The Dynamics of Fishing as a Natural Safety Net in the Okavango Delta, Botswana

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Abstract: Subsistence fishing in the Okavango delta plays a critical safety net function, especially among poor rural households. This study was undertaken to contribute to an understanding of this function. Data was collected from structured interviews of heads of fishing households in two villages in the Okavango Delta. Majority of subsistence fishers were males. The contribution of fish to total food during the high and low fishing season was estimated in the range of 50-75% and 0-25%, respectively. A significant number of households reported that they turn to fishing as a major strategy during livelihood shocks as fish is open access resource and available throughout the year. Bartering and sale of fresh and preserved fish are the means of sustaining households during difficult economic times. This study recommends to government to embrace the contribution of fish in poverty alleviation alongside other social safety net programmes.

Keywords: Subsistence fishing, Safety net, Livelihood food security, Sustainable development, Fisheries, Seasonality

1 Introduction

Small-scale fishing is an important source of livelihood for many of the communities living in the Okavango Delta (Mosepele, 2000; Kgathi *et al.,* 2004). As in other parts of Africa and the world at large, fishing in the Okavango Delta plays an important role in food security, firstly because it provides a rich source of protein and nutrients, and secondly, it is a source of food and income (FAO, 2005; Walmsley, 2006; Andrew *et al.,* 2007). By virtue of its importance to poor rural households, small-scale fishing plays a significant role in the prevention of poverty. In Botswana, the United Nations Human Development Report (HDR) (2006), indicates that about 23.5% of the population live below the poverty datum line (less than $1 a day or 6. 21 pula) and approximately 50.1% live on $2 a day or 12 pula). The country's human poverty index (HPI) (as measured by the percentage of children that die before the age of 5, adult illiteracy rate, access to health services, safe water and under fives who are moderately or severely underweight) in rural areas is 39.0 compared to 16.9 in urban villages and 16.8 urban centres. The rural district of Ngamiland ranks third in human poverty in Botswana (UNDP, 2000). There is bound to be variations of poverty prevalence within the district and across villages generally, and within fishing villages in particular.

It is estimated that 90% of 38 million people globally are classified as small-scale fishers, a significant proportion are rural dwellers involved in seasonal or occasional fishing activities (FAO, 2005). Small-scale fisheries play a role in poverty prevention by helping people to maintain a minimum standard of living (even when it is below a given poverty line) (Coady, 2004; FAO, 2005). Poverty prevention thus refers to reducing risks and increasing safety net function in a general context of vulnerability. Rural communities, who are mostly poor, are usually more vulnerable to shocks such as climate change, livestock disease outbreaks, HIV/IDS, political, institutional and economic fluctuations (Walmsley *et al*., 2006; Andrew *et al*., 2007). Where the normal means of household survival have been disrupted due to a natural disaster (e.g. poor crop yields due to low rainfall), fishing has often provided the alternative means of households survival (safety-net function). In addressing issues of food security, most governments, including Botswana, have responded by introducing social assistance programmes. These programmes include the orphan and home based care, school feeding, child welfare clinic rations, war veterans allowance, old age pension and drought relief programs (Department of Social Services, 2006). However, as structural causes of poverty

and food insecurity are dynamic, interlinked and ever evolving, new mechanisms for addressing these challenges need to be explored (Pottier, 1993). Current research has given particular attention to the role of non-timber forest products (NTFP) as a safety net and limited attention on the use of marine resources (including non-biological resources such as sand and clay for building purposes) (Shackelton, *et al.,* 2007; Paumgarten, 2005). Existing research in southern Africa shows that households experiencing HIV/AIDS related chronic illness and or death, are more likely to fall back on utilization of natural resources to cope with the shock (e.g. Hunter and Twine, 2005) and are less likely to do so where formal and informal support programs are available and accessible (Ngwenya and Thakadu, 2007). Also, Ngwenya and Mosepele's (2007) socio-economic survey of 248 fisher households in 22 fishing villages in the Okavango Delta found that at least 53% indicated that they had cared for continuously ill person/s in the last five years and that fish products provided a significant proportion (approximately 55%) of their food.

While government safety net programmes are but one option to respond to distress, it appears that due recognition is not given to the role of natural resources such a fish in providing safety net functions to vulnerable households. This lack of recognition probably emanates from the lack of understanding of and the description of the dynamics of using fish as a safety net particularly in food security, in Botswana. This paper focuses on the dynamics and households' mobilization of fish as natural safety net in the Okavango Delta to prevent and or mitigate the incidence transitory poverty and food security. The aim of this study is to investigate the role of subsistence fishing as a safety net. The objectives of the research are to identify characteristics of households who use fishing as a safety net; to determine factors which influence households to use fishing as a safety net; to determine when households use fish as a safety net; to asses the extent to which fishing is an option as a safety net in the face of specific shocks; to compare fish as a safety net with other social safety net and to make policy recommendations.

2 Conceptual Framework

Safety nets are mechanisms that mitigate the effects of poverty and other risks on vulnerable households during times of severe stress (Subbarao *et al.,* 1997). According to the World Bank (http://www1.worldbank.org/sp/safetynets/index1.asp) safety net programs help households to manage risk, minimize massive externalities, reduce the need for households to sell off productive assets and increase their likelihood of escaping destitution. Ample literature documents multiple functions of safety nets in southern Africa. Old age pension for instance, is transferred into investment in human development, labour, and overall basic needs household needs (Dufflo, 2003; Edmonds, Mammen and Miller, 2003; Inder and Maitra, 2004; Ferreira, 2004).

There are different categories of safety nets, and these are formal, informal and natural safety nets. Formal safety nets are non-contributory transfer programs targeted to the poor or those vulnerable to poverty and shocks (Subbarao *et al.,* 1997). In Botswana, these includes, cash transfers, public works, food related programs and other subsidies mentioned in the above paragraph. Extended family or community members provide informal safety nets, either individually or collectively. These involve transfers or exchange of cash, food, clothing, informal loans, provision of accommodation, and assistance with child care or care for the chronically ill (Foster, 2005). Natural safety nets are raw materials supplied by the earth and its processes, or renewable and non-renewable gifts of nature that can be used to produce goods and services, including but not limited to land, water, animals, minerals, trees, climate, soil, fire, seeds, grain and fruits. Households and communities use natural safety nets to prevent, mitigate or cope with shocks (Ngwenya and Mosepele, 2007).

Safety nets can be differentiated into two levels, the daily net and emergency net (Shackelton, and Shackelton, 2004). A safety net is a daily net when it is used on daily basis (rather than during certain times of the year only) to meet the needs of poor and thus sustain their welfare. This kind of safety net can work primarily as a direct cost saving to rural households as most of them have limited access to cash incomes. In contrast, an emergency safety net is used in response to unexpected economic, social or climatic hardship

such as during a drought period. This kind of safety net is used on temporary basis as a coping strategy to mitigate the effects of the shock. Often this safety net is visible when households that were not previously poor now turn to a resource in order to cope with the sudden economic and social environmental emergencies (Shackelton and Shackelton, 2004). Emergency safety nets can be transformed into a permanent livelihood strategy if the effects it intended to prevent are not reduced.

3 Study Area

This study was conducted in the Okavango Delta, the world largest RAMSAR site, renowned for its richness in biodiversity (both in terms of animal and plant species, as well as ecosystems). Over 120 000 inhabitants rely on the natural resources (Kgathi, Mmopelwa and Mosepele, 2005).

The specific study sites were the two villages of Ngarange and Kauxwi (Fig. 1), both located in the northwest corner of Botswana along the panhandle of the Okavango delta. The ethnic groups found in these villages are Bambukushu, Bayei, Basarwa, Batawana, and Baherero, Barakwena/Bugakwe and BaDxereku (Kgathi *et al*., 2004). The population of Ngarange is estimated to be 948 and that of Kauxwi is 849 (CSO, 2002). A number of economic activities are pursued in these two villages and include fishing, arable and livestock agriculture, basket making and collection of veld products. Pursuance of a number of economic activities is a strategic way of dealing with vulnerability and uncertainties in the environment.

3.1 Sampling Procedure and Data collection

A list of all households in the two villages was compiled and the fishing households identified formed the sampling frame of the study. All fishing households were interviewed. There were 47 respondents altogether with 32 respondents from Ngarange and 15 from Kauxwi. Primary data was collected using a structured

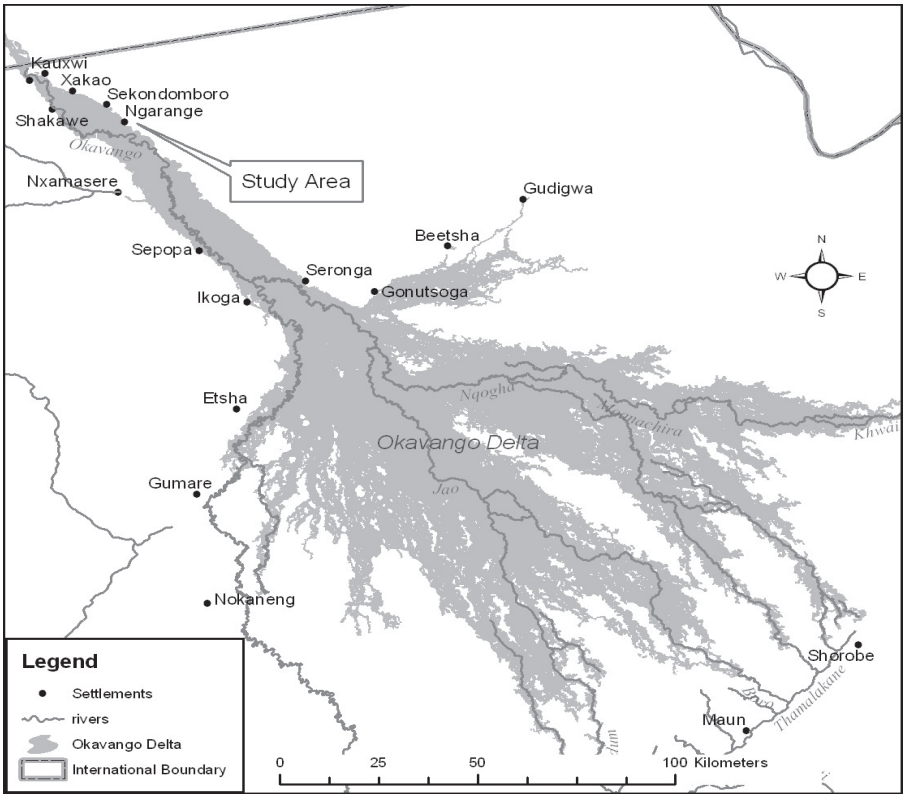

Figure 1 Map of the Okavango Delta showing study areas (Source: HOORC GIS LAB)

questionnaire. Heads of households were interviewed, but where a head of household was absent the adult person present was interviewed. The questionnaire comprised closed and open-ended questions. Informal discussions were held with extension officers from the departments of health and fisheries. A seasonal food calendar was compiled from key informants using an interview guide.

4 Results and Discussion

4.1 Profile of Fishing Households

The majority of subsistence fishers were males (72%), indicating that fishing is a male dominated activity. Social roles in small-scale fishing may be influenced by a number of factors. According to McGoodwin (2001), social norms in a majority of the world's small-scale fishing communities prescribe that the primary producer be men, while women perform other key supplementary roles in the households. Fishers' age ranged from 21-76 years with a majority (47%) of them without formal education. The majority of fishing households were Hambukushu (51%), followed by Baxhereku (28%), Basarwa (13%) and few Bayei (6%) and Batawana (2%). The range of number of persons in the study area was 1 – 15 persons, the average household size was found to be 5.9 persons, about 2 persons higher compared to the national average size of according to the 2001 national census is 4.1 persons (CSO, 2002).

4.2 Formal Government Safety Nets and Transfers

At least 60% of households have received one form of government safety net or another, either because they had an indigent member or at least had one child below the age of five years eligible for child welfare clinic rations. Children received supplements from the clinic; this included infant formula, *tsabana* (fortified porridge) for 0 – 2.5 years and other supplementary food basket (3 – 5 years), home based care food basket for children below the age of 2.5 years. Old age pension recipients get P191 per month, permanent destitute receive P55 cash and a food basket, and orphans receive a food basket without cash benefits.

Informal interviews suggest that respondents did not see advantages of receiving these programs and lamented that, without any productive assets, they are caught in the 'poverty trap' or remain defenceless. Of the total respondents, only 4% who received old age pension and 6% who received destitute and orphan food basket indicated that the intervention provided them with enough food to sustain the household for the whole month compared to 89% who said catching fish did. Compared to state safety nets, over and above regular use, fish has probably greater value than previously appreciated, in both financial and social terms. According to these informants, the advantages of using fish were that fish in the Delta was an abundant open access resource to be exploited by anyone who has the means. Fish products are versatile as either a source of food, income or both; it can be bartered for other food items, be preserved (dried or smoked) for use in other seasons. Fish provides extra income that helps to overcome bad years or events, also and limit negative impacts of unexpected resource shortages. According to FAO (2005) open access framework in fishing is the key mechanism that permits the safety value function of fisheries to operate and allow people to engage temporarily or permanently in this sector. For some respondents, the advantages of receiving a government safety net included guaranteed income, especially for those who are permanently unable to work such as elderly and the incapacitated people. But for others, as one respondent put it, households without assets forever remained under the 'tight grip of poverty.' and could not pull them out of the poverty trap. Government safety nets thus were not viewed as source of food security. However, the ability of a social safety net to meet household basic needs is likely to be affected by household size and dependency ration.

4.3 Household Asset Profile and Livelihoods

Livelihood activities in the study area are diverse, with some being simultaneously and others consecutively carried out by different members of the household depending on the season and labour demands. A portfolio of household livelihood activities include fishing (97%), crop farming (83%); livestock

farming (43%); making and selling baskets (19%); self-employment (10%); beer brewing (31%); old age pension (38%); destitute allowance (21%); orphan food basket (23%); community home based care food basket (10%) and child welfare clinic rations (60%). Previous researches in other areas in the Okavango Delta (e.g. Kgathi *et al,* 2004; Kgathi, Ngwenya and Wilk, 2007) have also found that livelihood activities in the Okavango Delta are complex and diverse. Other studies in southern Africa also suggest that multiple and diverse livelihood strategies are the mainstay of rural economy and that each sector has a value in (both financial and social terms) (Shackelton *et al.,* 2001, Paumgarten, 2005; Pfund and Robinson, 2005).

Transient (temporary) poverty is likely to occur within and across seasons. The probabilities of households falling in or out of poverty at any given time would also vary, depending on the productive assets profile of household in question. The diversification of livelihood activities is a function of a household portfolio of fishing and non-fishing productive assets. Fishing assets include fishing nets, fishing baskets, fishing spear, traditional boats, hooks and lines. Different types of fishing gear in the Okavango delta fishery allows for proportional exploitation of all different tropic levels in the fish community (see Kgathi, Mmopelwa and Mosepele, 2005; Mosepele and Kolding, 2002).

About 53% of the fishing households were subsistence gill net fishers with an average monthly income of P271.28. Twenty-one percent (21%) were basket fishers with an average monthly income of P193.10. 19% were hook and line fishers with an average monthly income of P103.89.

Gill-net fishers had a higher average monthly income than basket fishers and hook and line fishers and that their fishing gear is able to catch more fish of which some they sell to generate more income (Table 1).

A fishing net is the most common asset (70%); followed by a mokoro (dug-out canoe) (53%), a fishing spear (45%); a fishing basket (21%) and a plank fishing boat (6%). At least 32% of households had two fishing nets, while only 10% had two fishing spears or fishing baskets. Fishing baskets, hooks and lines are mostly used when the flood levels are low and fish is more concentrated in the flood plains. McGoodwin (2001) has also observed that small-scale fishery uses a variety of fishing gear, and that certain gears may lie idle for a long time when fishing conditions are not suitable for the use of that gear. The intensity of fishing activities depends not only on predictable variability of flood level, but also on ownership of primary fishing gears, in particular a mokoro and fishing net. Informal interviews suggest that mokoro can be rented out or shared (with relatives or friends). As such, most of the respondent (45.7%) indicated that they fish occasionally (1-2 days per week in fishing season); 15.2% frequently (daily during fishing season) and 39.1% seldom (only a few days a month or less).

Non-fishing livelihood activities were primarily farming related. The majority of households participated in dry-land farming, 41% owned small livestock (goats and sheep), 36% owned cattle (an average of two cattle), 30% had no cattle. Of those who had cattle, half had between 1- 10 cattle; 15.4% had 11-20 cattle; and only 3.8% had 21-40 cattle. Cattle are used as sources of draught power and cash income to meet other household needs. According to the Revised national destitute Policy (Ministry of Local Government, 2001), a destitute person has not more than 4 livestock units or less than 24 goats/sheep and receiving less than P150 per month with dependents. Using cattle ownership as a wealth indicator, roughly a household with zero cows (30%) is considered as very poor, ten or less cows is regarded as moderately poor (50%), 11- 20 cows as poor and 21 – 40 cattle as non poor, (20%). Poor people depend disproportionately on ac-

Table 1 Monthly income by type of fishing

HH primary fishing activity	Mean (Pula)	N	Std. Deviation
subsistence gill net fishing	271.2800	25	229.30520
subsistence basket fishing	193.1000	10	147.27333
hook and line	103.8889	9	85.43191
Total	258.8444	45	330.64496

cess to productive assets such as land and open access resources than the rich, and usually harvest natural resources to supplement their incomes. Households with no cattle to provide draught power use donkeys or hand hoes. For those who can afford, they can either hire/lease tractor/draught power or practised share-cropping.

For cattle keepers, access to pasture is important. Informal interviews with key informants were asked in semi-structured interviews whether or not, in their view, land available for common grazing of animals owned by villagers, compare with the amount used for grazing 5 years ago, was increasing or declining? Overall, their views suggested that not only was total grazing land for all animals grazed on the common much less than 5 years ago, but also the average quality of common grazing pasture land deteriorated. The main causes of worsening local problems with common grazing lands was attributed to several factors, among these the increase in animals grazed on commons by villagers and the incursion of wildlife in village pasture.

4.4 Shocks and Household Coping Strategies

In the past years, people in Ngarange and Kauxwi have experienced different livelihood shocks. These include sudden loss of job (30%), loss of livestock (60%) and damage of crops by wild animals (69%). The effects of these shocks included food shortage (98%) and reduced income (21%) for the households. As a result households had to find strategies and means of coping with these effects. Previous researches in other areas in the Okavango Delta (e.g. Kgathi *et al.,* 2004; Kgathi, Ngwenya and Wilk, 2007; Ngwenya and Mosepele, 2007) have also observed similar responses. Some of the respondents indicated that they adopted more than one coping strategy while others just adopted only one strategy. The majority (68%) responded by either turning to fishing or intensifying fishing primarily because fish is an open access resource that it is always available, it is a source of food and direct cash (sold fresh or dried), and that it can be exchanged or bartered for other food items such as grain. Figure 2 shows how fishermen utilised fish during the shock. Subsistence gill net fishers constituted the highest percentage of fishermen in each utilisation strategy (sale of fish, bartering, use of preserved fish and sale of preserved fish).

Other coping strategies were gathering wild food, looking for work, beer brewing, borrowing, basket making and migrating to less affected areas. Most (89%) of the affected households reiterated that fish enables them to survive a range of either short or long term stressors (job or livestock loss, prolonged illness, crop failure, drought and veld fires). According to them, this safety net function of fish was made possible by the non-decreasing stocks of fish in the Delta.

Based on their past experiences, fourty-one percent of the fishing households estimated that fish contributes 75-100% of total household food during food shortage (Table 2). Amongst these fishermen, it ap-

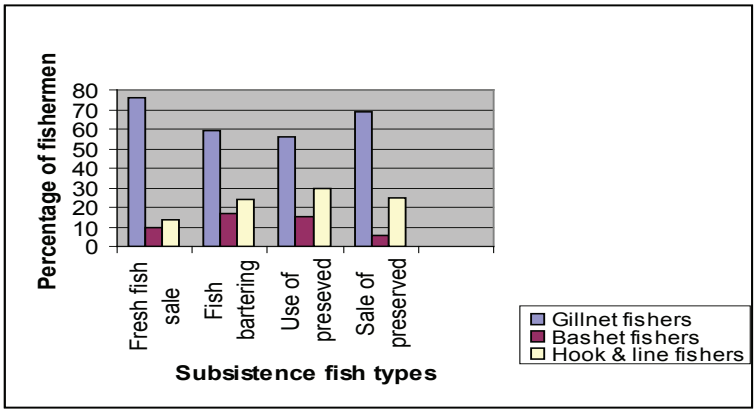

Figure 2 Utilisation of fish during critical shock period

pears from Table 2 that subsistence gill net fishers tend to be catching more fish as a safety net than other fishermen and potentially generating more income. It is thus not surprising that gill-net fishing households tend to have a higher average monthly income than basket fishers and hook and line fishers.

4.5 Fishing Seasonality and Other Economic Activities

The intensity of fishing activities in the Okavango panhandle by fisher groups depends on the water level, food security status, fish stocks and migration patterns in the river as well as on ownership of fishing gears, in particular a motorboat, mokoro and fishing nets. Most of the respondent (46%) indicated that they fish occasionally (1-2 days per week in a fishing season); 15% fish frequently (daily during fishing season) and 39% infrequently fish (only a few days a month or less). The availability of fish for most of the season makes it possible for households to fall back to fishing whenever other alternative livelihood failed. In Chad vulnerable households in areas around Lake Chad basin always invest the largest part of their labour in fishing (Béné, 2003).

The most preferred fishing season for households is during the low flood- hot and dry (August to December (52%), though fishing still takes place during the high flood autumn season (January – April) (17%) and in winter (30%) (June –July). Respondents said they preferred to fish in hot dry season because fish are concentrated in the flood plains as compared to fishing in the main channel which is risky to fish in. Women, men and youth fish in different fishing grounds which include the flood plains, lagoons and main channels with different fishing gears. The fisherfolkes' preference for fishing in the flood plain during the dry season is consistent with what has been observed by Welcome (1985) in tropical fisheries that fish becomes more available for capture as they congregate in channels and pools of the floodplain as water begins draining in the main channel.

A significant proportion of households (62%) regard fishing in summer and autumn seasons as most critical with regard to food security (August – April). Shackelton *et al*. (2007) study in the Transkei Wild Coast in South Africa, suggests that the frequency of consumption of fish was approximately three times greater in summer (2.4 ± 0.5) than in winter (0.9 ± 0.3). The mean consumption per meal was 4.9 ± 1.27. Informal interviews suggest that some economic activities are either gender or age based, or involve all members of the household. While some economic activities are primary within season, others may be secondary, and these activities may either overlap or are carried out simultaneously. While the general trend is that fishing intensifies during the dry period, households may start ploughing with the onset of the rains (usually November/December) or get involved in other economic activities such as traditional beer brewing and collection and sale of veld products. Thus, during the rainfall season, for some households, there could be a temporal shift from arable farming as a primary activity to fishing and thus farming becomes a secondary activity. Although subjectively, farming may culturally remain significant, the temporal shift to fishing could become permanent in the long term. Also during the rainy season, households are more likely to experience food shortage but have access to several traditional leaves (that grow as uncultivated on the farm) and on-farm greens (water melons, pumpkins, beans etc) are available (March-April). Common aquatic tubers/roots include *nymphaea lotus (*water lily*)* and *Cyperus papyrus (*papyrus).

Table 2 Estimated proportion of food provided by fish during food shortage by fishermen

Subsistence fisher type	Estimated proportion of food provided by fish during food shortage				
	0-25%	25-50%	50-75%	75-100%	Total
Subsistence gill net fishers	2 (67%)	7 (54%)	6(55%)	10 (52)	25 (100%)
Subsistence basket fishing	0 (0)	2 (15%)	4 (36%)	4 (21)	10 (22%)
Hook and line fishers	1(33%)	4 (31%)	1 (9)	5 (26)	11 (24%)
Total	3 (100%)	13 (100%)	11(100%)	19 (100%)	46 (100%)

During the winter season (June – July) there is also a diversification of economic activities. Fishing takes place in lagoons and on shore, while other economic activities are collection of veld products, basket making and beer brewing. In the Panhandle area of the Delta, fishing takes place all year round. Household do not necessarily abandon fishing during the ploughing season but continue to do so as a daily safety net (during the rainy season) and an emergency safety net (during the hot and dry season). Informal interviews suggested that fishing during high flood in the panhandle is also likely to be done by youth in spillways and adults in small lagoons and riverbanks.

While some households tend to pursue 'mixed' strategies (e.g. integrating farming and fish harvesting, or fishing with collection of veld products) as the overall livelihood strategy, the mixed fishing/non-fishing strategies at subsistence level could have limited or substantial integration in the local market economy (depending on the portfolio of activities). Other households may pursue 'specialized' strategies in which 'collection of veld products' 'beer brewing' or 'fishing' is the overall main driver of household production and earnings. Again, the level of integration in the local market depends on the extent of commercialisation of a particular product Investment levels in production assets are thus likely to differ between the two forms of livelihood strategies. Commercialisation of non-fish or non-timber products enables households to diversify sources of income and is of particular safety importance to women.

4.6 Threats to Fishing

One of the features of the Okavango Delta flooding system is its variability, which can affect the availability of fish. An overwhelming majority of respondents (89%) indicated that there is plenty of fish in the Okavango River and the stocks keep on increasing, only 6% indicated that fish population is declining and the remaining 5% reported that fish population varies according to seasons. About 79% of the respondents reported drying up of channels as the major threat to food and income security, about 9% said poor rainfall while 11% feared potential decline in fish stock. Responses from informal discussion indicated that fishing stocks are not actually declining. According to these discussions, as long as 'floods keep flowing from Angola' and there is water in the main river channels, there is will be enough fish for everyone. In the discussion, it was also highlighted that stocks of fish can only go down when flood inflow stops or is reduced, (or desiccation of channel/s occurs) or when fish stop reproducing. Another respondent argued that the 'goodness' of flood variability is that during high flood (February to March), water 'moves at high speed' in large volume filling the main channel, flood plains, lagoons and spillways. This movement forces the fish to migrate to different parts of the Delta and to be redistributed where children can now start fishing in spillways and side channels. When the flood recedes (Low Flood July – December), fishing activity in the flood plains intensifies by different user groups (commercial, subsistence gill net, hook and line and basket fishers). This allows for a range of fishing gears and watercrafts to be used, everyone therefore has the opportunity to do something.

About 75% of the respondent perceived increased inter-group conflicts among resource users (especially subsistence, commercial and recreational fishers) as threatening access to fishing. Mosepele (2001) also found that much of the conflict stems from undefined access especially in terms of fishing grounds. About 53% feared that unregulated increase in number of commercial fishers would result in over exploitation and decline of fish stock in the delta. Other social factors mentioned included the prevalence of chronic illness, inability to compete in the market because of low or diminished human and financial capital (skills/knowledge).

About 68% of the respondents perceived tour operators and crocodiles in the river as threats to livelihood security because both were accused of either 'stealing' or destroying fishing nets. Tour operators destroy fishing nets with their high-powered speedboats. Respondents lamented that due to their limited financial resources, fishing nets were expensive to buy or replace once destroyed by crocodiles or powered boats. Some respondents said that they feel powerless to stand-up against lodge owners and "tourists" because they lack the political capital.

5 Discussion, Conclusions and Policy Implications

The provision of social assistance by government of Botswana to various social groups (the elderly, children, pregnant and lactating mothers, orphans, water veterans and destitute persons) is a poverty prevention and food security strategy. Though these programmes can lessen the impact of poverty among households, in the long run they do not become sustainable food security strategies. Majority (89%) of respondents in this study indicated that fish as a safety provided them with enough food to sustain the household for the whole month. The advantage of using fish in the Delta is that it is an abundant open access resource exploited by almost all year round, though the preferred season was during the low flood period. Proximity of communities to permanent swamps and temporal flood plains allows for fishing by farmers, artisans, marketers and those in formal cash employment. Existing research and results from this study show that Okavango Delta fishery is not over-exploited and has the lowest yield and effort when compared to other African lakes and river systems. Free availability of fish (open access), its protein rich content, the ease with which it can be bartered with most food commodities and processed and stored to be used during times of emergencies makes it a critical safety net for many vulnerable households. In addition, small-scale fishery is resilient to shocks, contributes to food security, has greater economic efficiency, fewer negative environmental impacts and contributes to cultural heritage and environmental knowledge (FAO, 2005).

Households pursue a range of livelihoods, differentiated by seasonality, gender, ethnicity, age and household asset profiles (natural and produced). Majority (97%) of the households in this study reported that they were involved in fishing, however, though a range of livelihoods are still carried out simultaneously as a coping strategy or there could be a temporary or permanent shift in the livelihood depending on the prevailing environmental conditions such as climate change. Most households have experienced a shock of some kind in their lifetime that has affected the availability of food in the households and have responded by intensifying fishing and diversifying fish utilisation patterns.

Climate change is already staring to affect some of the poorest and most vulnerable communities around the world and is likely to severely affect food security and health through complex, localised impacts on small holder, subsistence farmers and fishers (Inter-governmental Panel on Climate Change). Households responses in Ngarange and Kauxwi and the rest of the Delta, will clearly be different. Some households will suffer shocks, but recover quickly (resilient households); some will either increasingly become more insecure in response to shocks (fragile household) or dependent on government social welfare programs (social pension, drought relief, destitute or orphan food basket) (a chronically poor households) (Frazer et. al., 2003). Small-scale fishing in the Delta can be seen as a productive, cost-effective and sustainable safety net that can help cushion the poor from the impacts, either by helping household build resilience against climate-induced shocks or by offering guaranteed employment. Government policy should therefore start recognising the great potential of fishing for future benefits especially in the face of shock.

Given the potential role of fish as a safety net, there is also need to manage the current fish stocks so that they also contribute to the welfare of the future generations. Fish management policy should consider regulating current fishing activities, especially in light of the existing inter-group conflicts among various types of fishermen in the Delta. Participation of local fishermen in the formulation of fish conservation and management strategies is key in sustainable development of fishery resources. Improved governance by participatory local management is in compliance with Code of Conduct for Responsible Fisheries (FAO, 1995). Any management strategy should not undermine the role of indigenous knowledge management systems of the fishermen. Any intervention (by government or non-government) should be directed towards investing in this sub-sector as it has emerged as one of the most important livelihoods in the Delta. Any development support (financial and non-financial) should target training fisherfolkes in fish enterprise management to enhance the fish potential to generate better income and employment opportunities.

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