Annex 5.

Social and cultural values (Fishing)

The Kilombero River fishery is an important source of food and revenue for the inhabitants of the area 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.

In terms of fisheries management better estimates of effort are based on the type and size or number of fishing gears used in the area. Although information on gear type does exist, there is only limited data on gear number and numbers of fishing units using the gear. Six legal and possibly five illegal fishing gears are reportedly used. Legal gears can also be used in an illegal manner such as using small mesh size (3.5 inch is the legal limit for gillnets) and blocking access to and from breeding areas with traps and nets. Many fishers are aware of the legality of many gears and techniques and often complain about their use and the lack of enforcement by government. They also have the tendency to blame others for illegal practices.

Jenkins et al. (2000b) also monitored fishing activity in four permanent camps at three month intervals over one year and reported that of 189 catches sampled, 79% of gears were bottom set compared to 21% set at mid-water or at the surface. The same study reported that nets accounted for 77% of catches with hand and long lines for 21% and traps for 1.5%. In these permanent camps most fishing activities were undertaken in the main river. This figure may be misleading as no differentiation was made between wet and dry season in their results.

Table. Brief description of traditional, legal and illegal fishing gears and techniques used in Kilombero Valley

Local Name	Gear Type	Remarks
Mshipi	Longline	A length of rope with 30-200 baited hooks (median 100) attached to lines set at intervals along the rope. Baits include soap (for catfish) and small fish.
Ndoana	Handline	A single line with one to five hooks baited with soap, small fish or fish eyes is cast into the water and retrieved.
Nyavu	Gillnet	3-5 inch mesh size static nets that can be set at the riverbed, in midwater or at the surface. Used in rivers and pools. Lengths vary from 90m-500m. (1)
Ndanga, Ngono	Basket traps	A traditional method. Varying designs of traps are made from bamboo and elephant (bamburi) grass. Also can be used using an artificial barrier made of reeds or sometimes scraps of net to trap fish swimming along the shore by diverting them into the trap.
Chandurua	Scoop net	A large (approx. 1.5m) triangular net with handle resembling a landing net using mosquito net used for small schools of fish swimming along the shore or for freshwater shrimp.
Kuzuia	Fence Trap	A traditional but illegal technique that blocks weir entrances of tributaries and breeding pools.
Kokoro	Pull Seine Net	An illegal technique where a usually small mesh net (1-3cm) is dragged along the bottom between two boats or pulled from the shore.
Kimia?	Cast Net	Illegal technique where a very small mesh net that is thrown over schools of small fish.
	River Blocking or Diversion	A traditional but illegal technique where the river is diverted to lower water levels and concentrate fish that are collected in nets.
??	Baiting	Anecdotal report of where an animal carcass (a hippopotamus) was used to concentrate fish that were then netted. Dubious legality depending on bait used.
Kusumisha	Poison	A traditional but illegal technique where poisonous plants are ground to a fine powder that is scattered in confined water and poisoned fish are then scooped out. Agaracide is also used.

(1) From Jenkins et al. 2000

The traditional fishermen of the Kilombero, the Wandamba concentrate on traps and lines believing that net fishing will damage the fishery (Monson, *pers com*). Other tribes such as the Wanyakusa utilise nets to a much greater extent. The Wandamba are now concentrated in the areas upstream of Ifakara whereas the Wanyakusa are found in larger numbers in the downstream areas (Jenkins et al 2000b). This seems to be a change in distribution in fishers as it was previously reported that the Wandamba fished in all areas (WWF, 1992).

The role of women in fishing is limited. They do not carry out any fishing but are sometimes involved in processing and marketing fish. Some women use fishing camps as an opportunity to carry out small scale trading. In places where fishing takes place in the wet season it is common for the husband to carry out the fishing in order to obtain money which is then sent to the wife to help in the working of the farm. In Wandamba camps women are banned from staying overnight. This is a component of the taboo against permanent camps because the presence of a woman on a camp creates a family group and therefore suggests an element of permanence (Monson *pers comm.*).

Another example of traditional practice, again from the Wandamba, is the previously mentioned taboo on fishing in the wet season system designed to protect the fish population during the spawning period (Monson *pers. comm*). Monson has also told of the Wandamba belief that the river has sites that are homes to spirits. These spirits must be kept happy by observing certain codes of behaviour when fishing (e.g. no drinking or sleeping with women). The Wandamba believed that if these traditions are not adhered to the spirits will desert them and so will the fertility of the fishery. The Wandamba have also stated that immigrant tribes have no respect for these traditions. There may be other examples of indigenous management from this and other tribes that have been longer residents in the area.

Responsibility for the management of the Kilombero River fishery lies with both the Ulanga and Kilombero District Fisheries Offices (part of the District Natural Resources Office) who are delegated officers of the Division of Fisheries. Their responsibilities include the monitoring of the fishery, the collection of revenue (e.g. from licenses and catch levy) and the enforcement of fishing legislation. However, with the exception of revenue collection, little enforcement, rudimentary catch monitoring and no coordination takes place. Although there are a number of well defined fisheries regulations (DOF, 1989, 1994 and 1997, 2000), there is little effort by the District Officers to ensure compliance. This is despite Ulanga District having been supplied with a fibreglass boat and outboard engine. There seems to be little coordination between Districts in terms of management activities including enforcement. Many fishers complain that they often have to pay for licences from both Districts when the Fisheries Act is quite clear that a licence bought from any District is valid in any other. The issuing of licences by both Districts to fishers who already have licences seems to be a revenue collection strategy rather than a legal requirement. Monitoring of fish catches is undertaken at one landing station, Ndumbuli, close to Ifakara in Kilombero District. Catches are theoretically recorded for 16 days per month a practice that is supposed to take place nationwide but in reality is fraught with problems, not least that monitoring stations are used to collect revenue so fishers often avoid them (Horrill *et al.*, 2001).

Total catch figures from the Ndumbuli station indicate that catch over the last four years has remained stable between 100-143 tonnes except for the *el Nino* year of 1997, about 80 tonnes. One cannot read too much into these figures, as it is hard to gauge sampling effort by fisheries officers and fishing effort. There were indications that overfishing was taking place in the early 1990s (WWF, 1992). However, the fishery has still persisted and the lack of long term quantitative data on catch and effort is a major constraint to assessing the status of the fishery. There is still considerable anecdotal information to suggest that fish catches have been declining over the last twenty years. Some fishermen claim that using the same mesh net size they now only catch 25% of what they caught ten years ago. The potential problem this would cause has been partly ameliorated by a steady increase in the price of fish (Chettleborough *pers. obs.*) and the availability and use of more efficient gears. The same fishermen suggested that the number of fishermen has increased ten times over the same period. A survey team from Ulanga District Council also reached similar conclusions because of declines in numbers of many species but with *Citharinus, Clarius* and *Hydrocinus* having undergone the biggest decline (UDNR 1999). Interviews carried out by Prof. Jamie Monson amongst Wandamba people also illustrate these trends.

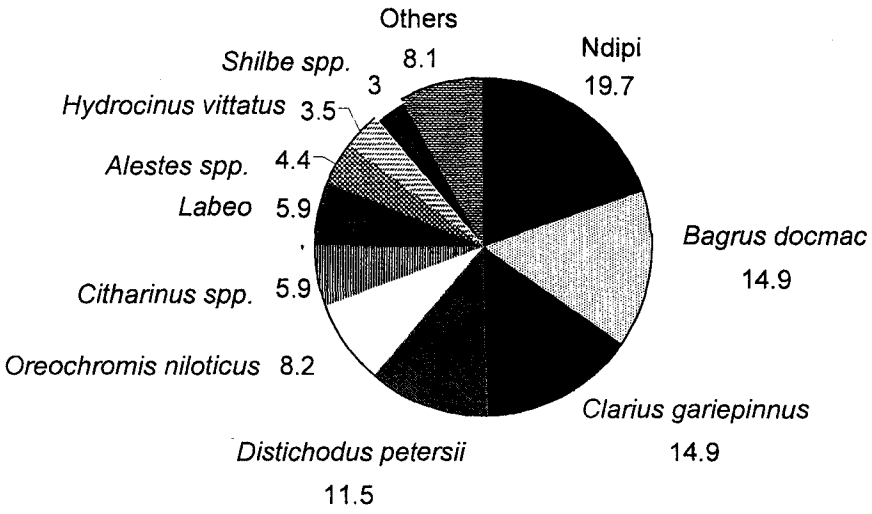

Figure 2. Kilombero Valley catch composition by catch weight (kg). From Jenkins et al. (2000)

Fish transported out of the valley are normally hot smoked, a process that partially smokes and cooks the fish giving it a preservation period of 4-6 weeks depending on humidity. Fuel for this process is firewood or reeds depending on what is available adjacent to the fishing camp. Fish buyers travel amongst a selection of camps to buy fish. Often fishers from smaller camps travel to larger ones to sell their catch.

All of the studies in the area have used number of fishers to try to estimate fishing effort. 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 and using the estimated flood plain area of 14,400 km2 and a total of 25,000 fishers would give a fisher density of 1.17 fishers per square kilometre (WWF, 1992).

A seemingly contradictory account is given by Jenkins et al. (2001) in that they report that the numbers of fishermen present is highest in the dry season due to the fact that:

- Camps upstream of Kivokoni are usually flooded in the wet season.
- Many people only fish in the non-farming period.
- 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.

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