



**WorldFish Center Report on the Opportunities and Constraints to
Improved Fisheries Exploitation and Management in the Maringa –
Lopori – Wamba Landscape**

For

African Wildlife Foundation (AWF)

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List of Acronyms

AWF – African Wildlife Foundation
CARITAS - Catholic Agency for International Aid and Development
CARPE - The Central African Regional Program for the Environment
CBNRM – Community-Based Natural Resources Management
DRC – Democratic Republic of Congo
DGM – Direction General de Migration
FC – Francs Congolais = USD 550 (May 2007)
GPS – Geographic Positioning System
ICCN – Institut Congolais pour la Conservation de la Nature
JRS – Jesuit Refugee Services
MLW – Maringa-Lopori-Wamba Landscape
NGO – Non-governmental Organization
PRA – Participatory Rapid Appraisal
USAID – United States Agency for International Development
USD – United States Dollar

List of Non-English Terms Used

Bésolo – women’s collaborative fishing method
Corbeille – a large sieve-like basket used to by women in écoupage, through which water is passed leaving behind fish; roughly equivalent to 4 epokos in volume
Écoupage – women’s collaborative fishing method
Epoko – small basket used by women in écoupage to bail water
Pannier – a flat oval woven rope/wicker basket at least 100 cm long, used to transport salted/dried fish
Pirogue – a canoe
Suzuki – a large woven rope/wicker basket, roughly 50cm high, 100cm long, used to transport smoked fish in, roughly equivalent to 10-12 valises
Tracasserie – literally “harassment”
Valise – a flat oval woven rope/wicker basket roughly 30sm long, used to smoke and transport fish

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Executive summary

The WorldFish Center was contracted by Africa Wildlife Foundation to conduct a preliminary survey of the role of fisheries in livelihoods, and opportunities and constraints to improved fisheries exploitation and management, in the Maringa-Lopori-Wamba Landscape. In May 2007, a three person WorldFish Center team, supported by AWF staff, visited the landscape to explore how the fishery operates to meet local needs and identify scope for interventions that might improve fisheries livelihood opportunities without undermining its sustainability.

It is clear that although fishing is important for both income and subsistence in the areas visited, profits are nonetheless modest and somewhat unpredictable. Moreover, fisherfolk should not be considered a homogeneous group: there are different sub-groups, using different gears and skills, involving women and men in both fishing and post-harvest activities, groups who are more or less dependent on farming, and who fish, on balance, more either for cash or subsistence needs. Thus the findings here need to be set within this context of different sub-groups, fishing for generally very modest remuneration, with the latter subject to considerable variability and uncertainty.

The team found no evidence of over-fishing and hence no immediate need for fisheries management interventions. However, there are no reliable current data on the fishery and, pending any change in that, it would be unwise to recommend actions to increase fishing effort.

Post-harvest handling is clearly characterized by a number of challenges, including poor smoking techniques and extended storage times which can lead to very high losses due to mold and insect attack. Almost no fish is salted/dried. Fish is taken to market only once or twice a year, at the start of the rainy season. Thus, with relatively high market volumes, prices are low. Moreover, the team found no evidence of collective action on transport, which would perhaps offer potential to reduce transport costs.

Net returns are further reduced as a result of the frequent and onerous *tracasserie* (rent-seeking) by officials at a number of ports along the river. This reduces incentives to transport fish to Basankusu, and seems to eliminate almost all incentive to transport fish beyond Basankusu.

These findings, although preliminary, give rise to a number of recommendations:

- more detailed information is needed on, e.g., marketing systems (including post-harvest aspects), fish resources (creel survey) and case studies of particular activities/sub-groups;
- develop capacity of fisherfolk groups, with a strong focus on common interests in which there are clear benefits from collective action; identify scope for women's interest groups;
- a key entry point is improvement in post-harvest handling of fish through improved smoking methods, and investigating the market viability of salted/dried fish;
- explore the potential for savings and credit interventions to change timing of fish sales
- work with consortium partners on effective strategies to reduce *tracasserie*; and
- explore possibilities to reduce transport costs and/or identify additional transport options.

Introduction

The human population density of the Lomako/Maringa swamp forest (estimated at 5-10,000¹) is low compared to a huge biodiversity that includes a relatively high density of bonobos (*Pan paniscus*), one of the five great ape species found in the DRC.

Nevertheless, bonobos are under threat from commercial/subsistence hunting and trade in bushmeat, as well as logging of the habitat. In recognition of its conservation value, the Government of the Democratic Republic of Congo set aside an area known as the Lomako-Yokokala Forest Reserve (see map in Appendix A). Additionally, the USAID-funded, Central Africa Regional Program for the Environment (CARPE) has selected the “Maringa-Lopori-Wamba Landscape”, an area of land that is centered on the Lomako-Yokokala Forest Reserve, as an area that needs integrated conservation support. Over the course of CARPE’s Phase II timeplan (2007-2011), the African Wildlife Foundation (AWF) will be responsible for the design and implementation of an overarching Land Use Plan for the landscape.

As part of AWF’s mission to reduce pressure on bonobos, and wildlife in general, it is seeking interventions in labor and food markets that have the potential to provide alternate sources of employment, revenues and food for local stakeholders and markets. The fisheries in the rivers and adjoining swamp forest have been identified as potential alternatives, however the current fishing pressure (both in terms of species diversity and total catch) and the volume of trade in fishery products locally and regionally, are poorly understood. This in turn limits the development of efficacious projects that might shift activity away from bushmeat towards a sustainably managed fishery.

In response, AWF enlisted the services of the WorldFish Center to conduct a survey of opportunities and constraints to improved fisheries exploitation and management in the Maringa-Lopori-Wamba Landscape. In May 2007, a WorldFish Center team composed of three scientists and an AWF guide/translator visited the landscape to generate as complete an understanding as possible (within the time and logistical constraints of the mission) of how the fishery operates to meet the needs of the human population and the interventions that might improve fisheries livelihood opportunities without undermining its sustainability.

Field Program and Methodology

The study aimed to gather information on:

- the role and importance of fisheries in livelihoods in the landscape;
- fish species present;
- seasonality in the fishery or in the activities that impinge on it;
- fishing methods used for both commercial and subsistence activity;
- status and trends in the sustainability of the fish resources and key factors affecting this, including (where possible) identification of sources of instability or uncertainty;
- fish consumption patterns and the role (actual / potential) of fish products as a substitute for bush meat;
- identification of different stakeholders, directly or indirectly involved in capture fisheries (and related activities) and, to the extent possible, a brief characterization

¹ Pers.comm. Jef Dupain, African Wildlife Foundation.

of each (gender, socio-economic status, subsistence or commercial activity, migrant or resident);

- the role of women in the fishery and related activities;
- opportunities, constraints and issues as perceived by those whose livelihood depends on the fishery, noting differing perspectives of different groups;
- any management regimes currently in place (formal, informal, operational or non-operational) and information on how effective they are (/were);
- sources of instability in the fishery and/or livelihoods relating to it;
- existing marketing patterns and processing and handling practices, with a preliminary indication of the relative importance of different end-markets and marketing chains, and key constraints to further development;
- service providers in the sector, including provision of critical inputs by the private sector (e.g., fishing gear, transport, credit, marketing services) and existence/capacity of public and non-governmental organizations that do/ could provide training, regulatory services, livelihoods development etc.;
- existing practices and potential for aquaculture in the landscape, and how this would relate to any key pressure points identified in the system;
- the institutions and policy context affecting the fishery and associated livelihoods, and;
- key areas of uncertainty in the findings (for instance, relating to recent changes that are difficult to assess or seasonality aspects that cannot be adequately assessed as part of this preliminary review).

The initial itinerary, as planned with AWF, called for the WorldFish Center team to visit all fishing camps along the Lomako River (up to Ndele camp) as well as all camps along the Maringa River, upstream from the Lomako confluence, up to Bokoli. However, the number of fishing camps found along the Lomako River proved to be significantly higher than expected, requiring the team to prioritize fishing camp sampling in favor of the section of the Lomako River bordering the Lomako-Yokokala Forest Reserve. In this area the team visited 10 out of 15 inhabited camps.

In the areas of secondary importance, the team visited a) two out of nine inhabited camps along the stretch of the Lomako River downstream from the Forest Reserve; and b) six out of 34 inhabited camps along the Maringa River upstream from the Lomako River confluence. Although of lesser importance, it was also valuable to gain an understanding of how fishing livelihood parameters change with proximity to Basankusu, the major trading center for the area. Therefore, the team visited seven out of 62 inhabited camps downstream from the Lomako River confluence.

This research took place during a three-week period in May, 2007, during the start of the rainy season. Observations and conclusions must be taken with the caveat, therefore, that data collection did not take place during the peak fishing season, i.e. January-April.

In order to gauge the primary sources of livelihood and fishery constraints, the research team use direct observation and unstructured interview techniques with individuals and groups of fisherfolk. As patterns started to emerge, data on the structure and function of

the fishery and associated livelihoods strategies were increasingly gathered through a semi-structured interviews with groups of fisherfolk in fishing camps. Throughout the mission, team members verified data collected through direct observation, key informant interviews, and the use of scenario-based discussions by which informants were asked to explain discrepancies between their representations and those of other fishing camp stakeholders.

In addition to interviewing fishing camp residents, part of the team traveled inland to visit a number of larger villages: Bokoli, Boonia, Bolima, Bocau. These are the permanent residences for many fisherfolk encountered, and these chiefs traditionally claim ownership rights over the camps visited. In these villages, due to the large numbers of community members who attended the meetings and the limited time available, stakeholders were divided into smaller gender-segregated groups and data were collected using Participatory Rural Appraisal (PRA) method for household budget and income mapping. In two games using this method, groups of 10 participants were asked to divide 100 coffee beans in a number of bowls giving an indication of the relative importance of a) their primary sources of income during the year (farming, fishing, hunting/gathering, commerce, skilled trades/other); and b) their primary expenses during the year (health, education, clothing, food, household/construction, work materials, transportation, entertainment). Additionally the team interviewed individual or small groups of key informants, village notables and local NGO leaders to discuss fishing conditions, livelihoods constraints and past experiences with community capacity-building and organization.

Throughout the research, the WorldFish team was accompanied by 1-2 AWF personnel who served as guides and interpreters. These were useful, as a majority of community members in most fishing camps and towns spoke little French, and therefore most questions were asked in French and translated into Lingala and/or Mongo by the Congolese team members or AWF personnel. When traveling along the Maringa and Lomako Rivers in motorized canoes (“*pirogues*”), the team was also accompanied by two local boat operators. When traveling overland, 3-4 locally hired porters helped to transport supplies between villages.

Finally, the WorldFish Center team visited fish traders at key fish markets in Basankusu, Mbandaka, and Kinshasa to gather data regarding fish prices, taxes, rent-seeking, cost and availability of material inputs to the fishery, and fish preferences among town and city-based consumers. To validate and better understand the data collected from fishing camps and villages, the Congolese members of the group purchased fish (or investigated prices when an agreed price could not be reached) whenever possible from fishers along the river, as well as in key markets. This field research also benefited greatly from a literature review of the overall DRC, and specific Maringa-Lopori-Wamba Landscape fisheries context conducted by Revaud (2007).²

Appendix B provides a summary of the itinerary.

² Revaud, Maryline (2007). *Revue de la Littérature Existante sur le Statut actuel de la Pêche et de l’Aquaculture in Republic Democratique du Congo (DRC)*. WorldFish Center, Cairo, Egypt.

Description of the Maringa-Lopori-Wamba Landscape³

The MLW landscape, which spans parts of three districts (Equateur, Mongala and Tshuapa) is an extremely isolated part of the country characterized by widespread poverty, in which 93% of the 74,000 km² is currently covered by humid tropical forest. This area once had a significant plantation agriculture sector (palm oil, rubber, coffee and cacao), was connected to the national energy grid, and boasted what was once described as one of the most beautiful cathedrals in Central Africa.⁴ However, a lack of investment by the Mobutu Regime, and the turmoil created by five years of domestic conflict (1998-2003) have destroyed most infrastructure in this area. Indeed, although the cathedral still stands, today even the Territorial capital and primary market for the area, Basankusu, has no electrical or roads infrastructure connecting it with the Provincial capital, Mbandaka. Additionally, most plantations are inactive with the result that few large vessels transport goods between Mbandaka (on the Congo River) and Basankusu. Aside from residents of Basankusu, most of the population either lives in villages along the axes of what used to be navigable roads, or scattered settlements along the rivers.

Results

Fish Species

A wide variety of species are captured in the Lomako and Maringa Rivers and associated swamp forests. Due to the inability of most fishers to access deep water or main river channels, the fishery targets juveniles, which are more vulnerable as they feed and mature in the flooded swamp forest and sexually mature adults moving between the flooded forest and the main river during spawning migrations. This study was not conducted during the peak fishing season (the dry season, January-April.) nor was any direct sampling conducted, but a number of species were observed (see Appendix C), and according to the fishers, there is no change in the species composition over the course of the year. This implies that the primary targeted species display horizontal migration patterns (river to forest) rather than longitudinal migrations (up/down river) through the area. However, the relative abundance of species caught does change, with some species being more easily captured in the dry season. Most fish encountered were either in smoked and or dried form making identification of species difficult in some cases.

The fish species that were observed and reported to be the most important for trade were three catfish genera: *Parachanna obscura* (know locally as “Mungusu”), *Clarias sp* (known locally as “N’golo”), and *Bagrus sp* (know locally as “Ekodji”). Fishers, both male and female, report an abundance of juveniles during the late rainy season, probably indicating that reproduction is occurring with the early rains (October-November and again in March-April). Many of the key fish species spawn in the flooded forest and the fish larvae remain in this area for 4-6 weeks feeding on detrital foodwebs and insect larvae. In addition, *Macrobrachium* (freshwater prawns) are reportedly quite numerous in women’s *écoupage* catches, and are reported to be carrying eggs during the dry season.

³ Sources: DUPAIN, Jef & NZITA, Maxime (AWF). Mov.1.1.1 Land use design: integrated land use planning strategy document. MLW Project/CBFP/CARPE/USAID, Kinshasa, octobre 2006, 30 p.; CARPE Report on the Maringa-Lopori-Wamba Landscape (http://carpe.umd.edu/resources/Documents/Maringa_SOF2006.pdf);

⁴ Pers.comm. Jef Dupain, African Wildlife Foundation

Fishing Gears and Methods

The most widely used gear is the traditional basket univalve trap (see photo gallery), which may range in size from 30 cm up to 3 m or more. These traps are placed in streams and shallow sections of main rivers at fish migration routes and are held in place with stakes, rarely baited and checked daily for fish. The main reason cited by fishers for the extensive use of these traps is their low cost, being mostly manufactured by the fishers themselves.

A widespread women's traditional fishery, known as "*écoupage*" is based on home-made baskets (see photo gallery) used as the waters recede from the forest during the dry season to capture small and juvenile fishes, crabs and freshwater prawns. The "*epoko*" is a small, nearly watertight basket that is used to bail water out of depressions in the swamp forest or (usually) from small dams constructed on low-order streams. Typically, 6-10 women, lead by an older and more experienced matron, will work together to share the work and help reduce risk of physical injury, however groups of young teenage girls also practice *écoupage* on their own. In some cases, the catch is divided equally while in other instances each woman keeps only the fish she herself captures.

In a variation on *écoupage*, known as "*bésolo*", a swampy area of brush and reeds may be chopped and burned (to prevent scratching by the plants), after which a barricade interspersed with traps is constructed around the area. Then the fish are captured through the women's use of their *epoko*, or by being captured in the traps as they try to escape the commotion. Conducted once a year, this activity apparently has the effect of improving refuge habitat for fish resulting in catch increases over time.

The most widely used "modern" gear in the commercial (all male) fishery is the "Lubumbashi" style gill net, named after the defunct fishing net factory that produced netting up until 1983. This braided nylon netting is now imported from China. These are generally placed in parallel with the river current across entry/exit points where fish move between the main river and the flooded forest (see photo gallery).

Hooks are comparatively rare among the typical fisher, but professional fishers (see below) report using baited hook-lines in sizes 3, 2 and 1 for the preferred *obscura* ("*mungusu*"), an ambush predator difficult to catch with set gillnets. The best quality hooks are manufactured by Mustad from Norway (approx FC 3000 per box of 100 for sizes 10-16 in Basankusu), approximately a third more expensive than the increasingly common Chinese imitation (approx FC 2000 per box of 100 in Basankusu). Also available are locally manufactured hooks (made from marine cable stolen from the various log transport and commercial boats plying the river and traded by crews to local fishers). These hooks are readily available in each of the main villages within the zone at a price of FC 5-10 per hook for the most common sizes (10-16).

Fishing gears are about one third cheaper in Mbandaka than in Basankusu (Table 1), but transport to and from this more distant market is expensive and infrequent.

Small hooks (Nos. 16-12)	FC 400/pack (100 hooks)
No. 4 hooks	FC 4700/pack
No. 2 hooks	FC 8000/pack
Braided line (No. 3)	FC 1100/spool of 400g
Nylon monofilament	FC 250-470 per 100 m (depending upon test)
Braided nylon netting, 2-3" mesh	FC 620/50 m of 80 cm wide

Table 1. Prices for imported Chinese fishing equipment at New Sara, Mbandaka (1 USD ≈ FC 500).

The fishery depends upon the use of the common 4-5 m dug-out pirogues for both capture and transport of fish. Transport to market at Basankusu usually occurs once a year, and takes roughly two weeks round-trip from the Lomako River. Additionally some individuals in a number of camps have more recently been able to make use of the Trans M-Congo Futur (logging company) boat that travels rarely between Baulu and Basankusu.

Primary fishery stakeholder livelihoods and roles in the fishery

While the focus of the trip was to gain an understanding of the fishing livelihoods in those areas that were closest to the Lomako-Yokokala Forest Reserve and the CBNRM zone across the Lomako River (see Itinerary in Appendix B), in order to gain an impression of the number and distribution of fishing camps, the team mapped rough GPS locations for all camps that were visible or known to exist by the boat operators along the route traveled (see Appendix D). Most, if not all residents of fishing camps are at least partially engaged in fishing and fish processing, however they are not a homogeneous group in terms of their fishing methods, skills, or residence patterns and some of these differences warrant further investigation.

A) Permanent Fishing Camp Residents

A total number of 25 fishing camps were visited along the Lomako and Maringa Rivers, and in 22 of these camps the team was able to gather basic demographic data (See Appendix E). As is to be expected given the timing of the visit (outside the peak fishing season), the majority (18 out of 22) of fishers encountered in the fishing camps spend most of the year living in the fishing camps. Although there were a number of individual migrant fishers and traders in most camps, only four camps were predominantly settled by migrants, and of these three were temporary camps while one had become a permanent camp. Housing in camps varied, however while a few camps' residents live in brick houses, the majority of camp homes were made of reeds, grasses and bamboo, and a number of residents inhabited camps that were largely flooded.

The camp adult populations ranged from a camp settled by a single family (2 adults) to a sprawling camp that had been subdivided into three parts with an overall total adult population of 210. On average, there were slightly more men (median=11, mean=15)

than women (median=8, mean=13) per camp. Additionally, for the camps where figures were available, there were means of 11 (median=13) children resident in each camp, and 2 (median=0) children who board with relatives while away at school. Anecdotal information and team observations indicated that a significant number of school age children do not attend school, and that a larger proportion of boys seem to be sent to school than girls.

Although many men (and children) participate in some form of fishing activity throughout much of the year (primarily for subsistence or local trading purposes), the most intensive fishing periods are the dry seasons. In most cases, permanent fishing camp residents are accompanied by wives, and they are primarily responsible for the cleaning, gutting, and smoking of the fish. January-March is also an important fishing season for women, using *écoupage* and *bésolo* fishing methods (see above). While these camps technically fall under the territorial jurisdiction of village-based chiefs, in the majority of fishing camps, men indicated that the fishery was an open-access fishery in which anyone could participate regardless of origin and without requiring any form of royalty or payment. Indications were however, that *écoupage* fishing areas were more closely guarded by the women from each village, meaning that some migrant women had limited access to this livelihood activity.

In addition to fishing, depending largely on the terrain and hydrology surrounding their camps, many of these camp residents also maintain small plots of farm land, and even plant fruit trees to meet subsistence needs. A few camp residents traveled to distant villages for short periods to farm their land and a few reported fishing along the parts of the Maringa River that came under the same jurisdiction as their present camps on the Lomako. In the more established camps, some chickens, ducks, and/or goats were also present, providing (according to the villagers) an alternative source of protein to fish and bushmeat, and some income at local markets and Basankusu.

Fishing camp residents along the Lomako typically transport all fish for sale to Basankusu once a year or sell their fish to traders destined for this market. In contrast with the Lomako River camps, many camp residents along the Maringa also sell smaller but more regular quantities of fish at several larger village markets (Iseka Lokoto, Baulu, Baringa, Bolafa) located along the Maringa. A common complaint heard from fishers regards "*tracasserie*" (literally, "harassment") by officials stationed in a number of larger villages along the Maringa River, and at the port of Basankusu (see Table 2). The most usual form that this takes is the levying of informal "taxes". The scale of such "taxation" varies and is not necessarily predictable. It seems that some traders are more successful than others in reducing these payments but, one way or another, the system certainly adds considerably to the transaction costs associated with marketing.

River	Location	Tax	Per unit	Responsible Authority
<u>Maringa</u>	Iseke Lokoto	FC 1000	Per pirogue	Port fee - Private ownership
	Baulu	FC 1000	Per pirogue	Port fee - DGM/naval service
	Baringa	?		Port fee – DGM
	Ekafela	?		Port fee
	Waka	?		
	Bolafa	FC 1000	Per pirogue	Port fee - Naval service
		FC 500	Per valise	
	Basankusu	FC 2500	Per pirogue annually	Annual Registration - District Authority
		FC 1000	Per valise	Collective levy by several agencies.
		FC 1000	Per person, per day of fish sales	
<u>Lulonga</u>	Lolanga	?		
	Boyeka	?		
	Wenga	FC 3000	Per pirogue	Port fee
		FC 1000	Per person	
		FC 1000	Per large basket of fish	
	Mbandaka	?		

Table 2. Informal/Formal taxation reported/observed along the Maringa/Lulonga

For this reason, a number of fishers on the Maringa River, who have access to the local fish markets at Baringa, Baulu, Boende, or Iseka Lokoto report that they choose to sell their fish at local markets and make a little profit rather than transporting their fish to Basankusu where there is the possibility that they may be forced to sell their fish at a net loss. This “tax” burden continues along the Lulonga River, and was the reason given for the lack of travel to Mbandaka to sell fish. When asked whether they try to avoid the “taxes”, fishers claim that it is difficult and seeking to do so incurs a risk of even higher penalties. As far as the team could ascertain, only two of these taxes are officially sanctioned ones for which receipts are provided. According to fisherfolk the rest are unofficial payments.

B) Local Village Residents-Part time fisherfolk

While some of the fisherfolk interviewed in fishing camps actually reside in their home villages, due to the timing of this visit, most of the seasonal fisherfolk had returned to their villages following the end of the peak fishing season. The team visited those villages nearest to the Yokokala-Lomako Forest Reserve (Bokoli, Boonia, Djoleke, Lifengo I and II, Bolima, Bocau). It was not possible to estimate populations in the villages due to time constraints, and not all community members are actively involved in the fishery. Each village is composed of several hundred households, and all villages are within close range of three secondary schools, recently built by the Trans M-Congo Futur logging company.

In the course of PRA activities conducted in several villages (see Appendix F), men in three out of four villages identified fishing as their primary source of income (accounting for an average of 53% of income generated). Women identified fishing as the second-most important source of income after farming in both villages sampled (accounting for

29% and 39%). It must be noted, however, that a number of informants privately claimed that hunting remains more central to livelihoods than the men were willing to admit (11% of income generated), and that, at least for some, hunting is more important than fishing.

The PRA results also indicate that gender does not seemingly affect the prioritization of household expenditures, with all groups in all villages identifying health/medical and education costs as the two categories for which they budget the largest amount of disposable income (averaging 25% and 26% respectively for women, and 18% and 18% percent respectively for men). Following these categories, women claim to spend an average of 19% and 14% on clothing and food respectively, while men claim to spend an average of 17% and 16% on work materials and food respectively.

The primary fishing seasons for men and women living in villages are similar to those of permanent fishing camp residents. Among men, most fishing occurs during the dry seasons (January – April and July – August) when the water is relatively low, the swamp forest is relatively dry, and fish are concentrated in the rivers. As a result of these villages' locations, residents are able to fish along the shores of both the Lomako and Maringa Rivers. There is a stated tendency, however, for many women and men to spend more of the dry season fishing from camps on the Lomako, and if they fish during the rest of the year, they do so in the camps along the Maringa, which are closer to their home villages. The Lomako is preferred during the dry season as it is a narrower river, and fish are more easily harvested when the river narrows yet further during the dry season.

Among women, most *écoupage* activities are described as being concentrated during January-March (the long dry season). During this period, these women live in camps separated from those used by other men and women. However, while no adult women were observed fishing during this trip, during the few days that the team spent traveling in the area the team encountered four separate groups of teenage girls doing *écoupage* in streams near the intersection with the path/road that connects the villages. Many of these girls claim to come from poor families, and their primary stated objective in fishing was to pay for school fees, a response that is borne out in the PRA results from a group of girls in Bokoli village, who allocated more of their budgeted income to education (29%) than any other PRA group.

The majority of residents spend the rainy season farming, for which any income raised from fishing is essential for paying for farming inputs (i.e. labor, tools). The ability to pay and feed laborers for the clearing of forest is described as the most important limiting factor in farming as the fertility of the soil diminishes rapidly following the clearing of forest and forces farmers to clear new forest plots every 2 years. The primary reason for peoples' persistent poverty, as described by villagers, is lack of infrastructure for transporting farm produce to markets in Basankusu, Mbandaka, and beyond. For this reason, they see little value in increasing the scale of agricultural production, and are forced to maintain a subsistence-level existence. Additionally, they identify the *tracasserie* by officials along the Maringa River as a serious disincentive for transporting their produce downstream by canoe.

C) “Professional” fisher/traders

The majority of the male fishers described in the two sections above operate an average of about 13 nets (@ 50 m length) and a few dozen hooks, and manage to capture 20-30 valises per year (see below). However, there is a small minority of fishers who stand out from the rest. Many, though not all, come from either Kisangani or Basankusu, and operate as many as 100 nets (@ 50 m) plus 1000-1500 hooks and catch 60 – 100 valises per year. After selling their fish they bring consumer goods (e.g., clothing, sandals, mosquito nets, torches, batteries, fishing gear) which they then barter for fish (e.g. one pair of trousers “sells” for two valises of fish) as well as doing their own fishing. These fishers typically continue fishing until they have enough fish to fill their pirogue and descend to Basankusu, Mbandaka, Kinshasa, Kikwit or Tshikapa to sell their catch, then replenish their supply of consumer goods and return. According to fisherfolk reports, there is at least one of these “professionals” in most permanent camps, and several in larger villages. From their own reports, many of these trader-fishers are highly mobile and they compete with each other for a presence in the best fishing camps.

D) Fisher camp residents by necessity rather than choice

There are two other sub-groups within the fishing camp resident populations that are unified by a lack of long-term interest in fishing. A significant number of (primarily) men from nearby villages indicate that they are only fishers because they lack the startup capital needed for farming (labor, tools). By remaining in the fishing camps, these men are able to avoid spending money (which would be difficult to do in their villages), and their intent is to remain in the fishing camp only as long as it takes to save up enough money to build a house and to clear a plot of land to farm.

In addition to the fishers, there are a number of camps that have been established by people who claim to have settled along the rivers seeking space to establish small farms and to fish. Most of these people indicated that they were poor city dwellers from Basankusu, a few claiming to have been civil servants, who left work after not being paid for long periods of time, and were forced to seek alternative livelihood strategies. Despite their poverty, these “foreigners” (as they were referred to by locals) were better educated and dressed than most of the local fisher population, and had well-constructed houses that were raised on stilts to protect them from flooding. When asked whether they also relocated in order to be able to hunt bushmeat commercially, most denied this as being a significant reason for their relocation, although in most camps people admit to occasional hunting. In a few camps (particularly along the Lomako River), there were clear indications of hunting activities, evidenced by the visible presence of large numbers of hunting dogs and hunting implements. Several of these “fishers” made specific reference to “the white man’s park” (referring to the Yokokala-Lomako Forest Reserve), and were suspicious of the team’s motivations in talking with them.

E) Basankusu, Mbandaka and Kinshasa market fish traders (mostly women)

While the populations of Basankusu and Kinshasa are radically different in terms of size and spending power, the fish traders who were encountered by the team in both markets share many characteristics. Most fish traders and vendors are women who usually purchase fish from fishers and traders at the local ports, and attempt to sell most of the

fish that same day. In Kinshasa, there are a number of large fish markets, while at Basankusu there are four. Only during times of scarcity (the rainy season) do these women go upstream to secure fish for sale. In Basankusu, these periods of scarcity occur annually toward the end of the rainy season, and at these times some fish traders travel to fishing camps upstream on the Maringa and Lopori Rivers or downstream as far as Bokata (45km from Basankusu) on the Lulonga River. Sometimes the need to seek fish directly from the fishers is attributed to the costly informal taxes levied by officials at a number of villages along the river. During periods of fish scarcity fish traders in Kinshasa travel upstream on the Congo River to intercept fish arriving at Moluko Port (80km from Kinshasa), and some may even travel as far as the fish markets in Equateur Province.

In Basankusu, fish vendors complain that their incomes are limited by the low purchasing power of Basankusu residents and do not raise their prices above a 10% profit margin for fear of being unable to sell their fish at all. Similarly, while the price charged for fish in Kinshasa is certainly higher than in Basankusu, it seems that fish vendors generally only make an operating profit of 10%.

Fish traders in both Basankusu and Kinshasa are organized in associations that serve as financial support networks, however each vendor conducts her own trading activities independently from others. These groups were very interested in capacity-building activities, and at least the ones in Basankusu have received some NGO training in the past. In Basankusu, two associations were established with the support of two NGOs, who were AWF partners during CARPE Phase 1. Both associations are rather weak. One continues to operate a revolving credit scheme but seems somewhat disappointed with the arrangements, claiming that they were promised other support on which there was no follow-through, whilst the other has a more positive view of its “mother” NGO but does not seem to have a vision or long-term plan for improving members’ living standards.

One team member visited Mbandaka fish market in order to determine the extent to which fish from the MLW landscape is sold there. Of the dozens of fish traders interviewed, most of the fish sold originated upstream on the Congo River. Traders claim that any fish that is transported from Basankusu typically is not sold at Mbandaka, rather is sent directly to destinations like Kinshasa or elsewhere.

The Fish Marketing Chain

Although the fishers themselves keep about 1 kg per family (average ~6 persons) per day for household consumption, the vast majority of fish is destined for market. These are usually smoked in a single layer over an open hot fire using dry wood for a period of about 6 days. This results in a product that is charred on the outside but poorly preserved on the inside. The typical practice is to hold these fish throughout the dry (fishing) season until prices rise in the following rainy season, meaning that most fish are held for at least 2-3 months, and sometimes up to 6 months prior to marketing. Smoking is often repeated monthly during storage to combat insect infestation and mold. The process leads to dry matter losses estimated by the fishers at between 30 and 50%.

Salting and sun drying produces a higher quality product, but relies on expensive salt that has to be brought in from either Kisangani or Basankusu. The high cost of salt,

approximately FC 10,000 per 20 kg, encourages fishers to brine their fish in lower-than-optimal concentrations, reducing quality. In fact, very little of the fish observed during the study were salted, and the only fisher who primarily used salt/drying was one of the “professional” fisher/traders based in Boonia, who sells his fish in Kinshasa, Kikwit and Tshikapa.

The catch from the women’s *écoupage* fishing is primarily marketed locally, although those closer to Basankusu do sell their fish there. Women are, however, heavily involved in the smoking of the men’s commercial catch, cleaning the fish, gathering firewood and tending the fires. Most notably, in one of the “professional fisher/trader” camps, all processing and trading is done exclusively by the women, leaving the men to spend more time fishing.

Fish are marketed in a variety of baskets and basins (see photo gallery). The smallest unit is the “*valise*” which holds about 30 smoked fish (estimated 5 kg dry weight, 10-20 kg wet weight). A “*basket*” contains 5-6 *valises* while a “*suzuki*” in turn holds some 3-4 baskets. None of the above units are standardized, so one often hears of a “small *valise*” or a “large *suzuki*”. Salted fish are transported on open “panniers” that hold roughly 10 fish. *Écoupage* catches are transported either in the small *epoko* used in the *écoupage*, but more frequently in large baskets called “*corbeilles*” that equal roughly four *epoko* in volume. In camps near Basankusu, some fish are kept alive for several days in 15L plastic basins for sale as fresh fish, and contain between 120-140 fish.

Price is a function of the size of the unit, species and condition of the fish. A valise of the most valuable species, *obscura* (“*mungusu*”) in good condition sells in Basankusu for about FC 3000. At the other extreme, the least preferred *Malapterurus sp* (“*neena*”) in bad condition sells for about FC 1000 per valise. Overall, prices vary by 30-50% according to the state of the fish and supply in the market.

Most fishers prefer to take their own fish to market, not generally trusting intermediaries, even family members. As markets are distant and expensive to reach, marketing tends to be opportunistic. Many fishers sit in their pirogues along the main channel waiting to sell small quantities of fresh fish, or occasionally valises of smoked fish to passing boats (Table 3). A minority of fish is sold this way, most likely to the “professional fisher/traders”.

Species	Appx. TL	Preservation	Negotiated Price
<i>Bagrus s</i>	45 cm	Fresh	FC 1500
<i>Clarias s</i>	30 cm	Fresh	FC 1000
<i>Parachanna s</i>	45 cm	Smoked	FC 4000 per valise
Mormyridae	30 cm	Salted/Dried	FC 1200 for three
Bichir	40 cm	Fresh	FC 400 for two
<i>Mormyrops anguilloides</i>	90 cm	Fresh	FC 500
Mormyrus	40 cm	Fresh	FC 300
Distichodus	40 cm	Fresh	FC 300

Table 3. Fish purchased from fishers in pirogues along the river (1 USD ≈ FC 500).

A minority of fishers give a few valises to a trusted fellow fisher who is going to market. Instead, most fishers choose to go to market when they need money or when the fishing is poor, rather than wait until there are enough fish to make a full load. This means that most of the fishers travel to Basankusu around the same time – after the end of the dry season (in May), when the fishing starts to get worse, and when people need money to invest in clearing land for farming.

Overall, the fishing business is not easy for the typical fishing family. Life in the camps is difficult, with no health care or educational opportunities and little access to basic necessities. Villagers report that they feel left behind by the outside world and that their lives seem to become harder every year. Artisanal fishers appear to be highly vulnerable to market variables outside their control as well as the unpredictability of the amount of taxes that they will have to pay en route to Basankusu (Table 4). Most fishers are able to survive by not replacing their nets annually, making more fishing traps themselves, and trying to negotiate lower “taxation”.

	Quantity	Units	Low Market		High Market	
			Unit Price	Total	Unit Price	Total
Nets	13	50m	-3000	-39,000	-3000	-39,000
Transport	2	2 oarsmen	-7,000	-14,000	-7000	-14,000
Food & Accom	14	days	-500	-4,200	-500	-4,200
“Taxes”	25	valises x 2 ports	-2000	-50,000	-2000	-50,000
			Total Cost	-107,200		-107,200
Fish Sales	25	valises	2500	62,500	5000	125,000
			Profit	-44,700		17,800

Table 4. Indicative enterprise budget for a fishing family working the two main fishing seasons on the Lomako River, based on average values reported by fishers according to high and low fish prices at market, and an estimated “tax” burden.

Although initial complaints are always about a shortage of fishing gears, when queried as to their inability to improve their standards of living from their fishing activities, many fisherfolk blame the absence of affordable land or river-based transportation and the burden of informally levied “taxes” along the rivers. These frustrations were also

mirrored in discussions in villages as people spoke about the limitations of their farming practices. Based on preliminary market data collected from fishers and fish traders, the price of one of the most commonly captured and sold smoked fish, the “*mungusu*” (*obscura*), can be seen to increase dramatically as one progresses from fishing camps to local, regional, and national markets (See Figure 1).

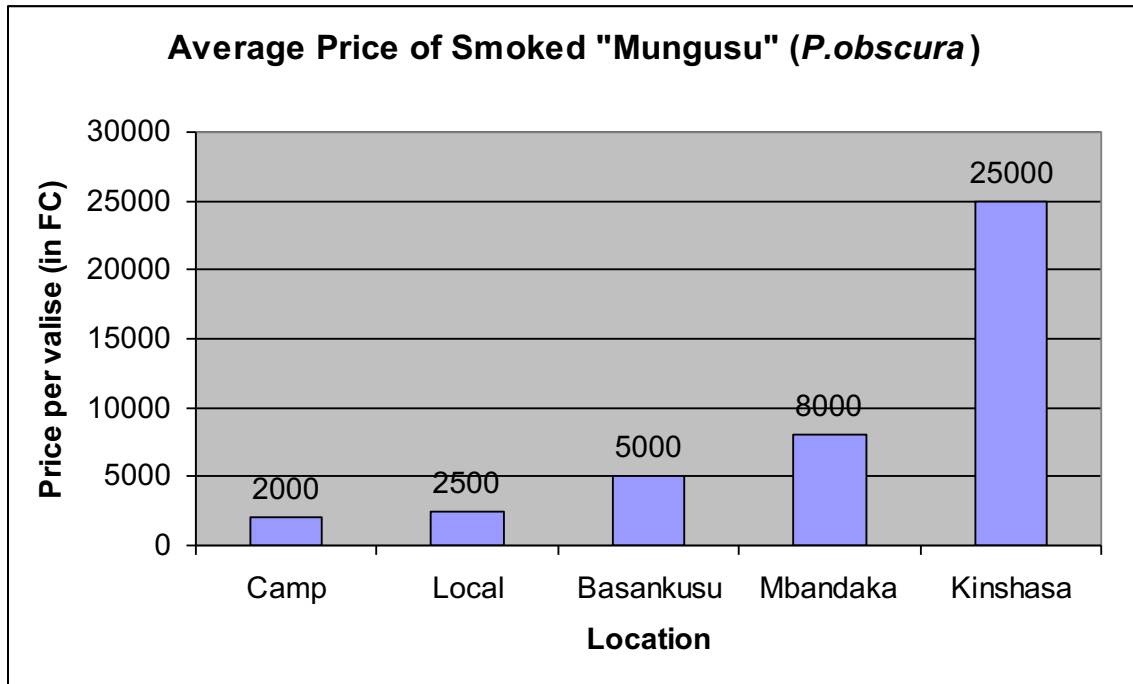


Figure 1. Average price of smoked “mungusu” (*obscura*) in different locations.

Although the data collected for salted and fresh fish are much less complete due to their scarcity locally and nationally, respectively, it appears that the relative return on salted fish has the potential to be double that of smoked fish, and may possibly surpass that of fresh fish due to its shelf life (see Table 5). In connection with the high value of salted fish, two “professional fisher/traders” regularly travel to sell their fish in Kikwit and Tshikapa, where the demand for high quality fish coupled with purchasing power in this mining area allows traders to reportedly charge FC70,000 per *pannier* for *mboto* (*Distichodus*), as compared with a price of FC50,000 in Kinshasa.

Name	Species	Smoked	FC/Kg	Fresh	FC/Kg	Salted	FC/Kg	FC/Kg Wet
Mboto	<i>Distichodus</i> (rosy)	30,000	6000			50,000	10000	1,500 2,500
Mungusu	<i>obscura</i>	25,000	5000					1,250
N'golo	<i>Clarias s</i> <i>Gnathonemus</i>			35,000	583			583
Mbesi	<i>s</i>	15,000	3000					750

Conversion factors between forms of preservation:
Smoked fish: is measured in valises of 20-25 medium sized fish, est. 5kg dry weight; estimated conversion factor dry:wet weight, 1:4; overall conversion (/20)
Fresh fish: is measured in terms of 15L basins= estimated at 4 valises, therefore 1 basin=60kg
Salted fish: measured in panniers of 10 medium-large sized fish; estimate 1pannierkg=1valisekg, therefore same conversion factor as smoked fish (/20)

Table 5. Estimated relative values of the most common smoked, salted and fresh fish in relation to wet weight as sold in Kinshasa.

Impacts of the AWF-ICCN interventions on fishing stakeholders

AWF has staff working in the area, primarily in monitoring biological diversity of the forest and engaging and sensitizing the local population regarding the laws regulating hunting. The creation of the Yokokala-Lomako Forest Reserve has presented a physical problem for those camps and villages that now find themselves within its boundaries. Most indicate that they are willing to move, but cite three principal reasons for staying for the time being: 1) lack of alternative dry land sites on the other bank, 2) lack of capital to rebuild and, 3) reluctance to abandon existing agricultural plots within the reserve. Additionally, in the larger villages, the team encountered a significant amount of ignorance regarding the extent to which the establishment of the Forest Reserve will impact their access and use of areas both in- and outside the Forest Reserve. This uncertainty translated into some open suspicion of the research team's intentions for collecting data, and several informants indicated that people were strategically underemphasizing the continued importance of hunting in their livelihoods as a consequence.

The "Institut Congolais pour la Conservation de la Nature" (ICCN), the Government's resource conservation department, is mandated with the management of the Yokokala-Lomako Forest Reserve, and has recently established a management headquarters at Lingunda. Lingunda is located on the opposite (South) shore of the Lomako River, just upstream from the Southern extreme of the Forest Reserve. It is apparent from discussions with the ICCN Conservateur (Forest Reserve Director) and observations of the camp, that this organization has the potential to bring about significant economic changes to the area's population. In what was once a simple fishing camp, the Conservateur has constructed a number of new buildings to house the ICCN staff, has installed a generator providing a very rare source of electricity in the area, embarked on a plan to construct guest lodging for future visiting tourists and researchers, and has a motorized pirogue that regularly travels to Basankusu facilitating a flow of people, communication, and goods to this remote area.

As discussed above, during CARPE Phase 1, two AWF partner NGOs established two Fish Vendor Associations, and though one continues to operate a revolving credit scheme, both organizations seem rather weak, and lack a long-term planning perspective. One of these NGOs remains active in the area. It is establishing Fishers' Associations in five camps along the Maringa River. The team visited one camp (the "Bolafa Fishers' Association") where the NGO is working an association comprising people recently moved to this camp who lack experience as fishers. Clearly, this will be challenging, since knowledge of the fishery seems to be poor (e.g., the membership claimed that they intended to focus their fishing activities on the rainy season (i.e. the poor fishing season). Also, somewhat disconcertingly, the members had received advance warning of the WorldFish team visit and were expecting to receive free fishing gear. This underlines the challenges that the consortium will face in promoting collective action (see recommendations below) – given the history of "hand-outs" and little experience of more planned and sustainable self-help initiatives.

Observed Impacts of other governmental on the fishing communities

Overall, the government provision of extension, capacity building, and provision of basic services is very weak in this area. Where there were once roads, river barge traffic, electricity, running water, communication infrastructures and a rural aquaculture extension program, decades of neglect and civil unrest mean that none of these continue to function, and the people feel completely cut off from the world. The only positive comments were peoples' relief regarding the departure of the demobilized rebel army troops who had been camped throughout the area for several years. Since then people claim to feel safer from theft and they comment on the resurgence of wildlife populations now that the poaching pressure has decreased.

With the notable exception of the ICCN presence in Linguanda, most other interaction between fisherfolk and the government at present seems to be negative, when officials based in larger villages and towns levy informal "taxes". The impacts of *tracasserie* and the negative view of government are illustrated in the following quote:

"Are we still in the DRC or is this another country? We have never had anyone come and talk to us about fishing until you arrived. We are very happy with your visit. Since the wars we haven't had anyone visit us and we have great difficulties in getting fishing materials. We are tired of all the 'tracasserie' and some [fishers] are even scared to go to town [Basankusu] to sell fish." (Quote by a fisher at Iseka Lokoto, May 14, 2007)

Activities of other NGOs on fishing stakeholders

Jesuit Refugee Services (JRS) worked in this area for several years after the war, and it established a number of co-operatives in the area (some of which included a fisheries component), including three that the team visited (Boofé, Iyambo, Bocau). Motivated primarily as a humanitarian relief effort, according to JRS field staff, this agency provided partially randomly selected, and partially politically appointed group of

community members with clothing, fishing materials, starter seeds, and a variety of tools and household implements at no charge. Subsequently JRS tried to organize these communities into co-operatives that spanned a wide range of livelihood activities: fishing, farming and livestock rearing. Although there were reports of one fisheries-related co-op at Ekukola (further upstream on the Maringa River), that continues to function, none of the three co-ops visited by the team were functioning to any great extent at the time of the visit. Community members and field staff all blame a lack of structure, haphazard or biased membership selection procedures, and opportunistic behavior by community-members for their uniformly poor performance. JRS discontinued its work in the area after 2 years. A brief description of the Boofé cooperative is provided below.

The Boofé Fishers Cooperative

At least one NGO mediated project, at Boofé on the Lomako above Lingunda (see photo gallery) attempted to directly address the fishing gear constraints cited by fishers by distributing basic equipment to each fisher (15 nets @ 50 m, 20 hooks, fishing line, a machete + file, salt, sugar, mosquito nets and “medicine”) free of charge. Only following this initial provision of free materials did JRS start any capacity-building or long-term planning with the communities.

Membership in the cooperative spanned three communities (Boofé, Lingunda and Pwassa) and participants were partly selected based on need while others were selected due to their high social status. The organization of the group was quite rigid and each person was assigned to specific tasks: 20-male fishers, 11 cleaners/smokers (2 women, 9 men), 2 counters (1 woman, 1 man), 4 packagers (all men) and 2 male sellers.

All fish captured were managed by a group which then managed sales and shared out the profits on an “as needed” basis, the idea being that a certain share of the profits would go towards replacing/upgrading fishing gear while the rest would be used for community services.

Over the 3-month season in which it functioned, the group captured an average of about 50 fish (avg wt ~500 g) per fisher per month or about 75 kg/fisher. In total, 3000 fish in 100 valises were smoked and sold by the group for a gross profit of about FC 300,000 (\$1 USD ≈ FC 500).

Over the course of this period, inter-community rivalries between the newly settled villagers of Boofé and the original residents at Lingunda resulted in divisions, and a significant proportion of the money had been spent to pay for a few members’ health emergencies (which required evacuation to Baringa on the Maringa River where there is a doctor and clinic). At the time of the interview, there was no money in the coffers, but the Boofé residents insist that they intend to continue working collectively, although the status of their relationships with the other two communities is unclear at the moment. The balance of funds received had been spent on a number of goats being raised for sale, and the intent is to purchase more fishing gear in preparation for the upcoming dry season. Goats were being sold locally for FC 5000 each.

Figure 2. Vignette of Boofé Co-operative

It has been the recently arrived logging company Congo-Futur that has visibly invested in local education, health and transportation infrastructure. In two years it has built 3 secondary schools and a clinic, and it is repairing the roads and bridges connecting the villages. Its arrival has also given rise to the establishment of a new fish market at Baulu, and some fishers have been able to use the Congo-Futur boats to transport their fish to Basankusu.

CARITAS (Catholic Agency for International Aid and Development)-Belgium maintains an office in Basankusu and is running a three-year (2006-2008) capacity-building program targeted at developing fisheries within a 100km radius of Basankusu. The primary constraint that CARITAS hopes to address is the seasonal scarcity of fish in Basankusu that is insufficient to fulfill local nutritional needs, and it sees poor fish preservation and low availability of fishing materials as the primary reasons for this. Over the course of the three year intervention, this NGO aims to organize 11 Fishers' Associations to educate fishers on better fishing methods, preservation techniques, and is already encouraged by the improvement in fishers' bargaining power through their collective sales. These members also received free fishing gears from CARITAS. In order to address the lack of available fishing gear over the long term, however, CARITAS is in the process of establishing three Fisher Association-operated points of sale for fishing materials, one each on the Maringa, Lopori, and Lulonga Rivers. CARITAS has been organizing the transport of materials to Basankusu by boat, and will pay for the inventory for the store for the first year. However, after this investment these enterprises are expected to become self-supporting and will be free to purchase materials either through CARITAS or independently. In order to help all of these Associations become responsible and self-sustaining, CARITAS is also training them in accountancy and management skills.

Discussion of Key Issues

The Government of DR Congo, in its "1987 Plan Directeur", identified under-fishing due to a lack of fishing gears as the major constraint to increased fishery productivity in most areas, including the Maringa-Lopori. This conclusion is similar to the perspective of the majority of fishers polled in the present study who insist that their primary constraint is a lack of fishing materials. Additionally, fishers reported that the major source of variation in fish stocks was seasonal, with annual catches varying from year to year but exhibiting no obvious long-term declines.

While such reports may suggest that no serious depletion of the fish stock is taking place, and the WorldFish team say no indication of fishing at the present time, there are no reliable fisheries data to indicate the status of the fishery. Any intervention to raise fishing pressure should only be taken once some fish stock assessments have been conducted. Such increases could be particularly harmful as it appears that a majority of fishers are quite unskilled at their livelihood, as evidenced by their targeting such fish as *P.obscura* and *Clarias sp.* with set gillnets that are less well-adapted for capturing these ambush predators than are baited hooks. Instead of catching larger fish, therefore, much fishing effort targets juvenile and/or reproducing adults on the flooded forest margins. Therefore, given current fishing practices and an absence of reliable fish stock data, it is unclear whether simply increasing the amount of fishing gears without significant changes in fishing techniques could be sustainable.

Neither is it apparent that having more fishing gears would significantly translate into greater prosperity while, fishers continue to lose as much of 50% of their fish due to poor preservation techniques and long storage times, while *tracasserie* claims as much as half of the earnings, and while the fishery is focused on the Basankusu market as its final point of sale. It would seem that the easiest and most immediate improvement in fisherfolk livelihoods could come from improving fish preservation methods and

decreasing the length of time that fish is stored. However, in order to achieve long-term growth, it would also make sense to take a broader look at marketing opportunities, including destinations beyond Basankusu. This might include down river destinations such as Mbandaka and Kinshasa, but note too that some traders argue that the mining regions around Kisangani, Kikwit and Tshikapa offer strong markets for salted fish.

A number of efforts have been made to organize the fishing camps, villages, and vendors, for a number of purposes however most of these seem to have resulted in little lasting impact. The primary problem seems to be that most of these initiatives have been formed by NGOs with little understanding of how the fishing economy functions or exactly how a fishing community might generate savings through collective action. With little leadership or organizational training, and no long-term planning, most of these groups have rapidly lost interest, or worse, have become victims to individual members' appropriation of the groups' resources. Nevertheless, if the local capacity for collective action was carefully nurtured and developed, an organized group of fisherfolk could possibly achieve better returns through coordination and collaboration in processing, transport, marketing and resisting excessive "taxes".

At present a lack of evidence of over-fishing or conflicts between fisherfolk suggest there is no need to introduce any active fisheries management. However, if fisherfolk were organized into associations based around the promotion of better fishing techniques, processing methods, etc., the established trust in, and collaboration for collective action could form a useful basis for the introduction of any community-based fisheries management program should it be deemed necessary in the future.

The points raised above underscore the importance of recognizing the heterogeneity among a category frequently simply thought of as "fisherfolk". While some are year-round fishers by choice, many are fishing as a last resort, and from the limited data collected, many fishers do not seem able to make any significant improvements in living standards due to the limited return to be made from sale of products. This latter group appears less prosperous than most village-residents who fish solely during the dry season, but whose farming activities are similarly limited by their inability to market agricultural produce beyond Basankusu. It is apparent that fishing will remain an important seasonal activity for most local village residents (female and male) in the dry season. While overall prosperity for many typically will come from increased agricultural production, for some occasional fishing (and hunting) activities will likely remain important sources of revenue necessary for paying costs such as school fees, medical treatments, funerals, etc., in particular among poorer families. There is a great deal more that can be learned from the "professional fisher/trader" sub-group, in particular in terms of learning how from their successes at overcoming transportation and *tracasserie* barriers.

Women and girls must be recognized as an important stakeholder group both in terms of their *écoupage* and *bésolo* fishing activities, and the key roles that they play in fish processing, transportation, and marketing, and any interventions in the fishery should be aware of specific benefits for and impacts on their welfare. Though only briefly touched upon, this study suggests that there may be a bias against sending girls to school, and that fishing may be particularly important for teenage girls seeking to continue their education. As opposed to men's independent fishing activities, women are organized in fishing groups, and might therefore have a more established basis of trust needed for

success in collaborative processing, trading, and marketing activities. Similarly, women fish vendors tend to operate on a small margin of profit, but seem able to maintain self-sustaining vendor associations with revolving credit schemes. Regardless of the type of intervention, therefore, the potential for women to benefit or suffer losses must be looked at carefully.

It would appear that improvements in terms of transportation and *tracasserie* would benefit fisherfolk and farmers alike, and might even divert some effort that is presently invested in fishing toward farming. Additionally, easier access to outside markets would increase incentives for fisherfolk to salt/dry fish, potentially greatly improving their profit margin. The team did not investigate the issue of whether those migrants who have settled in the area to hunt bushmeat would prefer to farm if returns on investment were improved by access to distant markets, or whether they would simply seek to increase the return from hunting.

While there is some reluctance among fishing camps within the boundaries of the Yokokala-Lomako Forest Reserve, most camps have been informed of the establishment of the Forest Reserve, and indicate that they are willing to move. There is need, however, for greater dialogue with these stakeholders regarding their concerns, and there seems to be substantial ignorance regarding the limits that the establishment of the Forest Reserve sets on hunting activities in the communal forests. The minority of settlers who seem to have moved into camps along the Forest Reserve margins for the purpose of hunting bush meat certainly will require further sensitization however as they seemed much less ready to leave their camps. The team did not investigate the impact of the forest concession by the timber harvesting company, Congo-Futur on the fisheries or fisherfolk, however the company enjoys widespread popular support for the employment and infrastructural development that it has brought to the area.

Conclusions and Recommendations

It is clear that although fishing is important for both income and subsistence in the areas visited, profits are nonetheless modest and somewhat unpredictable. Moreover, fisherfolk should not be considered a homogeneous group: there are different sub-groups, with different gears and skills, involving women and men in both fishing and post-harvest activities, groups who are more or less dependent on farming, and who fish, on balance, more either for cash or subsistence needs. Thus these conclusions need to be nuanced in this context of different sub-groups, generally poor returns, with the latter subject to considerable variability and uncertainty.

While this preliminary survey provided considerable information on the fishing population and their practices, it was in essence just a snapshot. More detail is needed on particular aspects (such as a more in-depth analysis of the marketing system, including post-harvest aspects, resource monitoring and case studies of particular activities / sub-groups of fisherfolk). These are discussed in more detail below.

In no particular order, but highlighting those issues which were emphasized by the communities and observed by the team, the following problems were identified:

1. As there is no evidence of over-fishing at present, there is no immediate need for fisheries management interventions. However, there are no reliable current data on the fishery and in their absence, it would be unwise to recommend actions that would lead directly to an increase in fishing effort or efficacy;
2. Post-harvest handling is clearly characterized by a number of challenges. Most fish is sold in smoked form, but the quality of smoking is poor, producing a product that is charred on the outside, but which is insufficiently dry on the inside. Subsequently, most fish is stored for long periods of time (usually 2-3 months, but up to 6 months), resulting in the need for “repeat” smoking. Despite these attempts to preserve the fish up to half of the fish dry mass is allegedly lost to mold and insect attack. There is very little use of salt for fish drying.
3. Fish is transported to market once or twice a year, but is generally not done collectively, thereby raising the transport cost per fisher. In addition, most fishers transport their fish to Basankusu at roughly the same time (at the end of the dry season). This results in low prices at market during these periods, and severe shortages of fish during the rest of the rainy season. Fish prices at Basankusu are also relatively depressed as this market town lies at the confluence of two large rivers (the Maringa and Lopori Rivers) and has a large area of wetlands that lie to the North.
4. The net returns from marketing are further reduced as a result of the frequent and onerous *tracasserie* that fishers and traders face in taking their goods to market. This burden not only reduces the net return for fisherfolk, it adds uncertainty which serves as a disincentive to transport fish to distant markets. Due to *tracasserie*, very little fish is transported beyond Basankusu, and in some cases even leads fisherfolk to limit their sales to smaller markets well upstream of Basankusu itself.

In order to address the issues discussed above, the WorldFish Center team recommends the following:

1. A creel survey is needed in order to obtain more information on the status of the fishery. Optimally, this should be coupled with in-depth case study analyses of stakeholder sub-groups’ usage of the fishery. Once fisherfolk are organized in stakeholder groups (see below), there is the potential to establish a participatory fish stock monitoring program.
2. In order to disseminate information and conduct capacity-building effectively, stakeholder groups should be formed and developed, taking care to first identify sub-groups with common interests and activities in which there are clear benefits from collective action (such as women’s vendor or *écoupage* groups). The capacity-development should aim to establish a culture of self-help (rather than

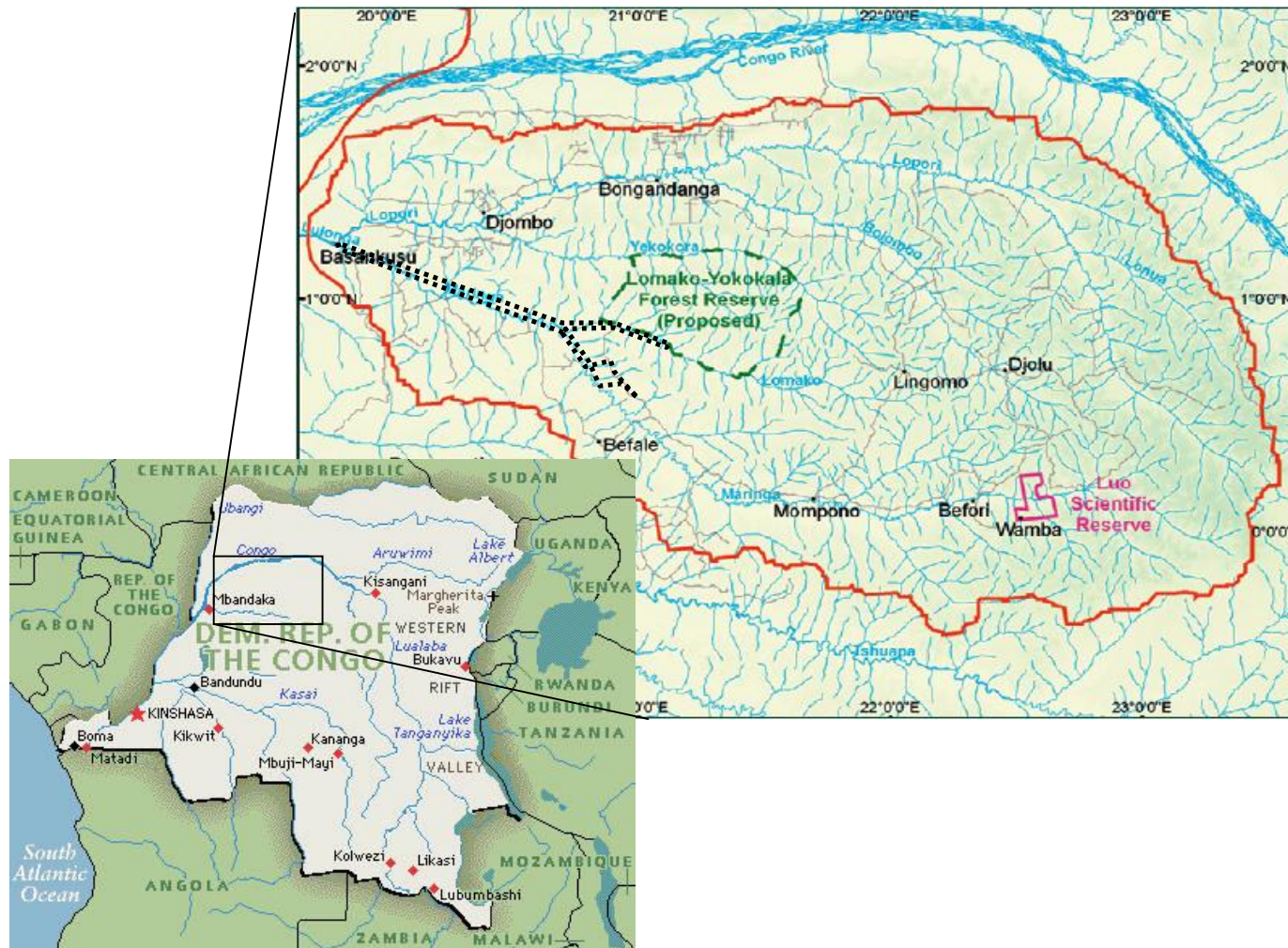
- waiting for “hand-outs), and in order to do so, groups should be developed around certain activities rather than as an end in themselves.
3. The key initial entry point should be to support improvements to post-harvest handling of fish. This would initially involve a review of smoking methods currently used and experiments with fisherfolk to determine how these can be improved. At the same time, the financial viability of using salt for preservation needs to be investigated, requiring both market research and prior estimation of costs.
 4. The timing of sales need to be explored in more detail with the fishery stakeholder sub-groups. This might be supported by collaboration with local micro-finance institutions, an option that should be investigated to determine the opportunities for a credit intervention, possibly with dried fish as collateral (so-called inventory or warehouse credit). Also group savings could be used to leverage credit in order to support members as they delay the sale of their fish until prices are higher.
 5. The consortium partners (SNV?) should explore options for addressing the problem of *tracasserie*. This will require an assessment of the evidence for whether collective action can be effective on this point, and may involve identification of local champions/organizations whom the consortium should “cultivate” to take up this “cause”.
 6. There is a need for exploration in detail of the possible synergies of coupling fish transportation with (existing or emerging) users of the river, such as the Congo-Futur boat and log-rafts or the ICCN launch. If fishers were to assemble their fish (perhaps in conjunction with farmers’ products), thereby guaranteeing a large volume, research is needed to determine whether this would sufficiently encourage other boats to come to the area.
 7. As many fishers claim that they would prefer to farm, but lack the capital needed, detailed collaborative research with consortium partners is needed to determine to what extent this is accurate, what forms of training or credit might improve fishers’ abilities to clear and farm the land, and to what extent some of the actions proposed for fisheries serve equally well to improve the attractiveness of farming (producer organization, transport, savings and credit, reducing informal taxation, timing of sales etc).

The above are essentially the micro-level practical interventions that are suggested by the preliminary study reported here. However, since so much depends on the ability to market, a more in-depth marketing systems study is proposed – to look in more detail at the marketing chain between the Forest Reserve and Basankusu and to understand better how (whether) the latter links to other markets such as Mbandaka and Kinshasa. This would consider all points in the chain and the services/ inputs provided at every stage, as well as the key people and institutions involved. Such a study would provide insights into critical constraints and opportunities that would help develop and fine-tune the activities with fisherfolk.

Appendices:

- Appendix A: Map of the Maringa-Lopori-Wamba Landscape
- Appendix B: Dominant species in the fish catches of the Lomako-Maringa fishery.
- Appendix C: WorldFish Center team research mission itinerary
- Appendix D: Camps and Villages recorded on the MLW Mission
- Appendix E: Demographic profiles of fishing camps visited
- Appendix F: Village PRA Results
- Photo Gallery

Appendix A. Map of the Maringa-Lopori-Wamba Landscape (source AWF).



Dashed line indicates route traveled.

Appendix B. Dominant species in the fish catches of the Lomako-Maringa fishery.

Species	Lingala name	Species	Lingala name
<i>Rheoglanis dendrophorus</i>	Ekodji	<i>Gnathonemus sp.</i>	M'besi
<i>Synodontis flavitaeniatus</i>	Likoku	<i>Citharinus sp.</i>	Lianganga
<i>Synodontis</i> (spotted)	"	<i>Distichodus</i> (rosy)	M'boto
<i>Clarias aff anguillaris</i>	N'golo	<i>Distichodus aff fasciolatus</i>	"
<i>Clarias</i> (mottled, neuromasts)	"	<i>Schilbe aff grenfelli</i>	Lolango
<i>Clarias</i> (white belly, large)	"	<i>Schilbe aff mulitaeniata</i>	"
<i>Clarias</i> (mottled yellow)	"	<i>Schilbeidae sp 3</i>	N'dangwé
<i>Clarias</i> (long barbells)	"	<i>Chrysichthys sp.</i>	N'kamba
<i>Parachanna obscura</i>	Mungusu	<i>Brycinus sp. (large)</i>	Mokobé
<i>Protopterus sp.</i>	N'zombo	<i>Alestes aff dentex</i>	"
<i>Hepsetus odoe</i>	M'wenge	<i>Labeo sp.</i>	Moganza
<i>Ctenopoma ocellatum</i>	Eka'a	<i>Notopteridae sp 1</i>	Mpeké
<i>Ctenopoma sp 2</i>	"	<i>Hydrocynus aff forskalii</i>	M'benga
<i>Polypterus</i> (yellow belly)	M'konga	<i>Malapterurus microstoma</i>	Ninah
<i>Tylochromis sp.</i>	Mibundu	<i>Mormyrops anguilloides</i>	N'yanda
<i>Hemichromis aff elongatus</i>	"	<i>Macrobrachium sp.</i>	Béfali
<i>Parauchenoglanis sp.</i>	Pakalaka	<i>Potamonautes sp.</i>	Likati
<i>Auchenoglanis occidentalis</i>	"		

Appendix C: WorldFish Center team AWF Mission Itinerary

Date	Activities Conducted
7-May-07	Arrive Basankusu from Kinshasa by Airserve plane.
8-May-07	9:00 - Depart from Basankusu by pirogue up the Maringa River, headed toward Ligunda.
9-May-07	Arrive Ligunda 11:00. Met with Conservator and DGM. Introductory discussions with the large group of people visiting Lingunda.
10-May-07	Ligunda group meeting attended by 44 persons from surrounding villages (Buyela, Lifengo, Boholi, Bolima, Bongila, Lisoko, Lungemba, Nakutu, N'gobe and a trader from Kishasa expressing an interest in the fishery.
11-May-07	Camp meeting Bosolomwa (00 51.4 N, 21 02.2 E).
12-May-07	Camp meeting N'delé (00 48.0 N, 21 07.4 E at "the port").
13-May-07	Camp meeting Bolafa appx 30 mins on Lomako from confluence with Maringa.
14-May-07	Camp meeting Iseka Lokoto (00 33.1 N, 20 55.4 E). 7 km walk to Bokoli. PRA discussions with male fishers and female ecoupage groups from Bokoli and Efoundi villages at Bokoli. Met with NGO leaders and village notables. Overnight at Bokoli.
15-May-07	REB return to Iseka Lokoto for transfer to Basankusu-Mbandaka. AR, BK continue overland to Boonia. PRA discussions with male fisher groups, met with JRS-Iyambo fishery cooperative leaders, NGO leaders and village notables. Overnight at Boonia.
16-May-07	Overland toward Bolima. Stop at Lufukya met with (male) group of village hunters/fishers, at Djoleke/Lifengo I&II met with NGO leaders and village notables. Overnight at Bolima.
17-May-07	PRA discussions with male fisher groups. Women's groups refused to participate. Overland to Bocau. PRA discussions with male fishers and womens' ecoupage groups, met with JRS-Bocau leaders and village notables. Overnight at Bocau.
18-May-07	Overland to Baulu (Congo-Futur) to meet pirogue that is to pick us up. Overnight at Baulu.
19-May-07	Depart from Baulu heading downstream on Maringa River. Stop at Isekombaka (00 35.9 N, 20 50.9 E), Iyoko I,II&III (00 39.1 N, 20 49.7 E), Ibutsua (00 40.5 N, 20 48.2 E). Meet with JRS extension worker at Baringa. Overnight at Baringa.
20-May-07	Depart from Baringa. Downstream from the Lomako River confluence, we stop at Yembe (00 54.1 N, 20 39.1 E) and Ilengu (00 54.4 N, 20 36.1 E). Overnight at Libuka.
21-May-07	Camp meeting at Libuka (00 58.1 N, 20 24.0 E). Depart Libuka, stop at Ipono (01 01.4 N, 20 13.4 E), Mont-Ngaliema (01 06.9 N, 20 04.1 E), "Kinshasa" (01 10.6 N, 19 59.2 E), where we met with a fisherfolk group organized by the NGO-Fildes., Libanga (01 13.2 N, 19 49.9 E). Arrived at Basankusu, and overnight at AWF offices in Basankusu.
22-May-07	Basankusu market survey, and met with Fish Vendors' Association.
23-May-07	Met with NGO-Fildes chairman, met with leadership of a (women's) Fish Vendor Association that had been organized by CARE, met with CARITAS staff, participated in AWF partners discussion.

24-May-07	Fishing material prices survey, held a group discussion with another (women's) Fish Vendor Association that had been trained by NGO-Fildes ("Action Communautaire pour la developpement de la femme rurale" – ACDFR).
25-May-07	Discussion with fishers regarding wetlands North of Lulonga River. Departure from Basankusu for Kinshasa by Airserve plane.
28-May-07	Meetings with AWF
29-May-07	Market survey at Makoti Poko fish market in Kinshasa.

Appendix D. Camps and Villages recorded on MLW Mission

Camp/Village	GPS Location	Bank	River	Visited/ Passed	Camp Status
<u>Lomako River Ascent upstream - from Lindunga to Ndele</u>					
Lingunda		South	Lomako	Visited	Inhabited
Boofe	N00°51'47.4" E010°57'44.9"	South	Lomako	Visited	Inhabited
Botumbela	N00°51'58.7" E020°58'35.6"	North	Lomako	Visited	Inhabited
Ifomi	N00°51'30.9" E020°58'52.4"	South	Lomako	Visited	Temp/Ecoupape
Bompombo	?	North	Lomako	Passed	Abandoned ?
Kinshasa	N00°51'34.7" E021°01'11.3"	North	Lomako	Visited	Inhabited
Unknown	?	South	Lomako	Passed	Abandoned ?
Bosolomua	N00°51'24.2" E021°02'11.5"	South	Lomako	Visited	Inhabited
Tolanga	N00°50'45.6" E021°02'41.9"	South	Lomako	Visited	Inhabited
Saidi	N00°49'42.3" E021°03'36.0"	South	Lomako	Visited	Inhabited
Unknown	?	South	Lomako	Passed	Abandoned ?
Remorqueur	N00°49'17.1" E021°03'40.4"	North	Lomako	Passed	Inhabited
Léonard	N00°49'19.7" E021°03'57.4"	North	Lomako	Passed	Abandoned ?
Ifulu	N00°49'10.2" E021°04'51.6"	North	Lomako	Visited	Inhabited
Bohua	N00°49'22.2" E021°05'29.3"	South	Lomako	Passed	Temp/Ecoupape
Patemo	N00°48'54.3" E021°06'21.7"	South	Lomako	Passed	Inhabited
Tala na miso	?	North	Lomako	Passed	Abandoned ?
Ndele	N00°48'01.0" E021°07'39.8"	North	Lomako	Visited	Inhabited
<u>Lomako River Descent downstream - from Lingunda to Lomako Confluence</u>					
Isekonga	?	South	Lomako	Passed	Inhabited
Ikakyalokolo	N00°51'35" E020°53'4"	North	Lomako	Passed	Temp/Ecopage
Ilengu	N00°53'6.7" E020°52'9"	North	Lomako	Passed	Inhabited
Boele	N00°51'3" E020°51'9"	North	Lomako	Passed	Temp/Ecoupape
Ngirigni	N00°54'4" E020°51'4"	North	Lomako	Passed	Inhabited
Chuwenda River camp	?	North	Lomako	Passed	Inhabited
Bokuboku	N00°54'2" E020°50'7"	Island	Lomako	Passed	Inhabited
Mampete	N00°53'5" E020°50'3"	?	Lomako	Visited	Inhabited
Lompoke	N00°53'5" E020°50'3"	?	Lomako	Passed	Inhabited
Unknown	N00°54'02.1" E020°49'0.2"	North	Lomako	Passed	Inhabited
Befofo 1&2	N00°52'46.4" E020°48'38.6"	South	Lomako	Passed	Inhabited
Belondo	N00°52'36.6" E020°47'01.2"	South	Lomako	Passed	Inhabited
Unknown	N00°52'18.1" E020°46'06.4"	North	Lomako	Passed	Inhabited
Unknown	N00°52'3" E020°46'07"	South	Lomako	Passed	Abandoned?
Bolafa	N00°51'55.6" E020°45'23.1"	South	Lomako	Visited	Inhabited
Transis	N00°51'43.7" E020°44'12.1"	South	Lomako	Passed	Inhabited
Iteko I	N00°51'42" E020°43'45.5"	North	Lomako	Passed	Inhabited
Botumbela	N00°51'42.3" E020°42'25.8"	North	Lomako	Passed	Temp/Ecoupape
<u>Maringa River Ascent - from Lomako Confluence to Iseka Lokoto (port of Bokoli)</u>					
Liya	N00°51'06.2" E020°41'27.3"	North	Maringa	Passed	Inhabited
Port de Lomako	N00°50'98" E020°41'37"	South	Maringa	Passed	Inhabited

Lompondje	N00°50'16.2" E020°41'36.9"	North	Maringa	Passed	Inhabited
Lingoy	N00°49'35.3" E020°43'42.0"	North	Maringa	Passed	Inhabited
Liyamba	N00°48'32.0" E020°44'34.1"	North	Maringa	Passed	Inhabited
Bokako	N00°47'18.5" E020°44'35.7"	South	Maringa	Passed	Inhabited
Besange	?		Maringa	Passed	Inhabited
Iteko	?		Maringa	Passed	Inhabited
Bombuli	?		Maringa	Passed	Inhabited
Etuka	N00°46'27.0" E020°44'19.9"	South	Maringa	Passed	Inhabited
Liya	N00°45'43.5" E020°44'47.8"	North	Maringa	Passed	Inhabited
Baringa	N00°44'05.9" E020°44'13.2"	South	Maringa	Passed	Inhabited
Intamba	N00°43'16.9" E020°46'26.1"	North	Maringa	Passed	Inhabited
Intsi	N00°42'35.4" E020°47'19.9"	North	Maringa	Passed	Inhabited
Tofele1	N00°42'36.2" E020°47'46.1"	North	Maringa	Passed	Inhabited
Tofele2	N00°41'55.0" E020°47'47.9"	North	Maringa	Passed	Inhabited
Bokolombe	N00°40'46.6" E020°47'19.6"	South	Maringa	Passed	Inhabited
Ibutswa	N00°40'25.2" E020°48'11.5"	North	Maringa	Passed	Inhabited
Waka1	N00°39'44.9" E020°48'42.3"	South	Maringa	Visited	Inhabited
Waka2	N00°39'43.4" E020°48'37.3"	South	Maringa	Passed	Inhabited
Bompete	N00°39'10.1" E020°48'30.9"	South	Maringa	Passed	Abandoned?
Iyoko	N00°39'14" E020°49'745"	North	Maringa	Passed	Inhabited
Biala	N00°39'05" E020°49'42.8"	North	Maringa	Passed	Inhabited
Isake	N00°37'54.9" E020°49'53.0"	North	Maringa	Passed	Inhabited
Itabi	N00°37'46.4" E020°50'37.6"	North	Maringa	Passed	Inhabited
Isekombaka1	N00°36'00.2" E020°50'51.2"	South	Maringa	Passed	Inhabited
Isekombaka2	N00°36'07.3" E020°50'58.8"	South	Maringa	Passed	Inhabited
Tshotsho	N00°35'59.6" E020°52'07.3"	South	Maringa	Passed	Inhabited
Bahulu	N00°36'19.4" E020°53'31.5"	South	Maringa	Passed	Inhabited
Bokoko	N00°35'12.0" E020°52'52.1"	South	Maringa	Passed	Abandoned?
Liya	N00°34'14.8" E020°53'50.4"	North	Maringa	Passed	Inhabited
Kota pona	?	South	Maringa	Passed	Inhabited
Divens/rebelle	N00°33'26.0" E020°53'40.0"	North	Maringa	Passed	Inhabited
Litofe	N00°32'47.2" E020°54'33.0"	South	Maringa	Passed	Inhabited
Port Iseka Lokoto	N00°33'11.5" E020°55'38.7"	North	Maringa	Visited	Inhabited

Villages visited over land

Bokoli			Inland	Visited	Inhabited
Boonia			Inland	Visited	Inhabited
Lofukya			Inland	Visited	Inhabited
Djoleke, Lifengo I&II			Inland	Visited	Inhabited
Bolima			Inland	Visited	Inhabited
Bokau			Inland	Visited	Inhabited

Maringa River Descent - from Baulu to Lomako Confluence

Isekombaka	N00°36'00.2" E020°50'51.2"	South	Maringa	Visited	Inhabited
Unknown	N00°37'85.7" E020°50'72.4"	North	Maringa	Passed	Temp/Ecoupage
Iyoko I, II, III	N00°39'14" E020°49'74.5"	North	Maringa	Visited	Inhabited
Ibutswa	N00°40'25.2" E020°48'11.5"	North	Maringa	Visited	Inhabited
Baringa		South	Maringa	Visited	Inhabited

Maringa River Descent - from Lomako Confluence to Basankusu

Gombalo	N00°52'14.4" E020°41'37.5"	North	Maringa	Passed	Inhabited
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Bengudju	N00°52'49.2" E020°40'56.9"	North	Maringa	Passed	Inhabited
Bombula	N00°53'29.9" E020°39'54.7"	South	Maringa	Passed	Inhabited
Yembe	N00°54'12.8" E020°39'11.0"	North	Maringa	Visited	Inhabited
Malili	N00°53'41.1" E020°38'57.8"	North	Maringa	Passed	Inhabited
Bosululu1	N00°52'06.1" E020°39'08.6"	South	Maringa	Passed	Inhabited
Bosululu2	N00°52'06.0" E020°38'41.1"	South	Maringa	Passed	Inhabited
Lofele	N00°54'25.5" E020°37'05.4"	North	Maringa	Passed	Inhabited
nganda ya basi	N00°54'59.5" E020°36'58.8"	South	Maringa	Passed	Temp/Ecoupage
Ilengu	N00°54'36.6" E020°36'11.6"	North	Maringa	Visited	Inhabited
Ilangala	N00°55'38.0" E020°34'04.2"	North	Maringa	Passed	Inhabited
Port Ekafela	N00°56'17.7" E020°33'52.7"	North	Maringa	Passed	Inhabited
bolengela	N00°56'38.6" E020°28'56.6"	North	Maringa	Passed	Inhabited
Bopanga	N00°55'14.7" E020°28'07.6"	South	Maringa	Passed	Inhabited
Boyambi	N00°56'35.5" E020°26'43.1"	South	Maringa	Passed	Inhabited
Bolengu1	N00°57'18.0" E020°25'57.0"	North	Maringa	Passed	Inhabited
Bolengu2	N00°57'20.0" E020°25'50.2"	North	Maringa	Passed	Inhabited
Ibelu	N00°57'40.6" E020°24'43.0"	South	Maringa	Passed	Inhabited
Libuka	N00°58'06.7" E020°24'00.9"	North	Maringa	Visited	Inhabited
Ekoto mbolo	N00°58'52.7" E020°22'46.0"	North	Maringa	Passed	Inhabited
Monuc	N00°58'56.9" E020°21'44.4"	South	Maringa	Passed	Inhabited
Konyeka		North	Maringa	Passed	Inhabited
Ikala	N00°59'06" E020°21'60.6"	North	Maringa	Passed	Inhabited
Boboto		North	Maringa	Passed	Inhabited
Iyoko		South	Maringa	Passed	Inhabited
Bofole	N00°58'23.1" E020°20'52.8"	South	Maringa	Passed	Inhabited
Vatican	N00°59'34.3" E020°19'22.1"	South	Maringa	Passed	Inhabited
Bololongo	N01°00'06.3" E020°18'43.1"	South	Maringa	Passed	Inhabited
Iteko	N01°00'09.1" E020°18'13.0"	North	Maringa	Passed	Inhabited
Bokenda	N01°00'05.4" E020°14'24.1"	South	Maringa	Passed	Abandoned?
Ipono	N01°01'12.8" E020°13'23.8"	South	Maringa	Visited	Inhabited
Waka	N01°00'25.9" E020°12'33.6"	South	Maringa	Passed	Inhabited
Toyeyemba	N01°02'07.6" E020°09'24.1"	North	Maringa	Passed	Inhabited
Unknown	N01°02'23.8" E020°08'04.2"	North	Maringa	Passed	Abandoned?
Boma heure	N01°02'57.2" E020°07'41.3"	North	Maringa	Passed	Inhabited
Unknown	N01°04'07.1" E020°07'28.6"	North	Maringa	Passed	Abandoned?
Unknown	N01°04'31.8" E020°07'21.0"	North	Maringa	Passed	Inhabited
Unknown	N01°04'58.0" E020°07'11.4"	North	Maringa	Passed	Inhabited
Unknown	N01°05'16.4" E020°06'59.4"	North	Maringa	Passed	Inhabited
Unknown	N01°06'15.8" E020°05'39.1"	North	Maringa	Passed	Inhabited
Tokuka1	N01°05'44.9" E020°05'30.6"	North	Maringa	Passed	Inhabited
Tokuka2	N01°05'30.3" E020°05'28.9"	North	Maringa	Passed	Inhabited
Bonkelo	N01°04'54.2" E020°05'13.9"	South	Maringa	Passed	Inhabited
Bolafa marché	N01°05'21.5" E020°04'43.1"	South	Maringa	Passed	Inhabited
Bolafa port	N01°05'47.9" E020°04'41.2"	South	Maringa	Passed	Inhabited
Ndele	N01°06'04.9" E020°04'40.8"	South	Maringa	Passed	Inhabited
Mont-Ngaliema	N01°06'55.1" E020°04'09.8"	North	Maringa	Visited	Inhabited
Monoko solo	N01°07'33.5" E020°02'23.1"	Island	Maringa	Passed	Inhabited
Bolaulu	N01°08'19.0" E020°01'48.3"	North	Maringa	Passed	Inhabited

marché Botumbela	N01°08'36.4" E020°01'31.1"	North	Maringa	Passed	Inhabited
Bolanga	N01°08'45.3" E020°00'50.5"	North	Maringa	Passed	Inhabited
Kinshasa	N01°10'39.2" E019°59'08.5"	North	Maringa	Visited	Inhabited
Bolafa pêcheurs	N01°10'30.8" E019°58'47.9"	North	Maringa	Passed	Inhabited
Bosole1	N01°09'57.3" E019°55'49.8"	North	Maringa	Passed	Inhabited
Bosole2	N01°10'24.2" E019°55'24.1"	North	Maringa	Passed	Inhabited
Bonkombolo	N01°10'42.7" E019°55'10.9"	North	Maringa	Passed	Inhabited
Fendje fendje1	N01°11'04.1" E019°54'31.7"	North	Maringa	Passed	Inhabited
Fendje fendje2	N01°11'04.1" E019°54'31.7"	North	Maringa	Passed	Inhabited
Itoko	N01°11'11.0" E019°52'35.8"	North	Maringa	Passed	Inhabited
Mbongo	N01°11'15.7" E019°52'02.3"	North	Maringa	Passed	Inhabited
Djiba	N01°13'09.0" E019°50'46.7"	North	Maringa	Passed	Inhabited
Libanga	N01°13'23.6" E019°49'88.1"	North	Maringa	Visited	Inhabited

Note: Temp/Ecoupage means that a camp is only used for fishing during the dry season, either by general fisherfolk or groups of women who practice a method known as "ecoupage".

Appendix E. Demographic Profiles of Fishing Camps Visited

Camp name	Origin	Residence	Men	Women	Children Present	Children School	Total Children	Total Present	Total Population
Boofe	Migrant	Permanent	15	13	24	0	24	52	52
Botumbela	Migrant	6 months	3	3	12	0	12	18	18
Ifomi	Migrant	6 months	1	1	0	2	2	2	4
Kinshasa	Local	5 months	5	3	7	0	7	15	15
Bosolomua	Local	Permanent	25	25	?	?	?	50	50
Tolanga	Local	Permanent	6	7	14	0	14	27	27
Saidi	Local	Permanent	1	2	5	0	5	8	8
Ifulu	Migrant	3 months	2	1	0	3	3	3	6
Ndele	Local	Permanent	30	30	?	?	?	30	30
Mampete	Local	Permanent	15	12	15	15	30	42	57
Bolafa	Local	Permanent	16	6	?	?	?	22	22
Isekombaka	Local	Permanent	18	18	14	0	14	50	50
Iyoko I	Local	9 months	50	60	?	?	?	110	110
Iyoko II	Local	9 months	30	40	?	?	?	70	70
Iyoko III	Local	9 months	25	15	?	?	?	40	40
Ibutsua	Local	long term	7	7	13	0	13	27	27
Yembe	Local	long term	9	5	14	8	22	28	36
Ilengu	Local	long term	5	5	8	0	8	18	18
Libuka	Local	long term	7	8	31	0	31	46	46
Ipono	Local	long term	13	14	?	?	?	27	27
Kinshasa	Local	long term	40	15	15	0	15	70	70
Libanga	Local	long term	3	5	0	6	6	8	14
		Sum=	326.0	295.0	172.0	34.0	206.0	763.0	797.0
		Mean=	14.8	13.4	11.5	2.3	13.7	34.7	36.2
		Median=	11.0	7.5	13.0	0.0	13.0	27.5	28.5
		Max=	50.0	60.0	31.0	15.0	31.0	110.0	110.0
		Min=	1.0	1.0	0.0	0.0	2.0	2.0	4.0

Note:

Total Present = Sum of men, women and children present, excluding children away at school

Total Population = Sum of men, women, all children (whether present or away at school)

Appendix F. Village PRA Results

1) Relative Importance of Livelihood Activities as Sources of Revenue

<u>Sources of Income</u>	<u>Men</u>					<u>Women</u>			<u>Overall Average</u>
	<u>Bokoli</u>	<u>Boonia</u>	<u>Bolima</u>	<u>Bocau</u>	<u>Average</u>	<u>Bokoli</u>	<u>Bocau</u>	<u>Average</u>	
Farming	27	16	19	50	28	42	43	42	29
Fishing	43	56	82	30	53	28	23	25	39
Hunting & Gathering	19	13	0	10	11	0	11	6	12
Commerce	6	7	0	8	5	31	11	21	9
Skilled Trade & Misc.	4	7	0	3	3	0	13	7	10
Total =	100	100	100	100	100	100	100	100	100

2) Relative Allocation of Income

<u>Resource Budgeting</u>	<u>Men</u>					<u>Women</u>			<u>Overall Average</u>
	<u>Bokoli</u>	<u>Boonia</u>	<u>Bolima</u>	<u>Average</u>	-	<u>Bokoli-Women</u>	<u>Bokoli-Girls</u>	<u>Average</u>	
Health	25	15	15	18	-	25	25	25	22
Education	23	14	17	18	-	24	29	26	22
Clothing	13	10	14	12	-	18	21	19	16
Food	9	25	14	16	-	18	11	14	15
Household & Construction	7	6	12	8	-	10	0	5	7
Work Equipment	11	20	19	17	-	5	10	7	12
Transportation	8	7	5	6	-	0	0	0	3
Entertainment	4	3	5	4	-	0	5	2	3
Total =	100	100	100	100	-	100	100	100	100

Photo Gallery



A “Suzuki” (bottom) and a basket (top) of smoked fish destined for market. (R.Brummett – WorldFish Center)



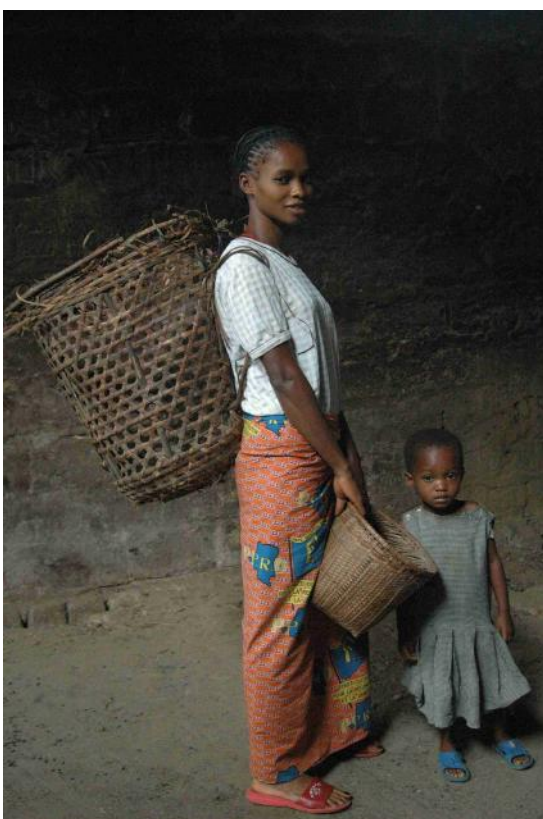
Valise of smoked *mungusu* (*Parachanna* sp). (R.Brummett – WorldFish Center)



A range of locally manufactured basket traps. (R.Brummett – WorldFish Center)



Gill nets set across openings into the swamp forest to capture fish as they move on spawning and feeding migrations. (R.Brummett – WorldFish Center)



Equipment used in women's traditional "écoupage" fishing. The smaller "epoko" basket is used to scoop water out of pools or small dams through the larger "corbeille" which captures juvenile fish trapped in the forest as flood waters recede. (R.Brummett – WorldFish Center)

A typical fishing camp on the lower Lomako River. (R.Brummett – WorldFish Center)



A fisher's group organized by a local NGO to help communities understand their problems and act collectively to manage resources for the benefit of all. (R.Brummett – WorldFish Center)



Girls out-number boys in the fishing camps as the latter are given priority in educational opportunities (R.Brummett – WorldFish Center)