

Report from fact-finding mission to Ghana 8-21 August 2015

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Executive summary

1. Background and purpose for the trip

Over the years, 19 students from Ghana have graduated from the International Fisheries Management Programme (IFM) at the Norwegian College of Fishery Science (NCFS) at the University of Tromsø, the Arctic University of Norway. In addition, three other students from Ghana are in their first and second year of the programme now. These students are trained and supervised by professors with broad experience in fisheries, aquaculture and development research from all over the world, but with no specific knowledge about fisheries and aquaculture in Ghana. Therefore, professor Bjørn Hersoug and professor Jahn Petter Johnsen from NFCS in the period 8-21 August 2015, went on an educational tour to learn more about fisheries and aquaculture in Ghana and to explore training needs and potential for educational and research collaboration with relevant institutions. The report is a summary of information from informants and of information collected from written sources. Description of the trip and the persons met can be found in Annex 1.

2. Marine fisheries

General

The fisheries in Ghana (sea and inland?) are estimated to account for about 10% of the employment in the country. The annual catch from marine fisheries is estimated to be around 320 000 tonnes, but the figures are uncertain. More than 2 million people depend on the fisheries in Ghana. The sector accounts for 60% of the animal protein consumed in the country and 75% of the fish catch is consumed locally. The average consumption per person is estimated to 23.7 kg, which indicate that Ghana has to import about 50% of the fish needed for consumption. The fish is caught by fishers from 186 villages landing fish on 302 beaches along the coast.

The export value, mainly from Tuna and cuttlefish fisheries, are reported to be about 254.4 mill USD.

Marine resources and management

The resources outside Ghana can according P. Bannerman, Head, Fisheries Scientific Survey Division; Fisheries Commission (FC) be divided in three different groups:

- Small Pelagic resources (sardinellas, anchovys, mackerels etc) (Inshore and semi industrial fleet)
- Large Pelagic Resources (Tunas & Tuna-like species, specialized tuna fisheries)
- Demersal Resources (Bottom species eg. Sea Breams, Grunts, Cassava-fish, Cuttlefish, Shrimps etc). The demersal species are except from cuttlefish and shrimps fished by the inshore fleet, while shrimp and cuttlefish are fished by industrial trawlers.

Our informants pointed out that in general the open access regime and inadequate regulations are major challenges. In general, there is lack of knowledge about the resources. In particular, this is a problem in the exclusive inshore fishing zone, shallower than 30 meter or inside 6 nautical miles, where most of the canoe fishing is going on. Dr. Fritjof Nansen surveyed Ghanaian waters regularly from 1989 to 2007, but did not cruise in the shallow waters. After 2007, there has not been any cruises. Thus, updated data is lacking for Ghanaian waters. Research is based on conventional models and deals mainly with target species; it is predictive and not adaptive. Low funding for research, lack of human resources and infrastructure for research, extension and development services, control and monitoring are major obstacles to better knowledge and potential better management. Lack of a smaller research vessel for cruises in shallow waters where Dr. Fritjof Nansen cannot cruise makes it difficult to monitor the resources in shallow waters.

The state management style is top down with little involvement of stakeholders. On the other side, the traditional system with fishing chiefs and the local councils still hold a strong position in canoe fishing, although this system according to our informants also lose some power. According to our informants, the traditional system is to some extent becoming politicized, which may make it less legitimate for groups of fishers who do not support the chief's and the council's policy.

Catch

The figures are uncertain, but total annual catch is by several sources estimated to be around 350 000 tons of various species. Several sources claim that that catches are declining. In terms of volume, canoe fishers land 70-80% of total the catch. Almost all the fish from the artisanal sector is consumed locally. The post-harvest losses are estimated to be around 20%.

Fleet and fishers

Offshore fleet

About 100 trawlers and Tuna vessels operate from Tema and Takoradi. The offshore fleet is owned by joint ventures (JV) between Chinese and Ghanaian investors (trawlers) and Ghanaian and South-Chorean investors (Tuna).

Semi-industrial fleet

About 230 vessels operate from 7 landing sites. Partly operated as JV with investors from abroad.

We have not been able to find updated information (after 2007) about these two segments of the industry.



Figure 1. Semi-industrial vessel

Inshore fleet

Since last Canoe frame survey in 2004, the total number of canoes has increased with 13,5% to 2013. The inshore fleet is largely motorized, as much as 73 % of the canoes are using outboard engines (2013). This is a 46% increase in motorization from 2004 in terms of motorization is about 45%. The 40hp Yamaha is the standard size and brand of outboards.

Table 1. Fleet structure after use of gear

	Number
Purse net canoes	3085
Beach seine canoes	1074
Line canoes	1142
Lobster set net canoes	1236
Ali drift net canoes	1873
Other drift net canoes	976
One man canoes	81
Total number of canoes	12728

The number of canoe fishers is 139155, an increase of 12% since 2004.

Table 2. Regional distribution of fishers

	%
Volta	13,0
Greater Accra	28,6
Central	29,1
Western	29,3

According to a socioeconomic survey among 110 canoe fishers, 40% of the fishers are between 40 and 50 years old, while 36% are older than 51. 52% of the fishers have no education, while 40% have primary school. Fishers are according informants in FC oriented towards the sea, and have little interest in jobs on land. However, 56% of the fishers report to have additional income. The age and educational level may be an obstacle to change in the sector, as people in the 40s and the 50s without education may have limited opportunities to fish other jobs. In the survey, 70% are married to only one wife and 68% have more than five children. In terms of income level, fishers are not necessarily to be regarded as poor.

The canoe fisheries are not regulated. There is open access and very few restrictions on the fishery. Many of our informants, presented the open access regime as the major challenge for Ghanaian fisheries, which in terms of size and organization are very difficult to monitor and control. This problem increases by the fact that the FC also lacks manpower and financial resources. Fishing is a family based operation with core and extended family involved. Both the fishing and the processing in the inshore sector heavily depend on social networks. Fishers can be financed on non-interest terms by female fish mongers, who on the other hand have the first right to buy the fish.



Figure 2. Canoes

Processing and sales

Women are the main actors in fish sale and processing, of whom 52% reported to be the sole responsible for supporting their children. However, 47% reported that they also received support from the husband. The main processing method (76%) is smoking, which takes place in the local village. After smoking, the fish is distributed to other

women for sale at the market. According to the framework survey, the fishmonger womens' businesses depend on loans and credits from individuals, financial and non-financial institutions with high interest rates. Inshore fishing, first hand sales, processing, transport and marketing are strongly interconnected and woven together with other income generating activities. In general the size and the network organization of fisheries and fish processing in Ghana, makes it difficult to approach the sector from a value chain perspective. The social values produced through the complex fisheries network have to be taken into account if stricter management is put in place. Thus, a livelihood perspective is required to fully understand the relationships. For example, strict management of the canoe fisheries will not only affect the whole value chain, but may also affect other livelihood strategies.



Figure 3. A fishmonger at the beach and processors in front of their smoking kiln

Development needs in the marine sector

There is a lack of updated knowledge about resources, access and effort. The FC also lacks manpower and infrastructure for monitoring and control. There is a need to reduce post-harvest losses and to improve the handling of the fish. Finally, there is probably also a need to improve the stakeholder stakeholder participation in the fisheries.

3. Inland fisheries

For years inland fisheries have been considered a marginal sector, but the number of participants is rapidly increasing and inland fisheries provide an important part of food security for the rural population. The fisheries take place in rivers, lakes and dams and involve some 70,000 fishers as per 2014. Fisheries on the Lake Volta is by far the most important and started in earnest when the dam was finished in the mid-1960s. However, the then local population was not to any important degree involved in fishing, and the fishermen largely emigrated from the coast, taking with them boats, fishing gear. Over the years there has been a dynamic exchange between the coast and the lake fishery, thus fishers are migrating back and forth, depending on the situation in the fisheries. At the

moment the fisheries in Lake are at a low, due to reduced water levels, for the fifth consecutive year. The fisheries authorities claim there are signs of overexploitation (lesser number of species and smaller size), but there is no reliable catch statistics. The last comprehensive statistics (frame survey) was made in 2000. According to the National Fisheries and Aquaculture Policy (MOF 2008) the potential is indicated to be in the range of 150,000 tonnes per year, while the actual catch is estimated to be 82,000 tonnes (DoF, 2007). In spite of lower catches and decreasing water levels, the Lake Volta fishery still attracts fishers from the coast, thus indicating a certain level of profitability, with the tacit understanding that the alternative value of labour is close to zero.

Inland fisheries are largely regulated by way of gear restrictions (size and type of gear), while zoning is due to be introduced in Lake Volta. There are no catch limitations. According to the fisheries authorities, the possibilities for increasing catches from inland fisheries are limited. That is why aquaculture now is heavily prioritised. Still, it should be noticed that the inland fisheries play an important role, both in terms of providing food and employment. Any restricted entry into these fisheries is bound to affect people with few or no alternative employment, and hence reduce food security.

4. Aquaculture

Efforts of introducing aquaculture have a long history in Ghana, but so far the results have been very modest. The colonial administration started back in 1953 with hatcheries to supply fingerlings to the reservoir programme, as a means to supplement the provision of fish and to increase livelihood opportunities. After independence, the national government adopted a policy to develop fishponds within all irrigation schemes in the country, thus setting aside 5 per cent of the area in each program for fish farms. Nile tilapia (*Oreochromis niloticus*) was introduced from Egypt, in order to boost fish production.

However, the production was modest and knowledge about feed requirements and water quality was largely lacking. In the 1980s the new government (the Armed Forces Revolutionary Council) strongly promoted aquaculture and a large number of people, farmers and investors, rushed into the sector, again with modest results and many, including banks, lost substantial amounts of money. The third wave came from 2000 onwards, when the first farmers started with cage culture in the Lake Volta basin. Tilapia was again the preferred species supplemented by catfish (*Clarias gariepinus*). As per 2015 there are around 20 farms running on a commercial scale with another 30 operators having small-scale farms.

The total aquaculture production in 2014 was 38,000 tons, of which around 2/3 from Lake Volta, the remaining from other lakes and ponds. This constitutes around 10 per cent of the total fish production in the country. Aquaculture, and in particular cage

culture of tilapia, has been strongly prioritised in the government's new policy and a special plan for aquaculture has been developed.

There are however, a number of challenges. The most important is lack of quality fingerlings, produced in hatcheries. There are few hatcheries, and most of them have limited capacity. The second applies to feed, which the farmers find rather expensive. There is currently one feed factor in the country, Raanan, a joint venture (owners from Israel and Ghana) producing feed for various species, while start feed for tilapia is also imported, primarily from the Netherlands. The third challenge applies to extension services, where the Fisheries Commission currently has very limited capacity to follow up on new farmers, giving advice and securing sustainable operations. Finally, it should be mentioned that at the moment no one knows the carrying capacity of Lake Volta, and conflicts with the artisanal fishers are also brewing, which means that zoning has to take place. The positive side is that the market seems insatiable, even if tilapia sold in Accra at very high prices, currently in the range of Cedis x-y, depending on size. Nearly all the fish produced are sold on the national (regional) market.



Figure 4. Aquaculture farm at Lake Volta

5. Fisheries administration

The administration of the fisheries has for long time been part of the Ministry of Agriculture. In 2005 a separate Ministry of Fisheries was created, which later was put under the Ministry of Agriculture, while the present Ministry of Fisheries and Aquaculture Development (MOFAD) was set up in 200?. The executive arm of the Ministry is the Fisheries Commission, presently set up with x divisions. Altogether, some 320 persons are involved in the fisheries administration, including personnel in the regional offices. A special unit was set up to control irregular, unreported (IUU) fishing, consisting of the Marine Police, the Navy and personnel from the Commission. The Commission also has an Advisory Board.

The fisheries administration is constantly claiming that its work is hampered by lack of funds, by lack of qualified manpower and by still being heavily centralised (in spite of decentralisation of certain functions a few years ago). On the other hand, it also seems like the co-operation with traditional authorities like village chiefs and chief

fishermen in each of the fishing villages works reasonably well, where these authorities often are called upon to solve conflicts and find solutions accepted by all parties. While the processors and fish mongers, mainly women, have similar arrangements, it can still be claimed that fisheries policies are largely male dominated (focusing on the resource and the actual fishing), in spite of the fact the a large part of the canoe fisheries are financed and managed by powerful fish-mammies.



Figure 5. Meeting at the Fisheries Commission, the Fisheries Scientific Survey Division

6. Training and research

Norway has a long track record regarding support to education and training in Ghana, starting with Ghana Nautical College, established in the late 1960s, to provide qualified manpower to the shipping sector, including the large fishing vessels (trawlers). This institution has later developed to become the Maritime University of Ghana, training personnel for the maritime sector, including the oil sector. However, this university is now out of fisheries (and aquaculture), where most qualified personnel is coming from the University of the Cape Coast (UCC) and the University of Ghana, Legon (UoG).

UCC offers education on Bachelor, Master and PhD level within marine biology and fisheries (Department of Fisheries and Aquatic Sciences): Fisheries and Coastal Management Capacity Building Support Project. It has recently created a special centre for multidisciplinary research into fisheries and coastal management (CCM) and it has received substantial funding through USAid through the programme: Fisheries and Coastal Management Capacity Building Support Project (USAID/UCC 2014). The cost of the entire programme is in the order of USD x million, where a large part is channelled through the UCC. UCC has got a strong link with the University of Rhode Island, one of best universities of the US in the field of fisheries and marine science, and they plan to send both Master and PhD students to this university in the years to come. However, UCC and in particular the leader of the CCM centre is very interested in establishing

links with the NCFS, UiT for exchange of students and personnel, and possibly running joint research projects in the future.

In the past, most of the Ghanaian IFM students attending the IFM study in Tromsø have come from the University of Ghana, Legon. At this university the actual fisheries and aquaculture education is the responsibility of the Department of Marine and Fisheries Sciences, which is a part of the School of Biological Sciences. They are providing personnel to both the public and the private sector. (Presently there is a moratorium on intake of new employees in the state service for state economic reasons). This institute is most interested in establishing a relationship with the NCFS, preferably through an MOU between the two universities. They have also offered to act as co-supervisors for our Ghanaian students when they are on leave after the first year, collecting information for their Master thesis.



Figure 6. Meetings with the Universities

6. Other Norwegian supported activities (Oil for development and the Nansen programme)

At present there are two other major undertakings with Norwegian support in Ghana. “Oil for development” is a comprehensive programme aiming at providing Ghana with skilled management manpower. The programme includes marine environmental assessments, currently performed by the research vessel “Dr. Fritjof Nansen” in cooperation with the Ministry of Oil and the Environmental Protection Agency (EPA). Ghanaian researchers have participated in these cruises, which also have an important training function. More researchers could possibly be included, depending on capacity on board and the qualifications needed. The relationship between the petroleum sector and the fisheries is disputed in Ghana as well as in Norway, and good monitoring systems may be one way of avoiding direct confrontations.

The other programme refers to the new Nansen programme, involving the new vessel “Dr. Fr. Nansen”, expected to be in operation from 2016. While this programme

covers a variety of activities and countries, there is a particular interest of continuing previous resource cruises (the last in 2007) in order to monitor the offshore fish stocks in Ghana's EEZ and in adjacent waters (often involving a large number of Ghanaian fishers operating in neighbouring countries). Previously Ghanaian students and researchers have been involved in such cruises (and in using the data afterwards). At both universities (UCC and UoG) there is a great interest in participating in stock assessment cruises.

7. Possible Norwegian assistance (“Fish for development”)

Interventions in the Ghanaian fisheries are not an easy task, and a number of projects have failed in the past. The modernization of the offshore (trawling) fleet with Norwegian assistance in the 1970s folded after a few years, largely due to the fact that maintenance of such complicated vessels proved impossible at that time, while also the fishing opportunities offshore were severely restricted by the introduction of national EEZs. (The small-scale canoe fisheries largely modernised themselves, by starting to use outboard engines, mainly imported from Asia).

At present the government and the fisheries administration, supported by USAID and the World Bank strongly argue in favour of reducing capacity in the canoe fisheries. (A capacity reduction of 30 per cent up to 50 per cent has been suggested). While total catches have gone down (partly a result of natural conditions?), the number of fishers has expanded. While the capacity reduction may seem logical from a fisheries economics point of view, it will prove extremely difficult, as most of these people, including fish processors and fish mongers, have few or no alternative employment possibilities. Alternative employment is currently years ahead, and closing open access now, will seriously reduce both employment and nutritional security for many persons and families.

It is probably easier to see what could be done in terms of reducing post-harvest losses, currently estimated to be in the order of 20 per cent of total catches. Where Norwegian assistance could make a difference is by supporting training and education, both in Ghana (short term courses) and abroad (scholarships). The Fisheries Commission has clearly stated that their staff need better qualifications, both in terms of research, actual management and in monitoring, control and surveillance. (MCS). The universities have also indicated that they need more and *better qualified* personnel, especially in relatively new areas such as aquaculture development, where lack of qualified people is most evident.

The Ministry of Foreign Affairs has just recently launched the development program “Fish for development”. The programme is still in its initial phase and the priorities have not been fixed. In the field of capacity building through training and education, Ghana could be an interesting partner in such a programme, provided interest from the Ghanaian government.

8. Business opportunities

While a large number of Norwegian companies are involved in Ghana, primarily connected to the oil industry, the business opportunities in the fisheries sector seem limited. The large tuna vessels are largely owned and operated by Korean/Ghanaian joint venture companies, while the Chinese are involved in the trawlers, most of them old and in bad shape. Hooks, lines and nets for the small-scale fleet are bought from Asia, and the market possibilities in this sector seems limited. However, as there is a need for renewal and maintenance in this fleet, the potential for business opportunities in relation to renewal or maintenance should be looked into.

In the aquaculture sector, there might be larger opportunities, if and when the sector is moving towards larger scale operations. Net pens of Norwegian design are already introduced, while the bulk of the industry is still operating with very simple technical solutions, and with feed from the (only) national company. Building and operating hatcheries may be an interesting option, as this sector is well developed in Norway, although primarily directed to other species. Consultancy work may increase in the future, connected to training, zoning, fish diseases and vaccination, etc.

Annex 1: Travel and persons met

The trip started August 9 with visits to beach seine fishers at Labadi beach, visit to the beaches in James Town, Moree and the harbour in Elmina the August 10. Next morning, August 11 we had a meeting at Cape Coast University, before we proceeded to the fishing village in Sekondi and looked at fishing boats, gear and the construction of semi-industrial vessels. As far as we were able to communicate, we also talked to fishers at all these places. In Takoradi, we met the Regional Director in the Fisheries Commission and the officer responsible for MCS activities, before the harbour authority in Takoradi gave us a guided tour through the fishing port and the fishing village beside it. In the morning, August 12 we went to the fish market in Elmina and watched the landing and trading of fish and also had a talk to the owner of a fishing equipment store. The chief fisherman's office was closed under both of our visits to Elmina.

After Elmina we headed back to Accra for a visit to the Regional Maritime University. August 13 started with a meeting at the Fisheries Commission before visits to one of the bigger fish-farming company's outlet for farmed tilapia, the FCs tilapia hatchery at Afienja. From Accra we went to Akusombo at Lake Volta and visited the research station in the evening and two fish farms on August 14. On Monday August 17 we visited FAO and Environmental Protection Agency (EPA). Tuesday August 18 we visited FCs Research and Statistics department in Tema and the fishing port in Tema. From Tema we went to Ada and looked at the Mangrove and the Shrimp Aquaculture farm close to the beach. Wednesday August 19 we visited the FC and the Norwegian Embassy and Thursday August 20 we had a meeting with people at the Marine and Fisheries Department at the University of Ghana, Legon. Friday 21 August; write-up of report and departure.

Travel Schedule

Date	Place visited	Observation and Facts Found
09. August	Labadi Beach,	Beach seine fishers, works organisation, amount of fish in one haul, marine debris
10. August	James Town Beach, Moree Beach Elmina harbour	Fish landing, fish sales, boat building, fish smoking, gear types (drift net) and maintenance, general living standard and livelihood

11. August	University of Cape Coast	Information about education and research, collaboration with USAID
11. August	Sekondi Beach	Fishing technology, drift nets, fish net material, boat building, gear maintenance, fish smoking, general living standard and livelihood Construction of Semi industrial Vessels
11. August	Regional Office Fisheries Commission, Takoradi	General Information about the fishing industry and management
11. August	Takoradi Fishing Port	Fishing technology, Purse seines and purse seine canoes , Semi-industrial Fleet, fish processing, harbour development
12. August	Elmina harbour and market	Fish landing and sales
12. August	Regional Maritime University, Accra	Education and activity,
12. August	Maritime Trade Information Sharing Centre, Gulf of Guinea	Visit at MTISC, information about sea and traffic monitoring
13. August	Fisheries Commission, Accra	Information about Inland Fisheries and Aquaculture
13. August	Volta Catch –Tropo farm main outlet at Tema Road, Accra/Tma	Fish sales
13. August	Tilapia Cat Fish Hatchery, Afiensa	Production of Fish fry
13. August	Cisir – Water research Institute, Akusombo	Research and production of fish fry, Aquaculture research
14. August	Fish Farm, Mr Lee and Sunwoo Culturing system	Aquaculture production
14. August	Volta Dam	Information about water level changes and conditions in the Lower lake Volta
17. August	FAO and EPA	Fisheries Development in Ghana, Environmental protection in Ghana

18. August	Fisheries Scientific Survey Division, Fisheries Commission, Tema. Visit to Tema Fishing port	Information about fisheries research, the Nansen programme, observation of industrial fleet, technology vessel standard and fish handling
18. August	Ado lagoon, mangrove and shrimp farm	Shrimp farm development, mangrove protection and beach erosion
19. August	Fisheries Commission, Accra	Development and training needs
19. August	Norwegian Embassy	Collaboration opportunities, development, business development
20. August	University of Ghana	Collaboration opportunities, research and education

Persons met (in alphabetical order)

Name (Mr/Ms)	Position and organisation	Place
Addai, Jones (Ms)	Registrar, Regional Maritime University	Accra
Addo, K. A. (Mr)	Professor, Head, Department of Marine and Fisheries Sciences, University of Ghana	Accra
Adjei, Benjamin M. (Mr)	Program officer, Fisheries and Aquaculture, FAO Representation in Ghana	Accra
Agbenor-Efunam, Koja (Mr)	Chief Programme Officer, Oil & Gas, Environmental Protection Agency	Accra
Agyakwah, Seth K. (Mr)	Research Scientist and Consultant, CSIR Water Research Institute	Akosombo
Aheto, Dennis W. (Mr)	Project Manager, USAID/UCC Fisheries and Coastal Management Capacity Building Support Project, University of Cape Coast	Cape Coast
An Dong Bae (Mr)	Fish Farm Manager, SunWoo Culturing system	Akosombo
Anchirina, Janet (Ms)	Zonal Director, Fisheries Commission	Akosombo
Asare, Christine. O. (Ms)	Director, SEA, Environmental Protection Agency	Accra
Ayree, Emmanuel N. (Mr)	Head, Inland Fisheries and Aquaculture Division, Fisheries Commission	Accra

Bannerman, Paul (Mr)	Head, Fisheries Scientific Survey Division, Fisheries Commission	Tema
Bourgon, Nelson (Mr)	Liason Officer , Maritime Trade Information Sharing Centre	Accra
Cudjoe, Peter. G. (Mr)	Fishing Harbour Manager, posrt of Takoradi	Takoradi
Edmond, NN	Hatchery Manager,	Accra
Kudjawan, Jewel (Ms)	Chief Programme Officer, Natural Resources, Environmental Protection Agency	Accra
Kwadjosse, Theodore (Mr)	Officer in Charge, MCSD and Coordinator Fisheries Enforcement Unit, Western Sector	Takoradi
Lamptey, Angela (Ms)	Lecturer, Department of Marine and Fisheries Sciences, University of Ghana	Accra
Lee, NN. (Mr)	Fish Farm manager,	Akosombo
Ofori-Danson, P.K (Mr)	Professor, Department of Marine and Fisheries Sciences, University of Ghana	Accra
Pappoe, Fred.	Advisor, Private Sector, Royal Norwegian Embassy	Accra
Peng-Yir, Nemorius (Mr)	Head, Administration and Operation Division, Fisheries Commission	Accra
Quarthey, Evelyn (Ms)	Marketing officer, Regional Maritime University	Accra
Quaye, John N. (Mr)	Managing director Mumford Maritime Ventures	Takoradi
Quist, Matilda (Ms)	Head, Marine Fisheries Management Division, Fisheries Commission	Accra
Sabah, Alex (Mr)	Regional Director, Western Region, Fisheries Commission	Takoradi
Solheim, Harriet V. (Ms)	Counsellor, Royal Norwegian Embassy	Accra
Adams, Liv (Ms)	Advisor, Royal Norwegian Embassy	Accra

Written material

Anon (2015) Ghana's fishing failure. *National News*. 17.-23. August, p2.

Atta-Mills, J., J. Alder, & U. R. Sumaila (2004) The decline of a regional fishing nation: The case of Ghana and West Africa. *Natural Resources Forum*, 28(1), 13-21, doi:10.1111/j.0165-0203.2004.00068.x

Akyempon, S., P. Bannerman, K. Amador and B. Nkrumah (2013) *Report on the 2013 Ghana Marine Frame survey*. Information Report No 35, Fisheries Scientific Survey Division

Fisheries Commission, Ministry of Food and Agriculture (2012) *Ghana National Agriculture Development Plan*

Hiheglo, P.K. (2008) *Aquaculture in Ghana: Prospects, Challenges, Antidotes and Future perspectives*. International Fisheries Management. Norwegian College of Fishery Science, University of Tromso.

- Korankye, T. (2008) *Dealing with HIV/AIDS and Poverty in Fishing Communities: How Risky are Artisanal Marine Fisher-folks at Elmina in Ghana?* International Fisheries Management. Norwegian College of Fishery Science, University of Tromso.
- Ministry of Fisheries (2008) *National Fisheries and Aquaculture Policy*
- Nunoo, F. K. E., J. O. Boateng, A. M. Ahulu, K. A. Agyekum, & U. R. Sumaila (2009) When trash fish is treasure: The case of Ghana in West Africa. *Fisheries Research*, 96(2–3), 167-172, doi:http://dx.doi.org/10.1016/j.fishres.2008.10.010.
- Odei, D. K. (2014) *Sustainable Development of Aquaculture on the Lake Volta. A case study of the Asuogyaman District in the Eastern Region of Ghana.* International Fisheries Management. Norwegian College of Fishery Science, University of Tromso.
- Overå, R. (2011) Modernisation narratives and small-scale fisheries in Ghana and Zambia. *Forum for development studies*. Vol. 38, no. 3, pp.[321]-343.
- Overå, R. (1998) Partners and competitors: gendered entrepreneurship in Ghanaian canoe fisheries. PhD-thesis. Department of Geography, University of Bergen.
- Sobang, N. B. (2014) *Access to fishing grounds and adaptive strategies. The case of Chorkor and Nungua Fishing communities of Greater Accra Ghana.* Master thesis in International Fisheries Management. Norwegian College of Fishery Science, University of Tromso.
- Tettey, A. S. (2007) *Women's activities in the Ghanaian fishery: The role of social capital.* International Fisheries Management. Norwegian College of Fishery Science, University of Tromso.