al, 2000b). Further investigation is needed to assess seasonal trends in the fishery and the relationship with spawning periods and areas.

All of the studies in the area have used number of fishers to try to estimate fishing effort. The estimated annual harvest from the Kilombero riverine system range between 9,500 tons – 12,000 tons fish. This harvest is thought to be more than the sustainable yield of 7,000 tons per annum. However, more scientific work is required to ascertain this sustainable yield (TECSULT 2001$_2$). In the late 1980s, Mwalyosi (1990) estimated that there were 25,000 fishers in the valley. The 1992 WWF mission used results from interviews to estimate that fishing was the primary income source for between 5-30% of men in villages bordering the floodplain and over 50% in villages located in the floodplain (WWF, 1992). The same study estimated that there were 5,000-10,000 full time fishers and 15,000-25,000 part time fishers giving a total of 20,000-35,000 fishers. Fishing effort is reportedly highest during the flood period between April and May. A seemingly contradictory account is given

by Jenkins et al. (2000_b) in that they report that the numbers of fishermen present is highest in the dry season due to the fact that: a) camps upstream of Kivokoni are usually flooded in the wet season, b) many people only fish in the non-farming period. And c) the Wandamba, the traditional fishermen of the valley, have a taboo against fishing in the wet season (Monson, *pers comm.*). The contradiction could be explained by the fact that during the wet season, many fishers fish closer to their homes and do not use the camps. Further details are provided in an annex 5.

Hunting

There are three forms of wildlife utilization: tourist hunting licensed hunting by Tanzanian residents (local hunting) and illegal hunting. However in reality the strict controls placed on hunting in the Game Controlled Area make it difficult, if not impossible, for local people to legally hunt (WWF 1992). Prior to 1973 legal local hunting was common. The Wangindo were one of the only three ethnic groups in Tanzania recognised as traditional hunters and given the right to hunt using traditional weapons (WWF 1992). Other occupants of the Kilombero could hunt providing they purchased one of the several types of hunting licenses available. The price of these was low enough for local people to be able to buy them. However after 1975 the cost of licenses increased significantly and as a result illegal hunting increased significantly (WWF 1992). There are two tourist hunting companies operating in the area (2001), Wildfoot Prints Ltd. and Kilombero North Safaris Ltd. Each company has a hunting area of approximately 200,000 hectares and specialize in buffalo and to a lesser extent leopard. Wildfoot Prints Ltd reports on serious illegal hunting/poaching in the wet season (particularly of elephant and hippo) as well as the lack of tangible signs of the use of revenues accrued from hunting by the Districts. Villages adjacent to hunting blocks and the Wildlife Division have also expressed concern. See annex 6 for further details.

Forestry

Communities adjacent to the Forest Reserves, under special arrangements, are allowed to collect firewood (dead and fallen wood) and medicinal plants for family use. The nature of this use is only documented for Nambiga Forest Reserve where it was found that the high availability of Miombo and riverine forest resources in the vicinity limited the need of local people to enter the reserve (Hinde et al, 1999a). It is probable that the most common type of utilisation of reserves is illegal logging undertaken by commercial interests from outside of the District (Hinde et al, 1999). It is likely that commercial interests are also driving illegal logging in other reserves. See annex 7 for further details.

20. Land tenure/ownership of:

The land in the Ramsar Site is under District Councils (Kilombero and Ulanga). The District Council manages wildlife, however, utilisation is controlled by the central government (Wildlife Division).

The Kilombero River forms the boundary of Kilombero and Ulanga Districts. Kilombero District has 5 divisions, 19 wards and 81 villages and covers an area of 1,491,800 ha. Of the total area of 81,950 ha is forest reserve, 199,000 ha are in the Udzungwa Mountains National Park, 323,000 ha is in Selous Game Reserve and over 21,000 ha belong to private companies and state prisons. Thus, the bulk of the estimated population of 280,197 people is confined to a strip of 858,850 ha of mixed arable land, wetland and Miombo woodland. The only room for expansion is into the floodplain or southwest along the valley.

Ulanga District has 5 divisions with 24 wards, 65 registered villages and 308 hamlets and covers an area of 2,456,000 ha, of which an estimated 40% is available for development. Less than half of the estimated population of 179,830 is between 18 and 45 years of age with 17% below the age of five (Ulanga District Council, 2000). Just over 90% of the population lives in rural areas. These population estimates are based on 2.1% annual growth rate since the last census in 1988. Unfortunately there is no data on immigration into the District but District officers report significant immigration of livestock keepers into the Kilombero Valley and ruby miners on the escarpment.

Since 1956 the Kilombero floodplain and peripheral area of woodland has been a Game Controlled Area. This designation strictly controls hunting but places no restrictions on other land uses and is of limited value in terms of conservation. Although there have been suggestions that the conservation status of part of the Kilombero Valley to be elevated to that of a Game Reserve (TWCM, 1989, 1991), they were not implemented.

For further information see annex 8.

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21. Current land use: (a) site (b) surroundings/catchment

a) The valley is dominated by an extensive floodplain (a mosaic of swamp, pond and lakes, river, riverine forest and grassland habitats) with a fringe of Miombo woodland and ground water evergreen forest. The valley can be divided into a smaller northern and a larger southern section separated by the narrowing of the floodplain to 3-4 km where the Ifakara-Mahenge road crosses the Kilombero River. The first section is broader, more extensive and less densely populated than the second or downstream section. The upstream section falls within the jurisdiction of Kilombero and Ulanga Districts with the Kilombero River forming the border. There are 65 villages bordering the floodplain, 10 villages on raised ground and a number of hamlets and temporary camps on the floodplain itself. The integrity of the ecosystem is still largely intact most likely due to its remoteness and inaccessibility coupled with existing conservation efforts in the catchment and buffer areas (Udzungwa National Park, Catchment Forest Reserves, Selous Game Reserve). The more southerly areas are mostly intact with little sign of human impact and could be providing an important refuge for wildlife. Most impact on the Ramsar Site is in the north where large-scale conversion of wetland habitat for agriculture has taken place. However, this is also the case around and west of Ifakara, around the village of Mofu along the Ruipa River and on the western fringe e.g. west of Itete. This pattern seemingly reflects the pattern of settlement and immigration into the area. The wetland and the surrounding buffer areas are being increasingly used for agriculture, livestock keeping and fishing. Large and small-scale agricultural development is being undertaken in both the wetland (for rice) and the Miombo buffer (for teak as well as food crop such as maize) with livestock keeping and fishing undertaken on an artisanal basis by an increasingly larger number of people. The heart of the Ramsar Site is the seasonally flooded grassland and bushland that forms the core of the Kilombero Valley. This is the focal area for birdlife and large mammals as well as for rice cultivation, fishing and hunting. The area is interlinked in ecological terms to the surrounding Miombo and forest areas (see also the land cover map).

b) Higher altitude evergreen forest is found on the Udzungwa Mountains and in the Mahenge Highlands. To the north lie the Kilombero Company Sugar fields. In the southern and western parts of the valley, the Ramsar Site is largely surrounded by Miombo woodland, farmland and agriculture on gently undulating hills above the floodplain.

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22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects: (a) at the site (b) around the site

There are several existing operational and non-operational large-scale developments in the Kilombero wetland and catchment areas. They include private plantations, state farms and pastoralism.

a) At the site

Kilombero Holdings Ltd Far (previously KOTACO)
The creation of this farm, previously owned by Korean Tanzanian Cooperation (KOTACO), involved the clearance and drainage of 5,000 ha of the floodplain in 1985. The original aim was to plant some 15,000 ha of rice but the scheme failed and it has since been bought by another company, Kilombero Holdings Ltd. Currently the land is not farmed and little is known of the present company's plans.

Idete and KiberegePrison Farms

Idete farm, located near the village of Idete, covers an area of 6,000 ha. Since some of this land was obtained without the full consent of the village, a certain amount of resentment remains. Kiberege farm is located close to Kiberege village. Its size is unknown as the Prison did not disclose this information but it covers several thousand hectares. Both farms grow rice, using prisoners as labour. The rice is used for food in the prisons and to supply other prisons.

Mofu farm

A new farm of some 500 Ha, owned by a Canadian, plans to start production of rice at Mofu in the near future. No further information was available including that concerning farming methods e.g. irrigation, inputs to be used.

Mbingu Farm

This farm of 3,000 acres is found 50 km upstream from Ifakara and is run by the Mbingu Sisters. Currently they produce paddy rice, maize, bananas and sunflower from an area of 400 acres. There are rumours that there are plans to expand this area.

M'mula Rubber Estate

In the 1980s the Kalunga Forest Reserve was sold to General Tyre East Africa in order to establish a rubber plantation. This venture failed and the land was sold to a Sudanese company that also planned to produce rubber. This has since failed and currently Kilombero District Council is trying to regain control of the area and declare it a Local Government Reserve. It still contains patches of good quality riverine forest and a population of Udzungwa Colobus monkeys.

Kilombero Valley Teak Company (KVTC)

KVTC is a CDC (Commonwealth Development Corporation) backed company that aims to plant at least 13,000 ha of teak in a series of plantations in both Kilombero and Ulanga Districts. Some of these plantations are inside while others are outside the Ramsar Site. CDC will invest £29 milllion in the project including a $ 12.5 million investment in a sawmill at Ifakara. At peak production they will produce 50,000 m^3 of timber a year producing an export commodity that will bring in hard currency and reduce the pressure on indigenous teak forests in Southeast Asia. This is particularly pertinent to Burma which, at current logging rates, will have no teak forests left in 30 years (KVTC *pers comm*). KVTC cut down indigenous miombo woodland in order to establish the plantations.

KVTC currently owns 28,159 ha in the valley on a 99-year lease. They will not be able to achieve their target for planted area, with the current land, because much of it is unsuitable for teak (e.g. the water table is too high, soil type is unsuitable) or their own environmental guidelines preclude them from planting. The environmental guidelines are based on a pre-planting Environmental Impact Assessment (EIA) carried out in 1992 and precludes planting on evergreen areas, steep slopes and close to water courses as well as prescribing a mosaic pattern of teak and Miombo within plantation areas (IIED, 1992). KVTC has management responsibility for the remaining unplanted land and is expected, by the Government, to conserve these areas. In order to achieve the targeted planted area KVTC is currently trying to obtain an area of Miombo covering 10,000 ha to the east of Mavimba village (Ulanga District) in the Mahenge Highlands outside the Ramsar Site. Concern has been mooted in some quarters about the potential environmental impacts of this development although little concrete data is available yet. Frontier-Tanzania has been investigating the impact on large mammal migrations and biodiversity since 1998, however, conclusions are only preliminary. A full Environmental Impact Assessment, planned for 2002 will provide additional information.

Agricultural model site

The Government of Tanzania identified Kilombero District as a model agricultural district. It is planned that this programme under the Ministry of Agriculture Food and Marketing will be implemented in the Kilombero Valley Floodplain. The aim of the Government is to utilise wetland areas to ensure sufficient national food production.

b) Around the site

Kilombero Sugar Company
The Kilombero Sugar Company is based at Kidatu in Kilombero District and has been owned by Illovo Sugar, a South African company, since it was privatised in 1998. The fields are lying just North of the Ramsar Site. The company currently owns 6,000 ha of land in the Msolwa River Valley. They produce sugar through plantations on this land and through an out grower scheme. The out grower scheme involves a number of external growers, some of which are in the Ramsar Site. The total out grower scheme is approximately 1,000 ha giving a total of about 7,000 ha of sugar plantations.

Tanzania Nutfields
The company has a large estate in the Mahenge Highlands outside the Ramsar Site that was used to produce seed stock for growing in estate(s) in Zambia (Information via Ulanga District Council).

Kihansi Hydropower Dam
The Kihansi River was dammed for generating hydropower in the beginning of 1990s. The unique natural spray zone at the Kihansi waterfalls was lost when it became operational in the late 1990s. The endemic Kihansi Spray Toad population, which was not discovered in the first EIA studies is consequently highly threatened and on the brink of extinction in the wild. The effects of damming on the large swamp forest fed by the Kihansi River in the Kilombero floodplain and the Ramsar Site have not been investigated. Further studies are needed.

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23. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

No management plan exists for the floodplain or the Ramsar Site. Both Kilombero and Ulanga Districts receive support from Ireland Aid to formulate District Development Plans and to implement selected activities. Each plan covers a three-year period with the current plans covering the period January 2000 – December 2002. Ireland Aid (IA) is the single largest donor in the Districts and has a long-term commitment to both (up to 2010). IA support to Ulanga District began in 1996 and the current plan in Ulanga is the second to be implemented. Support to Kilombero is more recent, 1999, and the current plan is the first they have produced. Relevant activities supported by IA as part of these plans are: a) bee keeping in both Districts, b) development of fishponds in Ulanga, c) establishment of village environmental committees in an attempt to promote community based resource management and planning, d) village level land use planning in Ulanga District and e) study to assess, the causes of and solutions to, escalating land use conflict in Kilombero District. Activities of the District plan not being supported by IA are: a) Activities to reduce encroachment in forest reserves in Kilombero District, b) establishment of community forest reserves in both Districts, c) improved fishing methods in both Districts, e) protection of spawning sites in Kilombero District.

Kilombero Valley has status as Game Controlled Area, which means that only hunting is regulated. However, habitat protection is not considered by this status and its protection status is practically of little use to the conservation of the Kilombero Valley Floodplain. There have been a number of proposals for upgrading a core area in the Floodplain to a Game Reserve (e.g. Rodgers 1984), however, this has never happened. The Selous Game Reserve to the east is the largest reserve in Tanzania only tourism and ecotourism and tourist hunting are allowed. The Ramsar Site overlaps with the Selous Game Reserve in north-east. To the north-west the Mwanihana and part of Matundu forests in the Udzungwa Mountains has the status of a National Park. The north-eastern Ramsar boundary lies almost adjacent to the National Park. The remaining evergreen forests in the Udzungwa Mountains ranges have status as Forest Catchment Reserves. The same applies for the Mahenge Mountains to the south-east.

Additionally conservation measures include the *Selous Game Reserve Management Project* funded by the African Development Bank (ADB). The aim of the project is to create a buffer zone for the Selous Game Reserve (TECSULT 2001$_a$, TECSULT 2001$_b$, TECSULT 2001$_c$). The project involves 25 villages in total eight of which

are in Kilombero District and 17 in Ulanga District. The proposed buffer zone includes the northern section of the floodplain from the Ifakara-Mahenge ferry crossing point to where the Kilombero River enters into the Selous and is bounded to the north by the current agricultural belt. The core activity will be village land use planning, which will ultimately create Wildlife Management Area(s), and community forestry reserves for the purpose of conserving national resources and ensure benefits to the local communities. This mission also identified the Kilombero Valley as one of special importance. There is a possibility that an Integrated Wetland Programme could advise on wetland issues as the buffer zone project is developed and implemented.

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24. Conservation measures proposed but not yet implemented: (e.g., management plan in preparation; officially proposed as a protected area, etc.)

It is planned that the designation of Kilombero Valley Floodplain as the third Ramsar Site for Tanzania will be followed up by wise use initiatives by the Government of Tanzania, which will be supported by Danish Foreign Aid (Danida). Included in a proposal for the *Integrated Management of the Kilombero Valley Ramsar Site* (Horrill *et al.* 2001) is outlined a Strategic Environmental Assessment approach for a Ramsar programme pilot phase. This will aim at building up capacity for wise use of natural resources locally and in the districts, as well as, the development of an integrated management plan for the Ramsar Site. The draft budget is about 3 million US Dollars for four years.

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25. Current scientific research and facilities: (e.g., details of current projects; existence of field station, etc.)

The Kilombero Valley Integrated Environmental Management Programme (KVIEMP) is a Frontier-Tanzania initiative aiming to address the increasing number of pressures on the natural resources in the Kilombero Valley. Frontier-Tanzania has been active in the valley since 1999. The research project aims at implementing a a) resource use programme, b) development of local capacity to manage natural resources and c) an environmental awareness programme. There has been a special focus to address the following problems: a) an increase number of cattle in the floodplain, b) increased intensity of fishery, c) farmland expansion, d) poaching of wildlife and e) teak plantation development. A number of draft papers or reports have been produced by the Frontier-Tanzania project. A project concept note was prepared in 2001 seeking continuation of the initiative for 2002 and beyond. A number of other researchers visit the Kilombero Valley from time to time and undertake selected research activities. Furthermore, the Tanzania Wildlife Conservation Monitoring (TWCM) previously funded by Frankfurt Zoological Society (FZS) and currently under TAWIRI regularly undertakes aerial counts of large mammals in the Selous Game Reserve and the Kilombero Valley. There were such censuses carried out in 1988, 1990, 1994, 1998 and 2001 (TWCM 1989, 1991, 1995, 1999, in prep.). A large number of publications in form of papers, reports and popular articles have been produced by various researchers and institutions (see the reference list). The survey in 1998 was the seventh to include the entire Selous ecosystem including the Kilombero Floodplain.

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26. Current conservation education: (e.g., visitors centre, hides, info booklet, facilities for school visits, etc.)

Many of the activities funded by the Irish Aid would have elements of environmental education, especially the establishment of village environmental committees. The African Development Bank is also supporting environmental education in various ways. An environmental awareness programme in Itete by Frontier-Tanzania has concentrated on primary schools and specifically on providing teachers the skills necessary to introduce environmental education in to schools. Moreover, Frontier-Tanzania has established a Community Based Organisation (CBO) in the town of Itete, which aims to promote benefits to the local communities based on sustainable use principles.

OKOA is based in Ifakara and aims to provide environmental services to local people. It is run like a small-scale consultancy, using skilled staff to develop projects, obtain external finance and implement activities. Fifteen percent of the budget of a funded project feeds back into OKOA. Their programmes so far have

included: the development of 'improved' stoves to reduce fuelwood consumption; the development of a "green charcoal" (using scrap wood); the development of village based tree nurseries and schools based child nutritional improvement.

27. Current recreation and tourism: (state if wetland is used for recreation/tourism; indicate type and frequency/intensity)

The number of foreign visitors to Kilombero Valley Floodplain is limited. The largest tourism potential is hunting and a limited number of birdwatchers visit, especially the Kivokuni Ferry point at Ifakara. The Kilombero Game Controlled Area is divided into two hunting blocks both of which are utilized for tourist hunting. Kilombero North covers about 200,000 ha and is managed by Kilombero North Safaris Ltd, Kilombero South also covers an area of 200,000 ha and is managed by Wild Footprints Ltd. Each company obtains a quota to hunt targeted species each year from the Wildlife Division. The hunting companies pay to the Wildlife Division game fees for each animal hunted, 25 % of the game fee is returned to the relevant District Council. It is the intention that the revenue is used for development activities in villages in, or near, hunting blocks. However, communities complain that they so far receive no benefit from hunting. The hunting companies also provide meat to local villages when it is available although there is no mechanism, which enforce this process and its implementation is variable. In the year 2000 buffalo accounted for 50 % of the revenue earned in Kilombero North. Hunting takes place in the dry season to allow animal reproduction. Additionally, accessibility is easy in the floodplain during the hunting season.

28. Jurisdiction: (territorial, e.g. state/region, and functional, e.g. Dept of Agriculture/Dept. of Environment, etc.)

Ministry of Natural Resources and Tourism in collaboration with the Kilombero and Ulanga Districts.

29. Management authority: (name and address of local body directly responsible for managing the wetland)

Kilombero and Ulanga District councils in collaboration with the Wildlife Division.

District Executive Director
Kilombero District
PO Box 263
Ifakara

District Executive Director
Ulanga District
PO Box
Mahenge

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