Alternative Livelihoods: A Tool for Sustainable Fisheries Management in Ghana

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Alternative Livelihoods: A Tool for Sustainable Fisheries Management in Ghana

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Abstract: Most experts agree that many fisheries around the world are in crisis. Indeed, many would agree that something needs to be done to fix this problem in order to ensure the sustainability of fishery resources. In most cases fishing will have to be reduced significantly which will affect fisher's income and livelihood. And, the important question that many will ask, what do we do with our fishers to earn extra income and to allow fish populations to rebuild? This study addresses this question in the case of Ghana by conducting interview and key informant discussion of Ghana's small-scale fishers and fisheries managers. This study indicated that over 73% of fishers interviewed were willing to switch jobs, with 27% indicating that they would not consider it. This result implies that there is a good potential for well-designed alternative livelihood schemes to succeed. However, about 50% did not have the required skills to work outside the fishing and agriculture related areas. Therefore, any well-designed alternative livelihoods scheme will have to address how to improve suitable skills among fishers.

Keywords: Alternative livelihoods, fishing pressure, fisheries management, Ghana, small-scale fisheries, socioeconomic

INTRODUCTION

Most experts agree that many fisheries around the world are in crisis. There is also wide agreement that something needs to be done to fix the problems (Pauly *et al*., 2002). Fishery resources in Ghana are under pressure due to high demand for fishery products, poverty, population growth and particularly lack of alternative livelihood options. Like most developing countries, such as Ghana, fisheries has been observed to "rhyme with poverty" Bene (2003) as a result of lack of alternative livelihoods.

Ghana has a coastline of about 550 km and a total continental shelf area of approximately 24,300 square kilometers. The Exclusive Economic Zone (EEZ) waters extend up to 200 nautical miles from the shore (FAO, 2008; Amador *et al*., 2006). The fishery industry of Ghana comprises mainly the marine sector and the inland sector. The marine fisheries sector is the main source of fish producing 85 percent of the total catch. The inland sector accounts for the remaining 15% of Ghana's fisheries production (FAO, 2008).

Fishing effort in Ghana has largely been unregulated and poorly managed, resulting in intensive exploitation and severe depletion of fishery resources (Ofori-Danson *et al*., 2012). Over the past decade, catches in local Ghanaian waters have declined by over 50% (Directorate of Fisheries/Marine Fisheries Research Division/FAO, 2011).

There is a general perception that a number of small-scale fishers mainly use destructive fishing gears, which can degrade habitat, capture high proportions of juvenile fish and ultimately lead to reduced yields. They also employ more fishing effort or intensity (such as high number of gears and canoes, many trips and longer fishing hours) that put excessive pressure on fishery resources, leading to overexploitation. The livelihoods of many small-scale fishing communities that directly depend on fisheries are under increasing threat and vulnerable to poverty. One major reason behind this observation is the lack of alternative livelihoods. However, few studies have analysed alternative livelihoods and its implications on fisheries management in the context of the small-scale fisheries of Ghana. It is widely considered that asking fishers and users is the best way to begin to find solutions to fisheries problems (McCay *et al*., 2003).

The overall aim of this study is to examine alternative livelihoods in small-scale fisheries of Ghana in order to reduce pressure on fishery resources and enhance sustainable management of fish stocks.

MATERIALS AND METHODS

Study sites: Study sites were Small London (rural inland fishing community, Latitude: 6°13′ 51″ N, Longitude: 0°5′ 29″ W), Kpong (urban inland fishing community, Latitude: 6°9' 0 N, Longitude; 0°4' 0 E), Ahwiam (rural coastal fishing community, Latitude: 5° 45' 0 N, Longitude; 0° 13' 60 E) and Elmina (urban coastal fishing community, Latitude: 5° 5′ 0″ N, Longitude: 1° 21′ 0″ W) (Fig. 1). These communities are involved in varieties of important fishing activities

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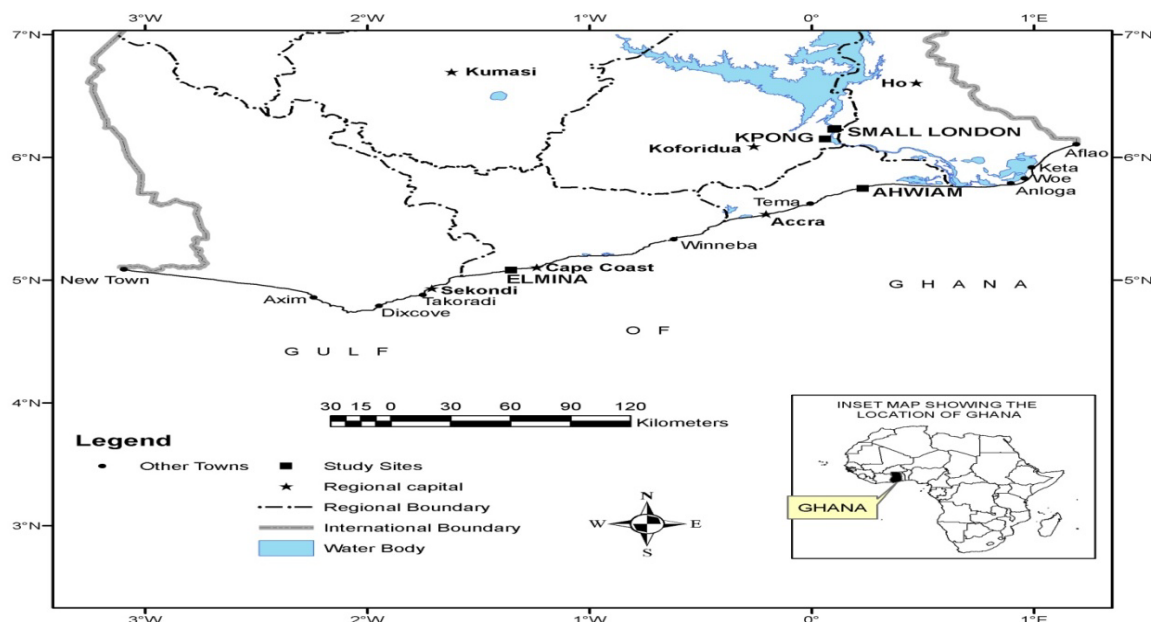
Fig. 1: A map of southern Ghana showing study sites

Table 1: Summary of sample size and strategy in fisher interview and key informants

Location	Sample size*	Sampling strategy
Small London	Fishers = 50 key informants = 10	Stratified random sampling
Kpong	Fishers = 50 key informants = 10	Stratified random sampling
Ahwiam	Fishers = 50 key informants = 10	Stratified random sampling
Elmina	Fishers = 50 key informants = 10	Stratified random sampling

*: Based on 2004 Canoe frame survey (Amador *et al*., 2006) and active canoes estimated

and are destinations for a significant number of migrant fishers.

Methods of data collection: Primary and secondary data were utilised through fishers interview, document analysis, focus group discussions and key informants. Stratified random sampling technique based on the 2004 Ghana Canoe Frame Survey (Amador *et al*., 2006) was used to select the representative fishers for the study. A total of 50 fishers were selected in each site. The interview was carried out between January-December 2010.

Fisher interview: The aim of fishers interview was to investigate fishers ability and willingness to adopt alternative livelihoods. Fishers were randomly selected and interviewed, either on-site or in their homes.
Fisher interview covered the following topics:

- Demographics (age, education, family size)
- Fishing activity (gear, target species, catch, fishing effort, number of years fishing)
- Economics (fishing costs and incomes, other sources of non-fishing incomes, household expenditures)
- Perception and attitude towards other types of potential employment
- Fishers' criteria for feasible alternative livelihoods

- Whether fishers would be willing to move away from fishing to other activities. (Table 1)

Focus group discussion and key informants: Discussions were held with key informants including; fishers, fisheries managers, civil servants and local authorities on the following:

- Plans for alternative livelihoods
- Financial costs of alternative activities and availability of funds and personnel
- Planned method/means of implementing alternative livelihoods

Document analysis: A number of publications produced by individuals, organizations and multimedia were analysed as secondary data sources (i.e. Ghana Statistical Service, Directorate of Fisheries, Food and Agricultural Organization). Documents generated in the field were also analysed (i.e., field notes, photographs and diagrams). Documents analysed include previous fishers alternative livelihoods and Sustainable Fisheries Livelihoods Programme.

RESULTS

Fishing activities and socio-demographic characteristics of fishers: Table 2 summarizes the

fishing activities of the fishers. Between 80% and 97.7% of the fishers interviewed declared fishing as their main occupation. However, the percentages of those who accepted fishing as their only income deviated quite substantially from these figures (Table 4), indicating that quite a few had additional sources of income from farming and various artisans trades.

Most respondents indicated that they had members of their last generation involved in fishing and fishing related activities, usually father (66.7 and 100%). Hence, the majority of fishers were introduced into fishing by one of their relatives. The importance of fishing on the cultural and social background of fishers cannot be underestimated.

The mean number of household members assisting in fishing were two or three, usually wife and children. However, most fishers would not encourage their children to take up fishing as their main occupation because of low incomes, unsustainable and unpredictable nature of fisheries in the form of low catches.

In general, the average years fished were; Kpong (11.5), Small London (27.7), Ahwiam (15.3), Elmina (15.7). Fishing grounds were habitat specific (that is, freshwater or marine) and fishers hardly changed fishing habitat, though they migrate to other places. Fishers at Small London usually fished at specific grounds for West African pygmy herring (*Sierrathrissa leonensis*).

The mean number of fishing days was 5 (both at freshwater and marine communities). Thursday is a non-fishing day at Kpong while Tuesday is also a non-fishing day at Ahwiam and Elmina. Fishers usually use these days to repair their gears and attend to other social functions. There was no non-fishing day in Small London. In most fishing communities in Ghana, a day or two in a week known as 'fishing holiday' is set aside for maintenance of fishing gears and canoes. The daily mean fishing time was 7-12 hours.

The mean number of fishing crew per canoe was between 1-2 and 1-9 for freshwater and marine communities, respectively (Table 2). The mean number of canoe per household was between 1 and 3; while individual ownership was 1 canoe per fisher. From the interviews, it was found out that most canoe owners hired other fishers to help them in fishing. Payments are in the form of catch sharing or by cash. Sharing system varies with gear and location. *Wasta* sharing system at Elmina is as follows: 75% canoe and 25% crew. At Ahwiam the sharing system for *Wasta* is: 67% net and 33% crew.

Table 3 summarizes the socio-demographic and economic characteristics of fishers. From the table, it can be observed that the mean age was; 45.7, 50.3, 33.0 and 38.7 years for Kpong, Small London, Ahwiam and Elmina, respectively. This is an indication that the fishing population is aging. 100% of fishers involved in the actual fishing activity were men. In the study stations, like many other places in Ghana, women do

Table 2: Fisheries data from interview

Indicators	Kpong	Small London	Ahwiam	Elmina
Fishery as the main occupation (%)	80	97.7	93.3	90
Last generation fishers (%)	100	100	100	66.7
Years of fishing (mean±SD)	11.5±6.5	27.7±13.3	15.3±8.4	15.7±8.9
Fishing time (mean±SD)	7.4±3.2	8.4±3.3	12.1±9.0	7.0±2.9
Weekly Trips (mean±SD)	5.2±0.7	5.5±1.4	5.1±0.9	5.8±0.7
Crew size	2.0±0.6 (1-3)	2.2±0.9 (1-4)	9.9±8.3 (1-20)	9.8±5.3 (1-24)
No. of canoe per household (mean±SD)	1.2±1.4	1.7±0.6	3.0±1.8	1.2±2.0
Canoe owned	0.8±0.5	1.3±1.2	1.0±1.83	0.2±0.5
Household members assisted in fishing (mean±SD)	0.6±0.5	1.0±0.6	3.0±2.0	2.5±1.1
Type of fishing ground (freshwater/Marine) (%)	100 freshwater	100 freshwater	100 marine	100 marine

Table 3: Socio-demographic and economic characteristics of fishers

Indicators	Kpong	Small London	Ahwiam	Elmina
Age of fishers (mean ±SD)	45.7±4.6	50.3±19.7	33.0±5.78	38.7±14.4
Head of household (%)	Yes: 40	Yes: 100	Yes: 36.7	Yes: 70
	No: 60	No: 0	No: 63.3	No: 30
Number of children (mean ±SD)	3.0±1.6	5.0±4.0	5.3±2.9	6.6±2.3
Years of formal education (mean±SD)	8.6±1.9	8.0±2.0	2.6±2.9	7.7±5.2
Literacy rate (%)	80	93.3	66.7	70
Size of household	10±5.2	6.7±4.0	15.8±3.3	8.7±2.4
Financial dependency (mean±SD)	4.2±2.1	4.3±1.5	8.0±1.5	5.7±3.5

Table 4: Percentage of respondents who are engaged in Alternative Livelihoods (AL) and areas of alternative livelihoods

	Small London	Kpong	Ahwiam	Elmina
Percentage	4%	20%	6%	10%
Areas of AL	Crop farming, auto mechanic, carpentry, block molding, teaching, research station	Crop farming, livestock rearing, aquaculture, corn mill operation, commercial car driving, seasonal poultry and restaurant immigrant, private security, research station	Crop farming, livestock rearing, salt mining, commercial car driving	Crop farming, livestock rearing, trading in non-farm items, teaching

Table 5: Fishers alternative livelihoods interests and skills levels

AL area	Small London		Kpong		Ahwiam		Elmina	
	Level of interest (%)	Level of skills (%)	Level of interest (%)	Level of skills (%)	Level of interest (%)	Level of skills (%)	Level of interest (%)	Level of skills (%)
Eco-tourism	100	50	100	30	100	90	100	100
Aquaculture	100	100	100	100	100	72	80	86.7
Fish processing	100	100	100	100	100	100	90	96.7
Vegetable farm	100	100	100	100	90	90	73.3	76.7
Livestock raising	100	100	100	100	100	90	80	76.7
Others(factory,construction, artisanal trade)	60	16	84	36	80	24	76.7	50

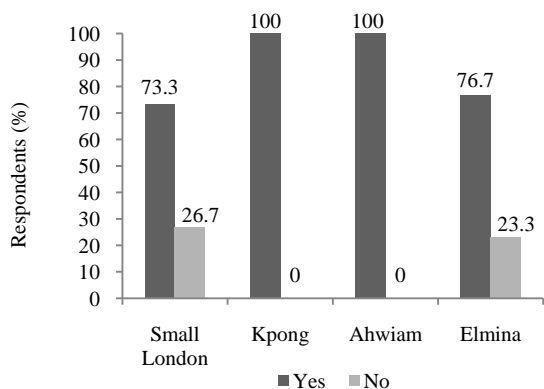*Based on fishers interview conducted. sample sizes in Table 1

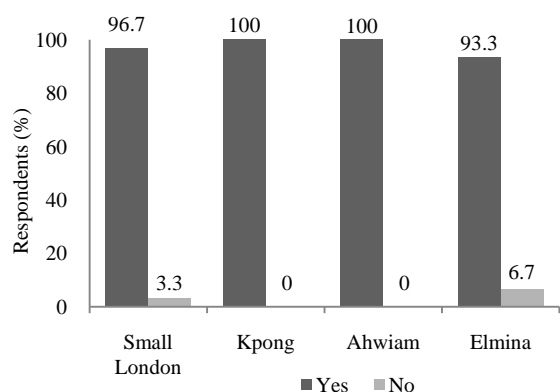Fig. 2: Willingness of respondents to switch to other AL jobs

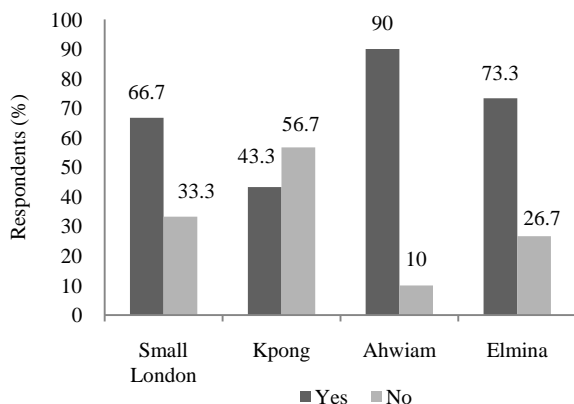Fig. 3: Willingness of respondents to learn required skills

Fig. 4: Willingness of respondents to stop fishing all together

not go fishing but are involved in activities such as processing, marketing and financing. Age and gender

limits a person's possibility to be a fisher because of traditions, physical abilities and social relations. Most fishers indicated that they were the heads of their own households, hence, bread winners of their families; 40%, 100%, 36.7%, 70% for Kpong, Small London, Ahwiam and Elmina, respectively. The mean household sizes were; 10, 6.7, 15.8 and 8.7 people for Kpong, Small London, Ahwiam and Elmina, respectively.

Financial dependency was between 4 and 8 people.

Alternative Livelihood (AL) results: Between 4%-20% of respondents were engaged in alternative livelihoods in addition to fishing (Table 4). Activities that fishers were mostly engaged were; crop farming, livestock rearing, teaching and trading in non-farm items. Income derived from alternative livelihoods jobs (average GH¢ 50-70/month; USD 26.5-37.1) were used to support fishing income since most fishers complained that income from fishing was marginally low.

Between 73%-100% of interviewed fishers indicated their willingness to switch jobs, with the remaining indicating that they will not consider switching jobs (23.2%-26.7%; Fig. 2). Fishers were willing to take fishing and agriculture-related jobs, such as boat operators, tour guide, crop and livestock farmers, aquaculture farmers, construction and factory workers (Table 5). However, fishers do not think that there are enough of these jobs to absorb them if they are to switch from fishing. The amount of income that respondents expect alternative livelihood job to provide if they are to switch from fishing is GH¢ 200- GH¢ 300/month (USD 106-159).

Of those who were willing to switch jobs, concern about not being able to secure a job outside agriculture-related jobs due to low qualification and skills were high (50% and over). Most of the fishers possess limited skills besides fishing and agriculture-related areas, with level of education ranging from none at all to elementary (i.e. primary, Middle School Leaving Certifiacte and Basic Education Certificate). However, most of the fishers were willing to learn the required skills (Fig. 3).

A sizeable number of fishers (10-56.7%) were not willing to stop fishing all together (Fig. 4). Fishing has been part of the identity and culture of fishers for many

generations. This was evident at Kpong, whereby fishers who were more willing to switch fishing to other jobs were also less willing to stop fishing all together (43.3%). Accordingly, fishers will continue to fish and efforts to regulate and reduce pressure on fishery resources need to be given serious attention.

Fishing pressure: Table 6 to 9 provide data on fishing pressure and income in terms of fishing trips, hours, number of gears and canoes employed. It can be observed that number of gears and canoes employed daily were not significantly different among sites. However, there were significant differences between weekly fishing trips, daily fishing trips and daily fishing hours (ANOVA, df = 1, p = 0.05); t-Test; two-tail, (p = 0.05). Income is widely used as indicator of poverty, hence was used in this case.

Overall, low income fishers had weekly mean income between GH¢ 32 and GH¢ 81.6, while high income group had weekly mean income between GH¢ 115 and GH¢ 200.7. Fishers at Elmina had highest

weekly mean income of GH¢ 200.7 with 5 days weekly fishing trips; and a total of 61.5 weekly fishing hours.

Low income fishers at Elmina had weekly mean income of GH¢ 32, with 3 days weekly fishing trips and a total of 31.2 weekly fishing hours. On the other hand, high income fishers at Kpong had weekly mean income of GH¢ 115 with 4 days weekly fishing trips; and a total of 28 weekly fishing hours. Low income fishers at Kpong had weekly mean income of GH¢ 63, with 6 days weekly fishing trips and a total of 24 weekly fishing hours. The reasons behind these differences is due to marketing options, species targeted (especially tilapias) and trading in commercially farmed Nile Tilapia *Oreochromis niloticus*. The nature of fishery resources and market are two most important factors that could influence the level of income and hence, poverty in fisheries. In the inland fishing communities, high income group had longer fishing hours but less weekly fishing trips compared with low income group.

Table 6: Income and fishing pressure at small London

	Income less than or equal to GH¢ 63.00 per week)	Income group (greater than GH¢ 63.00 per week)	ANOVA[1] & t-Test[2]
Weekly mean income (GH¢)(mean ±SD)	81.6±9.4	155±117.8	SD
Weekly fishing trips (mean±SD)	6.0±0	6.7±0.6	NS
Daily fishing trips	2	2	NS
Daily fishing hours	6.0±5.7	7.0±7.1	NS
No. of canoe employed daily	1	1	NS
No. of gears employed daily	1	1	NS

Table 7: Income and fishing pressure at Kpong

	Income less than or equal to GH¢ 81.00/week)	Income greater than GH¢ 81.00/week)	ANOVA1 & t-Test2
Weekly mean income (GH¢)(mean ±SD)	63.1±83.0	115±142.9	SD
Weekly fishing trips (mean±SD)	6.0±0.7	4.5±1.6	NS
Daily fishing trips	1	1	NS
Daily fishing hours	4.0±2.1	7.0±1.4	SD
No. of canoe employed daily	1	1	NS
No. of gears employed daily	1	1	NS

[1]: Based on the One-Way ANOVA (df=1, p = 0.05). [2] Based on t-Test: Two-Sample Assuming Equal Variances P (T< = t) two-tail; p = 0.5; mean ± SD; NS = not significant; SD= significant different

Table 8: Income and fishing pressure at Ahwiam

	Income less than or equal to GH¢ 43.00 per week)	Income greater than GH¢ 43.00 per week)	ANOVA1 & t-Test2
Weekly mean income (GH¢)(mean ±SD)	43.8±42.2	182.0±0.0	SD
Weekly fishing trips (mean±SD)	3.0±0.0	6.3±0.5	SD
Daily fishing trips	1	1	NS
Daily fishing hours	8.1±0.9	12.1 ± 8.6	SD
No. of canoe employed daily	1	1	NS
No. of gears employed daily	1	1	NS

Table 9: Income and fishing pressure at Elmina

	Income less than or equal to GH¢ 32.00 per week)	Income greater than GH¢ 32.00 per week)	ANOVA1 & t-Test2
Weekly mean income (GH¢)(mean ±SD)	32.0±9.1	200.7±99.0	SD
Weekly fishing trips (mean±SD)	3.2±1.9	5.2±1.3	SD
Daily fishing trips	1	1	NS
Daily fishing hours	10.4±6.8	12.3±8.3	NS
No. of canoe employed daily	1	1	NS
No. of gears employed daily	1	1	NS

[1]: Based on the One-Way ANOVA (df =1, p = 0.05); [2]: Based on t-Test: Two-Sample Assuming Equal Variances P (T< = t) two-tail; p = 0.5 Mean ± SD; NS = not significant; SD = significant different

DISCUSSION

The current level of fishing pressure and declining catches in the small-scale fisheries calls for the provision of alternative livelihoods for fishers to enhance fisheries management (a step towards reduction in fishing effort). Fishers will continue to fish till the last fish species is caught, thus, fishing pressure needs to be reduced by the provision of alternative livelihoods. Alternative livelihoods are seen as the way to help and encourage fishers dependent on fishery resources to move away from unsustainable harvesting practices. Alternative livelihoods can lead to poverty alleviation in fisheries (Neiland, 2004). Every overfished species poses challenge in terms of food security and poverty to the fishers and the nation. Experiences could be drawn from other parts of the world. For instance, the collapse of the Atlantic Cod fishery in the Eastern Scotian shelf of Canada in the early 1990s; and the overfishing by trawlers in the North Sea of the Coast of the United Kingdom, where total fish catches decreased by 5-10 times (depending on fish species) during the past decade (Stolberg *et al.*, 2006), led to thousands of job lost and some valuable fish species on the brink of extinction. Such occurance need to be avoided in Ghana since it will hamper our effort in attaining the Millennium Development Goals' of reducing poverty, hunger and attaining environmental sustainability. Alternative livelihoods will reduce fisher's over-dependency and over-capacity of the fishery resources, fishing effort, enhance stock recovery and ultimately ensures successful Fisheries Management (FM).

This study indicated that over 73% of fishers interviewed were willing to switch jobs, with the remaining saying that they would not consider it. This result implies that there is a good potential for well-designed alternative livelihood schemes to succeed. However, most fishers (50%) did not have the required skills to work outside the fishing and agriculture related areas. Therefore, any well-designed alternative livelihoods scheme will have to address how to improve suitable skills among fishers. Given the concern expressed by fishers that current alternative livelihood options in the fishing sector are restricted (fish processing, farming, eco-tourism) any scheme will have to look outside the fishing sector.

Government and interested stakeholders should work to increase job and livelihood diversification for fishers. At the moment, the ability of fishers to diversify their livelihood is constrained by factors beyond their control. These include:

- Inadequate capital assets and uncertain access to inputs
- Limited market and growth potential for recreational fishing and eco-tourism industries
- Lack of credit facilities to diversify into other income generating activities
- No mariculture activity or investment, though the opportunities are there

In addition, fishers acknowledge that their poor education is an obstacle to finding employment in other sectors. Government programmes can therefore consider training which will give fishers more marketable skills outside the fishing sector, example, skills for carpentry or electrical trades and information technology. Non-Governmental Organizations (NGOs) could also help in the provision of training programmes for fishers.

One area that should be taken into serious consideration in the provision of alternative livelihoods is the socioeconomic background of the fishers. The socioeconomic background of the fishers was diverse (Table 2). Larkin (1988) asserted that, managing fisheries is concerned more with the people than the resources. Nunoo (2003) also argued that, knowledge about the socioeconomic conditions under which fishers operate is important for the development of more prudent and effective fisheries resource management. Many alternative livelihood programmes rarely turn out to be successful, including those in Ghana and elsewhere (Kraan, 2009). The major reason behind is, the absence of socioeconomic information. The use of general socioeconomic information may sometimes miss the mark, hence, site-specific information is essential in provision of alternative livelihoods and fisheries management in general. Allison and Ellis (2001) indicated that, alternative livelihoods often results in disappointing or even perverse outcomes if they do not adequately consider the socioeconomic context under which fishers operate. Alternative occupation projects for fishers are likely to fail if they cannot provide the noneconomic aspects of job satisfaction that fishing does (Pollnac *et al.*, 2008, 2001; Pollnac and Poggie, 2006). Having an alternative and being able to make choices, is a way out of poverty (Kraan, 2009). Without proper socioeconomic information, any alternative livelihood in Ghana's small-scale fisheries is bound to be least effective, at worse a failure.

In general, this study shows that a sizable number of fishers are willing to pursue alternative livelihoods under a well-designed fisheries adjustment programme. In fact, the current costs of the fisheries (i.e., fuel, maintenance and other inputs costs) outweigh the returns and the profitability from fishing is low or negative for majority of fishers. It appears therefore that, the time is ripe for the Government of Ghana to work with fishers, NGOs and other interested stakeholders (universities, ministries, departments) to devise a strategic plan to help secure the flow of benefits from Ghana waters to both the current and

future generations of Ghanaians. Alternative livelihoods are important in managing and sustaining the small-scale fisheries for the current and future Ghanaians.

Furthermore, the role of poverty in fisheries has been explored from exogenous and endogenous perspectives, Bene (2003). Exogenous origin of poverty in the fishery, in which poverty arises from a lack of alternatives outside the fishery sector. This study reveals that the exogenous factor exists in small-scale fisheries of Ghana and plays a role in how fishers respond to fluctuations in the fishery, by intensifying fishing pressure.

In fact, regulating fishing pressure will not affect the livelihood of the poor only, even though, they are more vulnerable to poverty. Therefore, any initiative to reduce fishing pressure has to address all the key causes simultaneously in order to be effective (i.e., through the provision of alternative employment and enforcement of fisheries regulations).

Realistically, with low level of alternative occupation between 4% and 20% (Table 4), high number of fishers will continue to depend on fisheries as means of livelihood, resulting in depletion of fishery resources and ultimately economic and social blow to the small-scale fishers, the country and the sub-region as a whole.

CONCLUDING REMARKS

The study has showed that, alternative livelihoods are important in managing the fisheries resources in Ghana. Hence, the provision of alternative livelihoods will help in reducing fishing pressure and enhanced fisheries management eventually. Moreover, fishery problems and their management alternatives go beyond the scope of fish stock analysis, encompassing the socioeconomic and behavioral characteristics of fishers. Managing fisheries effectively would obviously require an understanding of the socioeconomic characteristics of the small-scale fishers.

Attempts should be made in controlling the increasing fishing pressure and effort (i.e., number of canoes, days at sea, number of gears employed) by provision of alternative livelihoods that fishers possessed the required skills. Alternative livelihoods will be the best option to help and encourage fishers dependent on fishery resources to move away from unsustainable harvesting practices and reduce fishing effort.

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REFERENCES

Allison, E.H. and F. Ellis, 2001. The livelihoods approach and management of small-scale fisheries. Mar. Policy, 25: 377-388.

Amador, K., P. Bannerman, R. Quartey and R. Ashong, 2006. Ghana canoe frame survey 2004. Information Report Number 34. Marine Fisheries Research Division, Ministry of Fisheries, Ghana.

Bene, C., 2003. When fishery rhymes with poverty: A first step beyond the old paradigm on poverty in small-scale fisheries. World Dev., 31: 949-975.

Directorate of Fisheries/Marine Fisheries Research Division/FAO, 2011. Total Fish Catch by Region and Gear 2000-2010. Marine Fisheries Research Division, Directorate of Fisheries, Tema, (2011 Unpublished).

FAO, 2008. Present and Future Markets for Fish and Fish Products from Small-scale Fisheries-case Studies from Asia, Africa and Latin America. FAO Fisheries Circular No. 1033. FAO, Rome, pp: 87.

Kraan, M., 2009. Creating space for fishermen's livelihoods. Anlo-Ewe beach seine fishermen's negotiations for livelihood space within multiple governance structures in Ghana. Ph.D. Thesis, African Studies Centre African Studies Collection, Leiden.

Larkin, P.A., 1988. The future of fisheries management: Managing the fisherman. Fisheries, 13: 3-9.

McCay, B.J., N. Dolaak and E. Ostrom, 2003. The Commons in the New Millennium: Challenges and Adaptation. MIT Press, Boston, USA, pp: 393.

Neiland, A., 2004. A Review of Fisheries Development Policies Since 1950. In: Neiland, A. and Bene, C. (Eds.), Poverty and Small-scale Fisheries in West Africa. FAO and Kluwer Academic Publishers, Dordrecht, pp: 252.

Nunoo, F.K.E., 2003. Biotic, Abiotic and anthropogenic controls of fish assemblages caught in beach seines at Sakumono, Ghana and their management implications. Ph.D. Thesis, University of Ghana, Legon, Ghana, pp: 153.

Ofori-Danson, P.K., K. Apegyah, B. Asiedu and D.K. Atsu, 2012. Stock assessment study and fisheries management plan for the Bui Reservoir 2012. Report Submitted to the Bui Power Authority, pp: 104.

Pauly, D., V. Christensen, S. Guénette, T.J. Pitcher, U.R. Sumaila, C.J. Walters, R. Watson and D. Zeller, 2002. Towards sustainability in world fisheries. Nature, 418: 689-695.

Pollnac, R.B., S.R. Pomeroy and T.H.I. Harkes, 2001. Fishery policy and job satisfaction in three poverty traps. J. Econ., 77: 5-37.

Pollnac, R.B. and J. Poggie, 2006. Job satisfaction in the fishery in two southeast Alaskan towns. Hum. Organ., 65: 332-342.

Pollnac, R.B., S. Abbott-Jamieson, C. Smith, C. Miller, P. Clay and B. Oles, 2008. Toward a model for fisheries social impact. Mar. Fish. Rev., 68: 1-4.

Stolberg, F., O. Borisova, I. Mitrofanov and P. Eghtesadi, 2006. Caspian Sea: GIWA Regional Assessment 23. University of Kalmar and UNEP, Kalmar, Sweden.