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PILOT PROJECT 1 "IMPROVEMENT OF THE POLICIES AND INSTITUTIONS FOR CO-MANAGEMENT IN INLAND WATERS

THE ECONOMIC AND SOCIAL CONTRIBUTION OF FISHERIES TO GROSS DOMESTIC PRODUCT AND RURAL DEVELOPMENT IN GHANA

FINAL REPORT

by

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List of Abbreviations

ADA	Asuogyaman District Assembly
ADRA	Adventist Relief Agency
DOF	Directorate of Fisheries (MOFA)
EcIA	Economic Impact Analysis
EEA	Economic Efficiency Analysis
FAO	Food and Agriculture Organization
GDA	Gomoa District Assembly
GDP	Gross Domestic Product
GVA	Gross Value Added
IDAF	International Development Assistance Fund
IPIC	Improvement of Policy and Institutions for Co-Management of the Volta Lake Project
KDA	Kpando District Assembly
LA	Livelihood Assessment
MOFA	Ministry of Food and Agriculture

MOFI	Ministry of Fisheries
MT	Metric Tonnes
NCU	National Coordinating Unit
NGO	Non-Governmental Organization
PMT	Project Management Team
PPMED	Policy Planning, Monitoring and Evaluation Division
SFLP	Sustainable Fisheries Livelihood Project
SLA	Sustainable Livelihood Analysis
SRID	Statistical, Research and Information Division
TEV	Total Economic Value
TMA	Tema Metropolitan Assembly
TOR	Terms of Reference

Executive Summary

Background and rationale

The importance of the fisheries sector in the economic development of the country cannot be under-rated. It plays a major role in the sustainable livelihoods and poverty reduction in several households and communities. The Fisheries sector is estimated to contribute about 3 percent of the nation's gross domestic product (GDP) and 5 percent of the Agriculture GDP. These figures, however, are an underestimation.

Fish is the preferred and cheapest source of animal protein and about 75 percent of total annual production of fish is consumed locally. The per capita consumption of fish is estimated at about 25 kg per annum representing 60 percent of animal protein intake by the Ghanaian populace.

However, there is a recognised lack of understanding or appreciation of the impact that the artisanal fisheries sector makes to the Ghanaian economy. This lack of understanding is one factor that has led to the fisheries sector having a low profile on the political agenda and hence the low level of attention it receives in the policy formulation process. There is a case for arguing that the contribution of fisheries sector to the national economy is not adequately reflected in the official GDP statistics.

The main objective of the study is to improve the understanding of the contribution and importance of artisanal fisheries in national development through the demonstration of the economic and social contribution of the fisheries sector to sustainable livelihoods and poverty reduction to communities along the Lake Volta. The study also presents information and tools that increase the skills and knowledge of the Directorate of Fisheries in generating and analyzing information on the role of artisanal fisheries in national development.

Key results

Under valuation of Fisheries sector in official GDP statistics. The study compared estimated fisheries sector GVAs to that of National Accounts Data for 2001 and 2002. It was seen that in 2001 and 2002, the total marine fisheries sub sector value has been underestimated by 4.9 percent and 4.5 percent respectively. Similarly, the inland fisheries sub sector value has been underestimated by 2.6 percent and 2.3 percent respectively in 2001 and 2002. These by implication underestimate the artisanal marine and artisanal inland fisheries contributions by the same magnitudes.

Based on the assumption that fish catch from other inland water bodies is 3.7 percent (which is still an underestimate) of Volta Lake Potential and that prices of fish from these waters are similar to those of Volta Lake and Aquaculture, the GVA for these sources was estimated.

Summing up the estimated value added by each of the sub sectors and comparing with the estimates from National Accounts data, it is seen that, overall, there is a 5.2 percent underestimation of the fisheries value in 2001 and 4.9 percent underestimation in 2002. These

estimations concern fish production (marine and inland) only. Transport, Storage, Wholesale and retail activities in Ghana are main sectors to which fishing contributes. Valuation of processed fish and marketing and its share as GDP in these activities, 2000 – 2003, indicate an average share of 1.7 percent.

Other direct fisheries contributions to the national economy are substantial. Fish and fishery products are now the country's most important non-traditional exports accounting for over 50 percent of earnings from non-traditional exports. It also supplements the state budget in the form of fishing licenses collected by the Directorate of Fisheries on behalf of government. In 2001, fishing licenses contributed 8.2 percent to total revenue and 31 percent of total revenue in 2002.

Fishing is central to livelihoods of fishing households in Ghana. There is much diversity in the livelihood of the communities that depend on fisheries resources for a living. An important lesson from the SLA is that the ways fishing activities contribute to household's livelihoods are complex and cannot be reduced to basic statistic indicators. Communities along the coast (Ablekum in Gomoa and Sakumono in Tema) derive between 40-50 percent of their financial strength from fishing whilst those inland (Abumey in Asuogyaman and Darfor-Torkor in Kpandu) derive between 75-85 percent of financial strength from fisheries. A key feature of most of the communities is fisheries resource management committees empowered to oversee and promote fishing planning and management. These management committees explicitly involve women in the decision-making structures and processes to ensure that women's interests are included in the management and sustainable use of the fishery resources.

Financial contributions to Districts Assemblies by fishing communities could be substantial. The contributions of the artisanal fisheries sector to revenue mobilization of the districts surveyed are minimal as estimates indicate that the contribution of revenue on fish products in these districts is less than 5 percent of all market tolls. Indications, however, are that the contribution of artisanal fisheries sector to revenue mobilization could be much higher.

Lessons, implications and related issues

There are several basic indicators that could help assess, at least cost, the contributions of the fisheries sector to economic and social development of Ghana. The focus, however, should not be solely on the quantification of the value of direct use contributions of fisheries sector to economic development. It is evident that other indirect use values arising from the fisheries sector needs to be incorporated. For instance, certain watershed areas in Ghana have been designated as Ecologically Protected Zones. Perhaps revenues accruing from tourist activities in these areas must be imputed to the fisheries sector.

Secondly there are imputed import substitution (replacement value) contributions. The value of fisheries landed serves as a substitute to an otherwise value of fish that would have been imported. How much would it cost to import substitutes of similar protein content? In treating the value of fish (marine and inland) caught in Ghanaian waters, sight should not be lost of this contribution in conserving foreign exchange.

Strengthening the Directorate of Fisheries links with National Accounts Office of Statistical Service is crucial. The most important input required from the Directorate of Fisheries to the work of the National Accounts Office is timely data reporting. In this regard, there should be a strengthening in the area of data collection and management. Officers working on the various sub-sectors in the fisheries data management unit should work closely with the national accounts unit of the Statistical Service. There is the need for the creation of a committee made up of the Directorate of Fisheries and the GSS to review data collected and expand data coverage as inputs into the national accounting data. For instance, currently, GSS relies on the Directorate of Fisheries for fish catch/landings data only and they (GSS) use their own price data on the fisheries sector generated from market surveys. There should be the participation of Directorate of Fisheries in the kind of data collected and reported.

The Directorate of Fisheries, through the committee established with the GSS, could expand the coverage of data currently employed in the computation of the GVA in fisheries. For instance, the potential of fish catch in the other lakes, lagoons and reservoirs are enormous for them to be left unaccounted for in the fisheries value added computations. Data on non-direct use, however, may still remain outside valuation considerations.

The Directorate of Fisheries needs to strengthen its links with the National Development Planning Commission. The National Development Planning Commission is the body responsible to advice the President on development planning policy and strategy. The National Development Planning Commission has a Public Sector Management Division (PSMD) that liaises with sector ministries including MoFA in the administration of development including plan preparation. In addition there is the Economic Policy Division and the Production and Technology Policy Division. The Directorate of Fisheries needs to lobby to strengthen its representation in the standing committee in MoFA that liaises with the PSMD. Not only will a representation of the Directorate of Fisheries on any standing committee of MoFA with NDPC enhance its linkages with the NDPC, it would afford an effective dissemination arena to articulate the contributions of the fisheries sector in the national planning process.

Certain key statistics can be computed to attract the attention of policy planners. These include:

- *Replacement value in US Dollar terms.* This is the value of fish catch landed and valued in US dollar terms. It reflects the amount of foreign exchange saved as a result of the local supply. This amount can be expressed as a percentage to total import value.
- Percentage of Fisheries contribution to GDP. It must be noted that the Fisheries Directorate would have to push, convincingly through regular surveys, the average landing price that must be used for computing the GVA by the GSS.
- Percentage fishery exports as a share of total merchandise exports

In conclusion, estimating the total economic value of the fisheries sector in the national economy is still seen as having been underestimated because of difficulties in quantifications of volume and prices particular of the inland fisheries sector. Valuation depends on the existence of statistics, which in most cases are unreliable. To obtain estimates of fisheries catch, particularly subsistence catch, surveys need to be performed. Besides these limitations,

the estimates may not reflect the full value of subsistence production to food security in isolated fishery communities.

1.0 Introduction: Background

The importance of the fisheries sector in the economic development of the country cannot be under-rated. The Fisheries sector is estimated to contribute about 3% of the nation's gross domestic product (GDP) and 5% of the Agriculture GDP (Anon, 1995). These figures, however, are an underestimation. Fish is the preferred and cheapest source of animal protein and about 75% of total annual production of fish is consumed locally. The per capita consumption of fish was estimated at about 25 kg per annum; representing 60% of animal protein intake by the Ghanaian populace (Anon, 1995; Quaatey, 1997). Based on a per person protein requirement of 40 kg (Wayo Seini, Nyanteng and Asantewah, n.d) in Ghana and with a current population of 20 million, the nation will require a total fish supply of about 800,000 MT per annum. The nation, however, only meets about 50% of fish protein requirements.

Domestic Fish Production

The fishing industry in Ghana is based on fishery resources from the marine and to a lesser extent, inland or freshwater fisheries and aquaculture. The Volta Lake, reservoirs, aquaculture and coastal lagoons are the main sources of inland or freshwater fish.

Fish production over the last decade has been fluctuating annually with a mean value of about 400,000 MT as shown in Table 1.

Table 1: Fish Production in Ghana 1993 - 2003

Year	Marine Fisheries Landings (MT)	Inland Fisheries Landings (MT)	Total Fish Landings (MT)
1993	316,680.3	40,000	356,680.3
1994	276,165.5	42,000	318,165.5
1995	273,672.4	52,400	326,072.4
1996	301,907.2	60,500	362,407.2
1997	295,223.8	62,700	357,923.8
1998	278,663.7	63,800	342,463.7
1999	268,885.1	81,900	350,785.1
2000	354,566.6	82,500	437,066.6
2001	370,952.9	81,000	451,952.9
2002	290,008.1	81,000	371,008.1
2003	331,412.0	82,000	413,412.0

Source: Directorate of Fisheries MOFA, 2004

Marine Fisheries

Ghana has a coastline of 550 km and relatively narrow continental shelf that breaks around 75 – 120 m depth and total continental shelf area of 24,300 km^2. Marine fishing activity in Ghana is strongly linked with the seasonal upwelling that occurs in the coastal waters. Two upwelling seasons (major and minor) occur annually in Ghanaian coastal waters. The major upwelling usually occurs between late June or early July and late September or early October. The minor upwelling occurs either in December or January or February and rarely lasts for more than three weeks. High biological activity takes place during this time to increase production of fish food. Most fishes spawn during this period and stocks are more readily available to the fishers

for exploitation and landing. For the rest of the year, fishing is poor and catches are made sporadically. The marine fishing industry in Ghana consists of three main sectors, namely, small scale (or artisanal), semi-industrial (or inshore) and industrial sectors.

There are nearly 10,000 dugout canoes used in the marine artisanal fisheries and operate from 304 landing centers in 185 fishing villages (Bannerman et al., 2002). The inshore fleet consists of locally built wooden-hulled vessels fitted with inboard engines. About 230 inshore vessels operated in 2003 from 7 landing centers (i.e. Tema, Apam, Munford, Elmina, Sekondi, Takoradi and Axim). The industrial sector comprises large, steel-hulled, foreign-built trawlers, shrimpers, tuna baitboats (pole-and-line) and tuna purse-seiners. About 34 industrial trawlers, 7 pair-trawlers, 2 shrimpers and 37 tuna vessels operated in 2003. The industrial fleets operate from Tema and Sekondi/Takoradi. With the exception of the tuna vessels, Ghanaians wholly own all vessels. All tuna vessels are operated on joint-venture basis with Ghanaians having 50% shares as required in the Fisheries Act 625 of 2002.

The marine fish resources of Ghana are usually grouped as (a) small pelagics; (b) large pelagics; (c) demersal; (d) mollusc and crustaceans. The small pelagics cover a wide range of species and are the most abundant marine resources in Ghanaian waters. Four species that are of economic importance are the round sardinella (Sardinella aurita), flat sardinella (S. maderensis), anchovy (Engraulis encrasicolus) and chub mackerel (Scomber japonicus). The large pelagics are mainly tunas. The main commercial tuna species, which occur throughout the year in Ghanaian waters, are the yellowfin (*Thunnus albacares*), skipjack (*Katsuwonus pelamis*) and bigeye (*Thunnus obesus*). The most important demersal fish species are of the Seabreams, Grunts, Cassava-fish, Snappers, Groupers, Cuttle-fish, Lobster and Shrimps.

Marine fish landings (metric tons) in the last ten years, arranged by fleet are presented in Table 2. On the average, a total of over 300,000 MT of marine fish is produced annually between 1993 and 2003.

Table 2: Annual Marine Fish Landings (MT) By Fleet For The Period 1993 - 2002

Year	Artisanal	Inshore	Industrial	Shrimper	Tuna	Total	Cuttlefish
1993	254,723.7	5,230	18,323.2	1,547.8	3,855.6	316,680.3	1,653.0
1994	211,746.8	6,037.4	18,965.7	2,442.3	36,973.3	276,165.5	2,390.8
1995	210,659.3	6,370.7	20,048.6	2,688.8	33,935.0	273,672.4	2,790.2
1996	228,606.1	8,352.8	25,103.5	2,590.1	37,254.7	301,907.2	2,966.7
1997	215,125.4	7,293.8	17,528.2	1,651.5	53,624.8	295,223.8	3,322.8
1998	189,458.6	6,137.4	16,847.5	652.6	65,567.6	278,663.7	2,973.7
1999	164,829.0	5,149.4	13,944.9	1,409.7	83,552.1	268,885.1	3,643.3
2000	275,964.7	8,668.1	15,454.8	1,224.0	53,255.0	354,566.6	1,703.5
2001	236,355.3	7,605.5	19,644.2	310.0	88,806.5	357,933.3	2,840.3
2002	200,769.2	7,784.6	15,159.2	249.0	66,046.1	290,008.1	3,649.2
2003	238,796.3	13,318.7	13,847.9	295.9	65,152.7	331,411.5	5,500.3

Source: Directorate of Fisheries MOFA

The artisanal sector landed on the average 220,639 MT of fish annually, representing about 73 percent of the total annual marine fish catch. Over 80% of the landings of the artisanal fleet are small pelagic fish species. The average total landing of the inshore fleet is about 7,449 MT per

annum, representing 2% of the total annual marine fish landings. About 90% of the landings of the inshore fleet are small pelagic fish species.

The industrial fleet (including shrimpers) landed on the average 20,000 MT annually, representing about 7% of the total annual marine fish catch. The landings of the industrial and shrimper fleets are demersal fish species including cuttle-fish. The tuna vessels land only the large pelagic fish species, including skipjack, yellow-fin and big-eye tunas. On the average tuna landings was over 56,000 MT annually, representing 18% of the total annual marine fish catch. The Fisheries Law authorizes that at least 10% of landings of commercial tuna vessels must be sold on the local market (i.e. not to be exported). About 67% of the landed tuna is processed into loins or canned tuna mainly for export.

Inland Fisheries

The inland fisheries cover fish production from Lake Volta, Aquaculture, Dams, other lakes and lagoons. However, fishery statistics is collected only from Lake Volta and Aquaculture. Table 3 below shows some of the inland water bodies and their respective potentials. It is clear from the table that fish production from inland fisheries is grossly under-estimated.

Table 3: Lakes and Reservoirs and their Fishery Potential

Lakes and Reservoirs	Area (km^2)	Fishery Potential (metric tonnes/year)
Volta	8,482	40,000
Bosumtwi	49	600
Weija	37	420
Kpong	36.5	--
Tano	18.6	225
Barekese	6.4	80
Others	117	145

Source: FAO Year Book of Fisheries Statistics 1991

Lake Volta Basin fishery catch

The Volta River basin dominates the country's riverine system and includes the 8,480km^2 Lake Volta. Fishing in Lake Volta contributes about 90% of the total inland fishery production in Ghana. Formed about 40 years ago, Lake Volta is the largest man-made lake in Africa. A tremendous fishing opportunity was offered by the creation of the lake and fishers from various parts of Ghana moved into the lake area. It is estimated that a total of 300,000 fisher folks depend on the lake for their livelihood of which there are about 80,000 fishers and 20,000 fish processors and traders (IDAF, 1993). Only planked canoes are used in the Lake Volta fisheries, thus the fishery is solely artisanal with about 17,500 such canoes actively fishing in the Lake operating from about 2,000 fishing villages. The lake is rich in fish fauna and a list of 112 fish species was prepared during the pre-impoundment phase (Roberts, 1993) and 108 species during the filling stage (Denyoh 1969). Currently, 70% of the species listed during the filling stage has changed mostly due to upgraded taxonomy and also to the disappearance of some species as a consequence of the change from riverine to lacustrine conditions (DOF, 2003).

Currently, there are signs of over-exploitation of the fishery resources. Over fishing in the lake probably commenced with the introduction of active and illegal methods (such as bamboos, drag nets and winch nets) in the early 1980's. Between 65 and 70 percent of commercial fish catch is landed by illegal fishing methods (Braimah, 1995).

Aquaculture

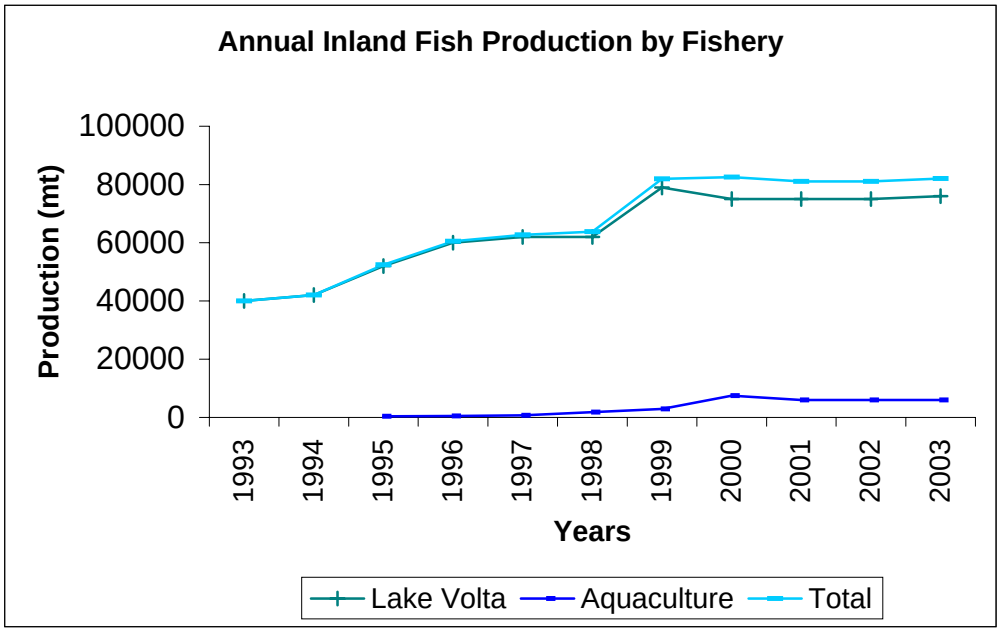
Even though fish farming is new to Ghanaians, its practice is becoming widespread in the country, especially in the Ashanti, Central, Eastern, Volta and Western regions. It has become a credible option for increasing fish production in Ghana since fish production from the sea and the Lake Volta appear to have reached maximum possible levels. In spite of its potential, the rate of development of aquaculture in Ghana has been much slower than expected.

There are about 1,000 fish farmers working on over 2,000 ponds with a total surface area of 350 ha. Both extensive and semi-intensive cultures are practiced. Extensive culture is associated with dugouts and small reservoirs, which are fished and restocked. Fish are cultured semi-intensively in earthen ponds either as monoculture of tilapia or polyculture of tilapia (especially *Oreochromis niloticus*) and catfish.

Inland Fish Landings

Annual inland fish landings for the last ten years are shown in Figure 1 below.

Figure 1: Annual Inland Fish Production



It is evident from Table and Figure that Lake Volta is the main source of inland fish landings; contributing over 90% of fish landings annually. The Figure also indicates an increasing trend in fish landings over the period. The important fish species, in terms of landings are as follows:

Tilapias (38.1%), *Chrysichthys* spp. (34.4%), Synodontis spp. (11.4%), *Labeo* spp. (3.4%), Mormyrids (2.0%), *Heterotis* spp. (1.5%), *Clarias* spp. (1.5%), Schilbeids (1.4%), *Odaxothrissa* spp. (1.4), *Bagrus* spp. (1.3) and *Citharinus* spp. (1.2%) (IDAF, 1999).

1.1 The Terms of Reference and Scope of Study

Demonstrably, fishing is an important economic activity in Ghana. It plays a major role in the sustainable livelihoods and poverty reduction in several households and communities. However, there is a recognised lack of understanding or appreciation of the impact that the artisanal fisheries sector makes to the Ghanaian economy. This lack of understanding is one factor that has led to the fisheries sector having a low profile on the political agenda and hence the low level of attention it receives in the policy formulation process.

The main objective of the study is therefore to improve the understanding of the importance of inland fisheries in national development through the demonstration of the economic and social contribution of the fisheries sector to sustainable livelihoods and poverty reduction (along Lake Volta). The study will also increase the skills and knowledge of the fisheries department in generating and analyzing information on the role of artisanal fisheries in national development.

1.1.2. Terms of Reference

The specific tasks undertaken under the broad objective are:

1. To improve the draft guide/framework for assessing the contribution of artisanal fisheries to the national economy on the basis of a literature review of relevant documents/reports, including those provided by the SLFP and the Unit in-charge of preparing the national accounts.
2. To select, in collaboration with the NCU and PMT, a District/Region of the Pilot Project for the regional assessment of the role of fisheries
3. To identify the sources of and collect the data necessary for applying the methodology/framework developed above
4. Apply the proposed methodology/framework to the data and making any necessary adjustments
5. To prepare a report on the contribution of artisanal fisheries to sustainable livelihoods and poverty reduction, including recommendations on the dissemination and use of the methodology/framework by the NCU
6. To present report to a selected national policy makers (using meeting/discussions, briefing note) and public (print media).

1.2 The Study Team

The study was conducted by an Economist at the Department of Agricultural Economics & Agribusiness, University of Ghana, a fisheries specialist of the Department of Fisheries, MoFA, and a Statistician with the National Accounts Section, Ghana Statistical Service.

2.0 Methodology of Study

The methodology of the study embodies the data requirements, data collection methods and the challenges in the data collection. The analyses of data collected are presented in subsequent sections.

2.1 Data Requirements

2.1.1 Selected Fishery Districts

For the regional level assessment, the study team, in collaboration with the National Coordinating Unit (NCU) and Pilot Project Management Team (PMT), selected four (4) Fishery Districts in Ghana. The selected district focused on both marine (industrial and artisanal) and inland artisanal (river, lake and lagoon) fisheries. The marine districts selected are Tema in the Greater Accra Region and Gomoa District in the Central Region. The inland artisanal districts selected are Asuogyaman and Kpando Districts, all along the Volta Lake.

The Asuogyaman and Kpando Districts were selected based on their participation in the SFLP pilot projects. In Asuogyaman District, it was understood that SLA studies on fisheries communities have been undertaken in this district for several communities along the Volta Lake upstream to the dam by the SFLP/IPIC station at Atimpoku. The communities include Kudikope, Dodi Asantekrom, Sedom, Mpakadan and Adjenadonor No.1. For this reason, the study team in consultation with the MoFA office in Atimpoku decided to select a community outside these study areas and also a community downstream to the dam. The Abumey Community, a settler community that lies downstream of the dam and is about 5 km from Akosombo and 8 km north from Atimpoku, the district capital, was selected.

In the Kpando District, it was also understood that similar studies have been done at Kpandu-Torkor. The study team in consultation with the Fisheries department at Kpandu Torkor and the MoFA office in Kpandu decided to visit the Dafor-Tonu Community which is about 15 km north of Kpando, the district capital.

The marine communities visited are Sakumono in Tema District and Ablekum in the Gomoa District. The communities – Abumey, Dafor-Tornu, Ablekum and Sakumono – provide opportunities to analyze the livelihoods of fishing communities from differently endowed districts.

2.1.2 Data Collection Methods

The study team, in the selected districts, undertook focus group discussions with community groups involving female fish processors and male fishers to document the sustainability of the livelihoods of the fishers and the contributions made by the people in the fisheries sector. The methodology utilized is the Sustainable Livelihood Analysis (SLA) framework involving the community drawing upon its assets. In addition the case study approach was also used where appropriate, such as estimating the volume of a days catch from the community and the price per a given unit. Personal interviews were also undertaken with relevant government officials

(District Assembly) and opinion leaders to obtain an insight into the extent of the contribution of the fisheries sector to the livelihoods of the community.

The study team also collected secondary data on fishery outputs (marine and inland) from relevant ministries/institutions such as the Ministry of Food and Agriculture (PPMED, SRID, Fisheries Departments), Individuals/ Private Sector and NGOs, and from the FAO, among others. District level data relevant to the fisheries sector in the District Assembly was also collected. In addition output and price data were collected from the district offices of the Directorate of Fisheries visited.

2.2 Estimations of the contribution of the fisheries sector to the national economy

Literature review of appropriate SFLP documents and national methods for preparing national accounts and other relevant written materials were undertaken. An appropriate methodology, given the available literature reviewed and the relevant data collected, allowed estimations of the contribution of the fisheries sector to the national economy.

2.3 Evaluating the Economic and Social Valuations of the Fisheries Sector

2.3.1 *Review of Methodologies*

Béné and Neiland (2003a), although in the specific context of inland fisheries, have reviewed different methods, potentially applicable to the valuation of fisheries. Based on Béné and Neiland (2003a) analyses, three broad but complementary approaches are reviewed. These are conventional economic valuation, economic impact analysis and socio-economic analysis.

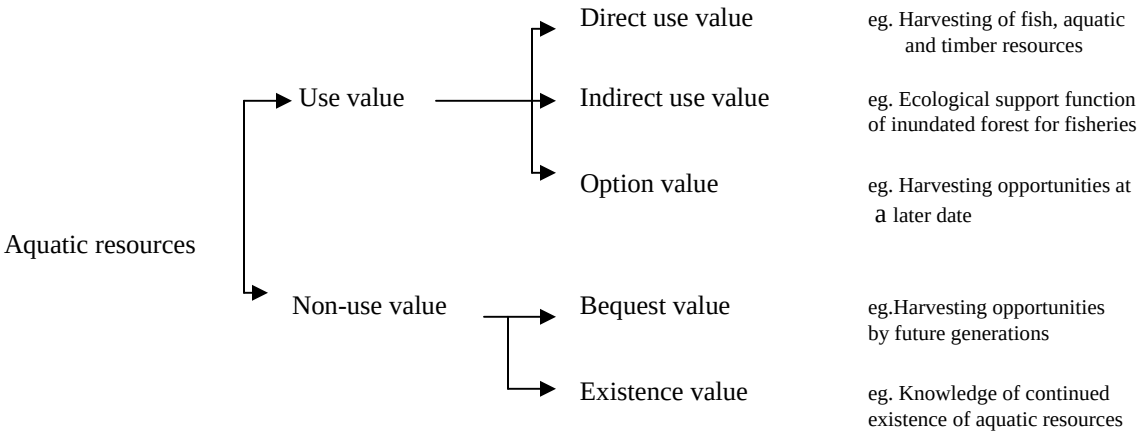
Conventional Economic Valuation

Two approaches underlie the conventional economic valuation method. These are *economic efficiency analysis* (EEA) and the *total economic value* (TEV) methods.

The EEA usually applies two principles, cost-effectiveness analysis and cost-benefit analysis. With cost-effectiveness analysis, the presumption is that least-cost option will achieve a given objective whereas with cost-benefit analysis, the option that produces the highest ratio of monetary benefits to cost is favored. Valuation of costs, identifying all benefits for valuation and the choice of an appropriate discount rate are some of the problems associated with the use of these methods.

The TEV recognizes that several benefits accrue to the use of a natural resource according to the particular use or function that the resource fulfils. In a general reference to the TEV of a river system and its adjacent wetlands, Béné and Neiland (2003a) provide a schematic overview as provided in fig.2.

Fig 2: Components of the total economic value (TEV) of an aquatic resource



Source: Béné and Neiland (2003a) p. 19

For the TEV, the directly and easily quantifiable component is the direct use value. In the specific context of this study, it is the value of the quantity of fish catch (both marine and inland). The non-use values will require other valuation techniques.

Economic Impact Analysis

The economic impact analysis (EcIA) considers the level of benefits generated by an intervention without considering costs implications. EcIA aims at establishing what effects a particular policy intervention or project has on specific variables and through multiplier analysis, measure the total economic activity generated within the regional economy (output, income or employment) through interdependence between, say the fisheries sector, and other sectors.

Socio-Economic Analysis

This methodology goes beyond the conventional cost-benefit analysis and emphasize on distributional analysis to examine how net costs and benefits are apportioned across different groups affected by any policy change. The socio-economic analysis has been further extended with the development of techniques for livelihood analysis (LA) (Carney et al. 1999) and by the conceptual frameworks underpinning the sustainable livelihoods approach (SLA) (Scoones 1998). A criticism of the LA/SLA methodology is the risk of over reliance on qualitative information; the quality of analysis of such information, to a large extent a function of the teams capacity to capture the complex nature of livelihoods and the depth of each issue raised during brainstorming sessions or during fieldwork activities (Pittaluga, Corcoran and Senahoun, 2001).

In another economic valuation of subsistence fisheries to the *nutrition* (food security) of Pacific Island communities World Bank (2000) made an assessment by estimating the value of a marketable substitute with an equivalent protein or caloric content. The methodology for the valuation of the importance of subsistence fisheries for food security involved seven major

steps. Two of the steps are (a) obtaining an estimate of subsistence catch through surveys in fishing communities, and (b) estimating the final economic value of subsistence fisheries based on the substitute with equivalent caloric or protein content.

The final economic value of subsistence fish production for food security is obtained by taking the amount of the most likely substitute necessary to yield an equivalent nutritional content to subsistence fisheries and multiplying it by the price of the substitute.

2.3.2. *Challenges in the application of one methodology in computing the contribution of the fisheries sector*

No one specific methodological approach suffices to estimate the contributions of the fisheries sector to economic and social development. As Béné and Neiland (2003a) indicate, the determination of the economic value, for example, of a natural resource becomes irrelevant if people whose livelihoods depend on these natural resources cannot access them. The various analytical frameworks, according to Béné and Neiland (2003a) offer a set of complementary techniques which when properly applied, can help to improve understanding of the contribution of fisheries sector to national economic development and to the livelihoods of the local populations.

In the broader concept of the complementarities between these empirical methodologies, this study employs the total economic analysis and the livelihood approach in determining the economic and social contribution of the fisheries sector in Ghana. The total economic analysis is used in the narrow sense as it focuses on only the value of the fish caught (direct contribution). This estimation of fisheries direct contribution to the economy is in line with Murray (2003) and SFLP (2004) draft methodological suggestions.

Estimating the total economic value of the fisheries sector in the national economy, particularly in Africa, has been underrated because of difficulties in quantifications of volume and prices. Of particular importance is the value of the inland fisheries sector in Africa. Valuation depends on the existence of statistics, which in most cases are unreliable. In order to obtain estimates of fisheries catch, particularly subsistence catch, surveys need to be performed. Because adequate and frequent production surveys are not performed in most countries, values given rely on estimates of production based on demographics and consumption patterns or extrapolation from old surveys, World Bank (2000). Whilst this probably underestimate subsistence production in many areas where fishing gear and technology have improved since the original surveys were performed, in other areas it may actually overestimate the subsistence catch, as sales of coastal (and river bank) products are becoming increasingly frequent. Besides these limitations, the estimates may not reflect the full value of subsistence production to food security in isolated fishery communities.

2.4. Analysis of the contribution of the fisheries sector to national and socio-economic development: Reviews from literature of other countries

In this section, firstly, a review of studies on the contribution of the fisheries sector to economic and social development in other countries is undertaken. Secondly, in consonant with the methodological approach adopted by the current study, empirical evidence on the use of the total economic value and the livelihoods approach methodologies are covered.

(A) ***Economic value contributions***

- *Gross Value Added--the computation*

Agricultural sector comprise diverse activities of growing of crops including tree crops, fruits and vegetables, growing of trees and logging, fishing, breeding and rearing of animals and poultry, production of milk and eggs among others. For the purposes of the computation of value added estimates, the agricultural sector is divided mainly into four sub-sectors: crops, livestock, fishery and forestry. The estimation of the fisheries gross value added and measurement of fisheries contributions are highlighted by the works of Murray (2003); SFLP (2004) and Government of Pakistan (2004).

(a) Murray (2003) Draft Guidelines for Estimating the Contribution of Fisheries to National GDP

Several indicators can be used to gauge the contribution of the fisheries sector in national economies. First an estimation of the fisheries direct contribution to GDP must be undertaken with the percent of the national GDP accounted for by the fisheries sector as the most important measure of that contribution. Other measures, however, include fisheries domestic production, direct and indirect employment generated and the size of the domestic fish market. Secondly, secondary industries involving the fisheries sector such as processing, wholesale and retail contribution can be estimated.

The production approach methodology, which measures the value added, is deemed the simplest to calculate. The simplest computation of fisheries value added is to calculate the revenue from fishing minus the intermediate cost of that activity. The intermediate costs directly involved in fishing include fuel, bait, and maintenance, among others. Usually, estimates are made to compute proportions (value added ratios expressed as fractions or percentages that lies between 0 and 1), representing the value that is left after intermediate costs are subtracted from final output value. Knowing these fixed (but periodically re-estimated due to changing fishing fortunes in a particular year and seasonal price changes) value added ratios simplifies the value added computations. The final direct output value of the fisheries sector is multiplied by this fixed value added ratio to obtain the value added.

The data requirements can be enormous. A comprehensive coverage is required and must first disaggregate the fishing activities by the scale of operation (industrial, small-scale and subsistence) as well as by source of fishing (marine or inland), among others. The key data

required are: an estimate of a weighted average price (due to differences in fish type, boat type, etc) and production data obtained from official sources or by an indirect form of estimation.

(b) SFLP-Regional Support Unit Draft Guidelines

The SFLP draft guidelines identify the most relevant and least cost indicators (basic indicators) and the data required to estimate levels of the chosen indicators. The three broad indicators are food security (domestic production, exports, imports, apparent supply/availability, annual consumption per capita), employment (number of professional fishers, number of occasional fishers and other jobs related to fishery) and national economic activity. These indicators need to provide information that better reflect the contribution of the roles of fisheries in the national, regional and local economies.

To calculate the direct contribution of the fisheries sector, it is important to distinguish four groups of activities in the fisheries sector. These are actual fishing (fished products), marketing of fresh products or wholesaling, fresh products processing and marketing of processed products. The contribution of the fisheries sector will then be a summation of value additions in these four activity groups. The value addition is then measured as the annual turnover (measured as production minus auto consumption) multiplied by the average price of products at the landing sites.

Indirect contributions by the fisheries sector to the national economy will include (a) the amount of annual investments in the fisheries sector such as boats, outboard motors, fishing gears, isothermal boxes, ovens for smoking fish, drying trays, boat houses, stores for stocking fishing materials, among several others, (b) the trade balance of fishing products.

Other elements that allow an appreciation of the role of small-scale fisheries in economic and social performance of local economies include (i) contributions to the state budget (fishing license (for foreign and national fishers), taxes on production and taxes on marketing), (ii) contribution to local communities budget (market taxes, right of access to resources, (iii) contribution to local development and poverty alleviation, for example, total population basing its livelihoods on fisheries, and (iv) annual investments in the sector (outboard motors and inboard engines; pre-mix stations; fishing harbors; fish markets; cold stores; ice making plants; shipyards and dry-docks for repair of fishing vessels).

(c) Government of Pakistan: Gross Value Added in Agricultural Sector: Rebasing from 1980-1981 to 1999-2000

In Pakistan, the fishing activities cover commercial and subsistence fishing in ocean, coastal and offshore waters and inland waters (Government of Pakistan, 2004). This includes catching, tackling and gathering of fish from rivers, canals, lakes, fish farms, ponds and inundated tracts.

The data on quantity and value of commercial and subsistence fishing (inland and marine) are obtained from the country's Marine Fisheries Department of Ministry of Food and Agriculture and from Provincial Fisheries Departments.

Adjustments are usually made to the quantities and values in output. For the outputs, the value of marine fish catch is adjusted (reduced by 6.5% for auction charges) so as to arrive at value at factor cost. The auction value of inland fishing is doubled to cover the under-reporting on inland fishing, based on recommendations from a committee that was established to study the problem. The doubling of the estimates of inland fish is based on annual catch of inland and marine fishing and their respective base year prices. To obtain value added, their data use 36 percent as input cost for marine fishing, 16 percent for fish farming and 16 percent for inland fishing.

- *The contribution of the fisheries sub-sector, Uganda*

Yaron, et al. (2004) review the contribution of the fisheries sector to Uganda's economy. Uganda's fisheries currently employ around 500,000 people of which around 100,000 are defined as fishers and a further 400,000 as secondary and tertiary workers. Export earnings from fisheries have increased over the past decade from US$1.4 million in 1990 to US$ 85.8 million in 2002. Fish exports were Uganda's most important export industry in 2002. Much of the benefit to the economy is derived from capture fisheries in Lakes Victoria and Kyogo which together account for almost 90 percent of the catch. The contribution of the other lakes is not fully known but indications are that these other lakes provide considerable potential for the fish sector.

Yaron et al. (2004) however indicate that there is a strong case for arguing that the contribution of fisheries to the national economy is not currently reflected in the official GDP statistics.

Fisheries in Uganda are reported as contributing 2.2 percent to total GDP. However, there is the argument that the official statistics fail to (a) use market prices to value the fish catch, and (b) include the value of the catch from minor lakes and rivers.

In light of this, Yaron et al. (2004) report a study in Uganda that quantifies the catch value from all main sources and estimates the value added in transport, trading and processing. Combining this data with GDP data at current factor prices for 2001-2002 implies that fisheries in Uganda contributes about 5.8 percent of GDP, twice the official statistics.

- *Uganda Biodiversity—Economic Assessment Study*

In another study on Uganda by Emerton and Muramira (1999) on the economic assessment of Uganda Biodiversity, they argue that the lake fish's catch and value are underestimated. Emerton and Muramira (1999) argue that in 1998, it was estimated that over 217,000 tonnes of fish were caught in Uganda's major lakes with a landed value of nearly Ush 326 billion. See Table 4 below.

Table 4: Value of Fisheries in Uganda, 1998

	Production (000 Tonnes)	Value (USh mil)[1]
Lake Victoria	105	157,800
Lake Albert	19	28,650
Lake Kyoga	80	120,300
Lakes Edward, George and Kazinga Channel	6	8,400
Albert Nile	4	5,250
Other Waters	4	5,250
TOTAL MAJOR LAKES	217	325,650
MINOR LAKES, WETLANDS AND RIVERS [2]	54	81,413
TOTAL ALL	271	407,063

Source: Emerton and Muramira (1999), Table 6 p.17. (1). The authors argue that National Fisheries data record a total value of fisheries for major lakes of some USh 74 million, equating to an average fish price of USh 0.34/kg. This price, they argue, is unrealistically low. Their study therefore used the average market price of USh 1,500/kg to calculate the value of fisheries. (2). As National fisheries data refer only to major lakes, the authors assume that minor lakes, rivers and wetlands contribute at least an additional 25 percent to production which is likely to be an underestimate.

Including other lakes, wetlands and rivers, they add at least a quarter more of the estimated catch to lake fisheries catch and value to obtain the annual value of fisheries activities in excess of USh 407 billion. The new estimates provide an official underestimation of the fisheries sector by about 25 percent for 1998.

(B) ***Livelihood approaches***

- Evidence from the Lake Chad Basin areas

Béné and Neiland (2003b) study on a better assessment of the contribution of inland fisheries to the livelihoods of people in the Saherian region indicate that Lake Chad has always played an extremely important role in the livelihoods of the people in the lake's vicinities. Given the political instability in the area, national statistics on inland fisheries for the region is unreliable making it extremely difficult to make any accurate assessment of the economic activities taking place in the Basin thereby constraining policy makers ability to generate and implement rural development policies appropriate and adapted to the region. The study's research methodology was the socio-economics multi-activity survey techniques by which data was collected through semi-structured group interviews conducted on village key informants. The central element of the survey was an activity ranking exercise combined with participatory wealth ranking exercise. Their analysis reveals that the contributions of the inland fisheries vary between wealth groups; there is the existence of fees levied by several local institutional (legal and illegal) entities including central government agents. An important lesson deduced by Béné and Neiland (2003b) is that the contribution of fishing activities to household's livelihood is remarkably complex and difficult to assess.

Sarch and Allison (2000) indicate that one important consideration for better fisheries management is that it should be based on existing livelihood strategies that have evolved from

a finely developed understanding of the dynamic behaviour of the resources and adaptive response to both local environment and broader social context. The authors focus on Lake Chad and the East African Great Lakes areas and propose that fisherfolk's livelihood strategies are well adapted to both seasonal and inter-annual climate induced fluctuations whilst state management potentially or actually undermine the strategies that fisherfolk have evolved to both cope with and benefit from fluctuating resource availability. They also contend that in the inland Niger Delta, persistent drought has impoverished all livelihood groups and fishing has provided an important safety net for a significant minority of the population.

3.0 Brief Profiles of the Selected Fishery Districts

3.1 *Tema Municipal Assembly (TMA)*

TMA covers an area of 396 km^2. The population of TMA from the 2000 Ghana Population Census and Household Survey was 511,459 made up of 252,109 males and 259,350 females with an annual growth rate of 2.6%. Ashiaman, which is a migrant community, has the highest population growth rate in Ghana (4.6%). A sizeable proportion of the population falls between 10 and 16 years.

Tema is also the leading industrial city in the country. There are over 400 factories in Tema which have been categorized into 8 major areas – Chemical, Textiles, Food Processing, Engineering, Paints, Fish Cold Stores, Printing and Woodwork industries. Stone Quarrying and Sand Winning are also carried-out in the rural areas of the Municipality. Farming is a minor economic activity in the municipality with fishing forming the bulk of agricultural activities.

TMA has an extensive network of roads. The Municipality has a total of 418.05 km and 67.9 km of urban and feeder roads respectively. A significant number of these roads have no drains or pedestrian facilities and those that exist are generally in deplorable conditions. The TMA enjoys electricity from the National (Akosombo) grid and has generator to supplement supply from Akosombo. It has markets for carrying-out commercial activities ranging from consumables to automobiles. Trading in foodstuffs is the most common activity.

The Municipality has a total of 676 schools, made up of 158 nurseries, 266 primary, 237 JSS, 12 SSS and 3 Vocational/Technical. The schools are both government and private owned. The TMA has 1 General Hospital, 1 Polyclinic and 3 Health Centre/Post all owned by the government. In addition, there are several privately owned clinics/hospitals. Greater majority of residents in the urban areas have access to pipe borne water while those in the rural communities depend on rivers, streams, ponds, boreholes, hand dug wells and sometimes tanker services for their water supply. A total of 19 different banking institutions operate in the Municipality mainly in Tema, the district capital. Out of this number only 2 are rural banks.

TMA has a main harbour and fishing harbour for berthing and handling facilities for both fishing vessels and canoes. A fish market is attached to the fishing harbour. The Ghana Ports and Harbour Authority administer the harbours. There is also a shipyard & drydocks for repair of fishing vessels. There are several cold stores mainly located in Tema for storage of fish. The

Tema Municipal Directorate of Agriculture offers extension services to capture and culture fisheries, fish handling and processing. Continental Christian Traders, among others, deals in fishing inputs while the Oil Companies offer bunkering services to the fishing vessels.

3.2 *Gomoa District Assembly (GDA)*

The district covers a total area of 1,022.3 km^2. The 2000 Ghana Population Census and Household Survey put the population of GDA at 194,792 with an annual growth rate of 2.4%. Women constituted 54.6% of the population with 45.6 % being men. The age structure was 0-14 years 37.6 %, 15-60 years 57.3% and 61 years and above 1%. The average household size for the district is 4.42. The people are predominantly Fantis.

Agriculture is the backbone of the economy of the district. Agricultural activities undertaken in the district include crop farming, livestock farming and fishing. Industrial activities engaged in the district include manufacturing of soap, brick and tiles, alcohol, textile weaving, salt extraction and agro-processing activities. Sand Winning and Quarrying of Stone is another economic activity of the district.

Out of 408.7 km road network, 103.7 km are tarred; 235.2 km have the surface graveled and 67.8 km of earth surface. 57 communities out of 197 communities are connected to the national grid for electricity. Commercial activities are tied to large outside markets in Accra, Agona Swedru, Cape Coast, Mankessim, Techiman and Kumasi. Most market centers have small physical spaces without stall or sheds.

The district has a total of 346 schools, made up of 98 pre-school, 155 primary, 115 JSS, 6 SSS and 4 Vocational/Technical. The schools are both government and private owned. The district has 1 hospital, 2 health centers and 8 community clinics. Even though about 63.9% of communities have pipe-borne water, water has not flowed through the pipes for several years due to low pressure from supply source. Communities rely on boreholes; hand dug wells, streams and tanker services for water. The district has 5 different rural banks.

Private mechanics offer repair services to outboard motors and inboard engines. There are 3 private owned cold store and ice making plants for storage of fish and supply of ice for fishing. There are 7 pre-mix stations owned by the Community Based Fisheries Committees for supply of fuel for fishing trips. The Gomoa District Directorate of Agriculture offers extension services capture and culture fisheries, fish handling and processing. The Gomoa district Assembly provides markets. ADRA, an NGO, offers credit facility to fishermen and farmers to engage in agro-forestry as part of reforestation of the coastal savanna project.

3.3 *Kpando District Assembly (KDA)*

The district covers a total area of about 2000 km^2 with about 40% of the area submerged by Lake Volta. The population of the district from the 2000 Ghana Population Census and Household Survey was 112,961 with an annual growth rate of 0.5%. The people are predominantly Ewes.
The main economic activity is agriculture. The presence of the Volta Lake in the district makes

inland fishing one of the major agricultural activities. Other economic activities include allied industries (handicrafts, beads, wood-carvings, pottery and ceramics).

The district is accessible by a good road network. The Accra-Have-Nkonya trunk road runs through the district from south to north. The district is also accessible by lake/river routes. There is a pontoon service linking the district to other places. 239 out of 299 communities in the district are connected to the national grid for electricity. There are 2 large markets and 10 satellite markets in the district.

The district has a total of 289 schools, made up of 93 pre-school, 118 primary, 67 JSS, 7 SSS, 1 Teachers Training College and 3 Vocational/Technical. The district has 4 hospitals, 25 health centers/ clinics. The main sources of water supply are pipe-borne water, boreholes, wells and streams/rivers. The district has 4 different banking institutions including 2 rural banks.

Private mechanics offer repair services to outboard motors. There is 1 pre-mix station owned by the Community Based Fisheries Committees for supply of fuel for fishing trips. The Kpando District Directorate of Agriculture offers extension services capture and culture fisheries, fish handling and processing.

FORUM, an NGO offers credit facility and training in alternative livelihoods such as snail rearing, bee keeping. The Kpando District Assembly provides fish markets. The Volta River Authority provides lake transport.

3.4 *Asuogyaman District Assembly (ADA)*

The district covers an estimated area of 1507 km^2. The 2000 Ghana Population Census and Household Survey put the population of ADA at 74,142 with an annual growth rate of 1.7%. Women constituted 47.9% of the population with 52.1 % being men. The age structure was 0-14 years 44.1 %, 15-64 years 51.3% and 65 years and above 4.6%. The population of the district is heterogeneous. The predominant tribes are Ewes 26.3%, Guans 25.6%, Krobos 12.2% and Akans 32.5%.

Agriculture (crop farming, livestock farming and fishing) is the major economic activity in terms of employment and rural income generation. Other economic activities are in the Service and Industry sectors. Agriculture sector employs 52.7 % of working population while the Service and Industry sectors employ 44.9 and 2.4 respectively.

Transportation in the district is by road and lake transport. The district has an extensive network of highways, trunk roads and feeder roads. The conditions of roads in the district are generally poor. Akosombo has an inland water port. The ADA enjoys electricity from the National (Akosombo) grid. There are 4 large market centers in the district. Trading in foodstuffs and processed fish is the most common activity at these markets.

There is an inland port at Akosombo managed by Volta Lake Transport Company. Private mechanics offer repair services to outboard motors. Private Oil Companies supply fuel for

fishing trips. The Asuogyaman District Directorate of Agriculture offers extension services on capture and culture fisheries, fish handling and processing.

The artisanal fisheries contributions to these districts economic and social development are summarized under section 6.

4.0 The Ghanaian fisheries sector contribution to the economy: Total Economic Analysis of direct use

(a) The coverage, methodology and source of materials for computation of the fisheries value-added component in national accounts[1]

In line with Division 13 of the International Standard Industrial Classification (ISIC) of all economic activities, the scope of the fishery sector in Ghana includes (i) commercial fishing in ocean, coastal and off-shore waters (ii) catching, taking and gathering of fresh water fish from rivers, lakes, dams, ponds etc, (iii) subsistence fishing and angling by people other than professional fishermen, and (iv) gathering of seaweeds, sea shells, pearls, sponges and other ocean and coastal water products.

The principal source of information on fisheries is the Annual Report of the Directorate of Fisheries of the Ministry of Food and Agriculture. The main source of wholesale prices of fish is the Directorate of Fisheries. The prices are collected on important species of marine fish at the landing centers. It also provides data on wholesale prices of fresh water fish with the help of the information collected at the landing centers. The Annual Report contains data on (i) total catch of marine fish by large fishing vessels and canoes (ii) catch of inland water fish (iii) imported fish and fish products (iv) landings by foreign vessels on contract, and (v) wholesale price of fish.

The Directorate of Fisheries also supplies data on the quantity, prices and value of canoe and industrial fishes catch by type of fish for marine fish. For freshwater fish, the outfit supplies data on the quantity, prices and the value of catch from the Volta Lake and other inland waters by type of fish.

Computation of Value addition (Current and Real Prices)

Fishing in Ghana is divided into Marine and Fresh water fishing. The value of output of catch of marine fish is estimated by adding the output of industrial and canoe fishing. The value of output from fresh water fish is the sum of output from the Volta Lake and other inland waters.

[1] The material here is sourced from Chapter IV of an unpublished Draft of Ghana Statistical Service on National Income Accounting (Fishing)).

The Gross Value Added (GVA) in Current Prices

Gross value added (GVA) is the value of output minus the value of inputs. In the case of marine fish input costs (operational costs and repairs and maintenance) and consumption of capital forms 50.7 percent and 16.0 percent of the value of output respectively. Gross value added in marine is value of total output less cost of production. Net value added is gross value added less consumption of fixed capital. For Fresh water fish, the operational cost and repairs and maintenance forms 0.001 percent and no allowance is made for consumption of fixed capital. In notational terms:

- Gross Value Added Marine =

(Quantity of Fish *x* Average Price) – (0.507 * (Quantity of Fish *x* Average Price)

This is equivalent to 0.493*(Quantity of Fish *x* Average Price).

- Gross Value Added Freshwater =

(Quantity of Fish *x* Average Price) – (0.001 * (Quantity of Fish *x* Average Price))

This is equivalent to 0.999*(Quantity of Fish *x* Average Price).

Hence **Gross Value Added in the fisheries sector** is given as

Gross Value Added Marine + Gross Value added Fresh water

The average prices are average landing site prices. The reason for estimating output values at the landing site prices is to avoid the problem of double counting in the prices. Market prices include trade margins that are captured under wholesale and retail trade in the national accounts. It also includes transport margins that are captured under transport and storage in the national accounts.

For the computation of *value added in real prices*, the quantity of fish catch for each year is valued in a base year price (for example 1993 constant prices) by multiplying the quantity and the base year price. The same proportions of operational costs, repairs and maintenance and consumption of fixed capital to value of output as in current prices are used to obtain corresponding estimates of gross and net value added at constant prices.

(b) Gross Domestic Product and the Fisheries Sector: Published National Accounts Data.

The agriculture sector as a whole in Ghana contributes about 35 percent, on average, to Gross Domestic Product (GDP). This is an indication that agriculture is the main stay of the economy.

The fisheries sub sector is a very significant component in agriculture Gross Value Added (GVA). In Table 5 the sub sector contributed 12.7 percent in 2001 and 12.6 percent in 2002 of

agriculture GVA. In total GDP, the fisheries sector, between 2000 and 2002 contributed on the average 4.5 percent. The Inland fishing sector contributed less than 1 percent on the average between 2000 and 2002. It should, however, be emphasized that the value of inland fishing has been underestimated since the data reported was only for the Volta Lake. The share of artisanal fisheries (marine and inland) in the total contribution of fisheries in total GDP is about 3.43. This represents about 76 percent of the total fisheries component.

Table 5: Distribution of Gross Value Added in Agriculture

	At Current Prices (billion Cedis)			**Percentage Distribution**		
	2000	2001	2002	2000	2001	2002
1. AGRICULTURE	**9,577.2**	**13,416.8**	**17,174.3**			
1.1 Crops and Livestock	5,976.0	8,471.0	10,961.1	62.4	63.1	63.8
1.2 Cocoa Production and Marketing	1,304.9	1,744.1	2,131.0	13.6	13.0	12.4
1.3 Forestry and Logging	1,055.1	1,492.8	1,924.8	11.0	11.1	11.2
1.4 Fishing	1,241.1	1,708.9	2,157.3	13.0	12.7	12.6
Of which Total Marine	1,008.7	1,377.5	1,655.1	10.5	10.3	9.6
Artisanal Marine*	736.35	1005.57	1208.22	7.67	7.52	7.01
Total Inland	232.4	331.4	502.2	2.4	2.5	2.9
Artisanal Inland**	209.16	298.26	451.98	2.2	2.3	2.6
Total Artisanal	945.51	1303.83	1660.20	9.87	9.82	9.61
GROSS DOMESTIC PROUCT	27,152.7	38,070.7	48,862.4			
of which Fishing				4.57	4.49	4.42
Total Marine component				3.71	3.62	3.39
Total Inland fish component				0.86	0.87	1.03
Total Artisanal				3.49	3.42	3.39

Notes: (*) Artisanal marine contributes 73 % of Total Marine (**) Artisanal Inland contributes 90 % of Total Inland Source: Computed from Ghana Statistical Service figures

(c) *Estimates of fisheries direct use contribution (marine + inland) based on quantity and landing site price of fish data available.*

For expositional purposes, we estimate the gross value added in marine and freshwater fisheries for 2001 and 2002, the latest years for which data exist and compare to the published national accounts data.

The estimates of GVA for marine and freshwater fish catch in the tables below are based on

a. Quantity of fish landed data provided by the Directorate of Fisheries
b. Average landing site price estimated as 70 percent of market prices collected by Prices Section of Ghana Statistical Service (this assumes that 30 percent of the market price is for marketing margins)
c. The value added ratios (0.493 for Marine and 0.999 for Freshwater) established by the Ghana Statistical Service.

Comparing the estimated GVAs to that of National Accounts Data for 2001 and 2002, it is seen that in 2001 and 2002, the total marine fisheries sub sector value has been underestimated by 4.9 percent and 4.5 percent respectively (Table 6). Similarly, the inland fisheries sub sector value has been underestimated by 2.6 percent and 2.3 percent respectively in 2001 and 2002 as indicated in Table 7. These by implication underestimate the artisanal marine and artisanal inland fisheries by the same magnitudes.

Table 6: Estimate of Total Marine Fish GVA for 2001-2002

Year	Marine Fish landed[1] (MT)	0.493*Marine fish landed (MT)	GVA (Billion cedis)[2]	Estimated price (kg)	Av. Landing Price (kg)[3]	Computed GVA (Billion cedis)	Comparison (Computed GVA/GVA)
2001	370,953.0	182,879.8	1,377.5	7,532.3	7,900.0	1,444.8	1.049
2002	290,008.1	142,974.0	1,655.1	11,576.2	12,100.0	1,730.0	1.045

Notes: (1) Data from Dept of Fisheries (2) Actual data on Gross Value Added on Marine Fisheries from GSS (3) Average landing prices of fresh fish, GSS.

Table 7: Estimate of Inland (Volta Lake + Aquaculture) Fish GVA for 2001-2002

Year	Inland fish landed (MT)	0.999*Fresh water landed (MT)	GVA (Billion cedis)[2]	Estimated price (kg)	Av. Landing Price (kg)[3]	Computed GVA (Billion cedis)	Comparison (Computed GVA/GVA)
2001	81,000	80,919	331.4	4,095.5	4200	339.9	1.026
2002	81,000	80,919	502.2	6,206.2	6350	513.8	1.023

Notes: (1) Data from Dept of Fisheries (2) Actual data on Gross Value Added on Freshwater Fisheries from GSS (3) Average landing prices of fresh fish, GSS.

Based on the assumption that fish catch from other inland water bodies is 3.7 percent of Volta Lake Potential (see Table 3) and that prices of fish from these waters are similar to those of Volta Lake and Aquaculture, the GVA for these sources was estimated as shown in Table 8.

Table 8: Estimate of Other Freshwater Bodies Fish GVA

Year	GVA Fresh water catch Est. (MT)	3.7% of GVA Fresh water catch estimate (MT)
2001	339.9	12.57
2002	513.8	19.01

Summing up the estimated value added by each of the sub sectors and comparing with the estimates from National Accounts data, there has been an overall 5.2 percent underestimation of the fisheries value in 2001 and 4.9 percent underestimation in 2002. The comparison is shown in Table 9. The estimations in Table 9 concern fish production (marine and inland) only. Valuation of processed fish and marketing and its share as GDP are estimated as indirect fisheries contribution in subsequent sections.

Table 9: Total Estimated Fisheries GVA (Billion cedis)

Year	Est GVA Marine	Est GVA Freshwater	Est GVA Other FreshWater Bodies	Total Est GVA	GVA (National Accts)	Comparison
2001	1,444.8	339.9	12.57	1,797.2	1708.9	1.052
2002	1,730.0	513.8	19.01	2,262.8	2157.3	1.049

Value added by fisheries in other activities such as fish storage, processing and marketing, among others, are computed in section 4.2.

4.1 Comparison of computations to National Accounts Statistics

The methodology of estimating the value added of fisheries in national accounts in Ghana is not very different from many of the African country practices. The Directorate of Fisheries of the Ministry of Fisheries supplies the fish production figures for the computations. Landing site prices are provided by the SRID of MoFA and also through periodic market surveys carried out by the GSS.

There are a couple of reasons why the GSS computations of the GVA for the fisheries sector might under estimate the contribution of fisheries in GDP. Firstly, the figures supplied for the computations are for only marine and Volta Lake fish landings. Secondly, the rest of the other lakes and rivers are not covered. Also, the average landing site prices used in computing the value added might underestimate the value since prices at the landing sites change according to the season. The input-output-ratio is assumed constant over the year for all kinds of fishing gear, while in reality, the ratio changes depending on the season and the type of gear.

The methodology used in computing the value added of the fisheries sub sector does not also take into account own account consumption, which according to the SNA 93, should be imputed and added to the value added. This has not been possible due to lack of appropriate surveys to impute this. These methodological and coverage issues should be addressed to reflect the actual value of fisheries in agriculture value added. For instance, fish processing and marketing as well as transport related fishing activities are bulked together and captured in wholesale and retail trade and transportation respectively under industry and services in the national accounts.

4.2 Other Fisheries direct contribution to National Economy

(a) Fish and Fishery Products Exports

Since the launching of the Ghana Economic Recovery Programme in 1984, fish and fishery products are now the country's most important non-traditional export, accounting for over 50% of earnings from non-traditional export. The Table 10 below presents the quantity by commodity/species and value of fish and fishery products exported in 2001 and 2002.

Table 10: Quantity and Value ($) of Fish Exports, 2001-2002

	2001		2002	
Commodity	**Quantity (MT)**	**Value (US$)**	**Quantity (MT)**	**Value (US$)**
Canned Tuna	22,148.900	50,398,075.99	32,384.900	71,048,496.88
Frozen Tuna	16,830.500	10,291,921.77	17,809.800	12,191,012.84
Frozen Fish	6,190.710	8,088,369.03	1,779.220	6,205,265.46
Prawns	0.690	2,612.22	0.947	1,935.06
Shrimps	54.623	363,386.95	81,820	114,017.92
Lobsters	156.797	608,990.96	295.264	934,866.90
Cuttlefish	1,369.300	1,796,759.04	381,624	572,432.88
Octopus			66.652	63,621.38
Smoked/Dried Fish	5,807.850	2,689,088.76	5,311.720	4,380,198.67
Salted Fish	6.542	6,464.00	16.118	17,223.48
Shark Fins	0.088	300.00	1.000	99.60
Aquarium fish	0.040	200.00	0.122	250.00
TOTAL	**50,093.4**	**74,246,166.50**	**58,119.0**	**95,529,421.07**

Source: Ghana Export Promotion Council

In 2002, over 58,000 MT of raw and processed fish were exported; earning over US$95 million for the country. The smoked/dried fish, salted fish and aquarium fish are from inland fisheries. The rest are from marine fisheries and are from the landings of industrial (including shrimpers) and tuna fleets. The lobsters are mainly from the landings of artisanal fleets. Export earnings from fish and fish products are a significant source of foreign exchange for government. These earnings constitute as high as 3.98 % of total exports in 2001 and rose to 4.74 % in 2002.

(b) Fish Imports

Local fish production has never been enough to meet local demand. It is estimated that the fish requirements of the Ghanaian populace is about 800,000 MT while local production is about 400,000 MT. Importation of fish is, therefore, allowed to supplement local production. However, as a policy, fish imports are allowed only during the lean fishing season (ie March – June). The policy aims at ensuring a stable and good price of locally produced fish during the major and minor fishing seasons. The Table 11 below presents quantity and value of fish imported for the period 1998 – 2003.

Table 11: Quantity and Value of Imported Fish, 1998 -2003

Year	**Quantity (MT)**	**Value (Billion Cedis)**
1998	17,100.0	42.750
1999	52,156.6	156.471
2000	64,024.0	256.096
2001	105619.8	289.012
2002	144597.8	410.004
2003	197,902.50	653.078

Source: Directorate of Fisheries MoFA

The information in the tables above does not include informal export and import of fish across Ghanaian borders, as there are no official or documented data on them. The Custom and Excise Law does not consider head loads of processed fish carried across borders as fish meant for export. Rather, the law considers it as fish meant for personal use by the traders.

(c) Apparent Supply/Availability of Fish

Presented in the Table 12 below available fish for consumption by the Ghanaian populace for the period 1998 – 2003.

Table 12: Available Fish for Consumption, 1998 - 2003

Year	Annual Fish Landings (MT)	Annual Fish Import (MT)	Annual Fish Export (MT)	Fish Available (MT)
1998	342463.7	17,100.0	41,315.9	318,247.8
1999	350785.1	52,156.6	48,743.4	354,198.3
2000	437066.6	64,024.0	54,277.7	446,812.9
2001	438933.3	105,619.8	50,093.4	494,459.7
2002	371008.1	144,597.8	58,119.0	457,486.9
2003	413412.0	197,902.5	57,849.9*	553,464.6

Source Directorate of Fisheries MoFA *Provisional

Fish available to the populace has been increasing since 1998 due to increasing trend in fish imports. The share of local landings in total supply decreased from 99.04 % in 1999 to 88.8 % in 2001 and estimated to have decreased further to 74.7% in 2003. In absolute terms, the volume of local landings has increased between 1998 and 2003.

(d) Annual Fish Consumption per capita

The population of Ghana at 2000 was 18 million with an annual growth rate of 2.5% (Ghana Statistical Service, 2000). Using this figure, the per capita consumption of fish, 1998 – 2003 are presented in Table 13 below.

Table 13: Computations of Annual Fish Consumption per capita, 1998 - 2003

Year	Fish Available (MT)	Population (Million)*	Consumption per capita (kg/annum)
1998	318,247.8	18,000,000	17.7
1999	354,198.3	18,450,000	19.2
2000	446,812.9	18,911,250	23.6
2001	494,459.7	19,384,031	25.5
2002	457,486.9	19,868,632	23.0
2003	553,464.6	20,365,348	27.2

Source: Directorate of Fisheries MoFA *Calculated

The Table indicates an increasing contribution of the local fisheries sector to trend in the fish consumption per capita since 1998. The fish consumption per capita for 2003 was 27.2 kg/annum.

(e) Employment: Number of Fishers

The fishery resources of the country support directly or indirectly the livelihoods of a percentage of the Ghanaian population. It is estimated that a total of 500,000 fishers, fish processors, traders and boat builders are employed in the Fisheries Sector. These people, together with their dependents, account for about 10% of the population (Afful, 1993; Anon, 1995; Quaatey et al., 1997). A canoe census conducted for the marine fisheries in 2001 estimated the number of artisanal fishermen at 120,000 (Bannerman et. al., 2001). IDAF (1993) estimated that about 300,000 fisherfolks depend on Lake Volta for their livelihood of which 80,000 are fishermen and 20,000 are fish processors/traders.

The number and types of fishing crafts operating in the marine fisheries are given in Table 14.

Table 14: Number and Type of Fishing Craft in Marine Fisheries

FLEET	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
CANOES	8895				9981		
INSHORE VESSELS	241	239	239	236	244	230	233
IND. TRAWLERS	48	47	38	46	45	34	47
SHRIMPERS	14	11	6	3	3	2	6
TUNA	36	35	39	34	33	33	37

Source: Directorate of Fisheries MoFA. The canoe figures are from canoe frame surveys, which were conducted in the years indicated. The figures for the other fleets are from positional analysis of the vessels collected daily from the landing centers. A canoe survey conducted on Lake Volta in 1998 (DoF, 2003) estimated the number of canoes operating at 24,032.

(f) Contribution to State Budget

Apart form the fisheries sector contributing to GDP, employment and other social activities, it supplements the state budget in the form of fishing licenses collected by the Directorate of fisheries on behalf of government. In Table 15 fishing licenses contributed 8.2 percent to total revenue in 2001 and 31 percent of total revenue in 2002.

Table 15: Contribution of Fisheries to State Budget (Fishing Licenses)

	2001	2002
Total Revenue	6,904.5	8,799.9
Fishing License	567	2,698
Fishing License as percentage of total revenue	8.2	31.0

Source: Government of Ghana Budget Statement and Directorate of Fisheries

The contribution of fisheries to state budget through fishing licences cover only the industrial and semi-industrial fishing sectors. Currently the artisanal fisheries (marine and inland) are not licensed hence do not pay these licensed fees.

(g) Other Indirect contributions of the Fisheries sector: transport, storage, etc

Fishing as an activity contributes also to other sectors of the economy but in order to avoid double counting, these contributions are estimated in those other activities. Transport, Storage, Wholesale and retail activities in Ghana are the main sectors to which fishing contributes. Fish processing, which is a manufacturing activity, also forms part of the Gross Value Added in manufacturing. In 2002, the contribution of fisheries in the other sectors of the economy was about 850 billion cedis (Table 16). This forms about 1.7 percent of GDP.

Table 16: Contribution of Fisheries in other Activities (Bil. Cedis)

	2000	2001	2002*	2003**
Transport, Storage	139.8	199.2	258.5	351.8
Wholesale and Retail Trade	273.5	388.1	503.3	679.5
Manufacturing	49.0	68.5	88.2	118.7
Total	462.4	655.8	850.1	1,150.0
Total as a percentage of GDP	1.70	1.72	1.74	1.74

Source*: Computations by GSS (National Accounts Section).* **Notes***: These contributions are estimated as 12% of GDP in Transport and Storage, 15% of GDP in wholesale and Retail trade and 2% of manufacturing GDP respectively.*

4.3 Revenue contribution to Districts of Fishing communities

The contributions of the artisanal fisheries sector to the revenue mobilization of the districts surveyed are minimal. Estimates indicate that the contribution of revenue on fish products in these districts is less than 5 percent of all market tolls (see Appendices). However, Aggrey-Fynn (2001) indicates that the contribution of artisanal fisheries sector in the Jasikan District to revenue mobilization could be as much as 16 percent of total revenue.

5.0 The Ghanaian fisheries sector contribution to the economy: Sustainable Livelihood of selected Communities

Fishing is central to the livelihoods of both artisanal coastal and inland fishing households in Ghana. Livelihood comprises the capabilities, assets and activities required for a means of living. To Carney (1998), a livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future while not undermining the natural resource base.

To complement the total economic value of the contribution of fisheries to the economy, case studies of livelihoods of artisanal fishing communities along the Volta Lake and the coast (marine) was undertaken. The case studies focused on how fishing communities use their capabilities, assets and activities for a means of living. It also analyses their vulnerability and alternative livelihood strategies. It also quantitatively assessed the contributions of these fisher folk communities to the economic and social development of their respective districts using simple indicators.

In summary, there is much diversity in the livelihood communities that depend on fisheries resources for a living. An important lesson from the SLA is that the ways fishing activities contribute to household's livelihoods are complex and cannot be reduced to basic statistic indicators. Communities along the coast (Ablekum in Gomoa and Sakumono in Tema) derive between 40-50 percent of their financial strength from fishing whilst those inland (Abumey in Asuogyaman and Darfor-Torkor in Kpandu) derive between 75-85 percent of financial strength from fisheries. There are observed varying degrees of migration. In all the communities, fishing resources are diminishing and in all these situations, the communities draw upon their assets to overcome the threats that face them. Fishing has provided an important safety net for significant proportions of these communities, but has attempted to diversify into other vocations, particularly farming. A key feature of most of the communities is fisheries resource management committees empowered for overseeing and promoting fishing planning and management. These management committees explicitly involve women in the decision-making structures and processes to ensure that women's interests are included in the management and sustainable use of the fishery resources.

Below is a summary of the SLA undertaken in the communities.

5.1 Asuogyaman District: Abumey Community

SLA studies on fisheries communities have been undertaken in this district for several communities along the Volta Lake upstream to the dam by the SFLP/IPIC station at Atimpoku. The communities include Kudikope, Dodi Asantekrom, Sedom, Mpakadan and Adjenadonor No.1.

The Abumey Community is a settler community and lies downstream of the dam. The Community is about 5 km from Akosombo and 8 km north from Atimpoku, the district capital.

The principal livelihood strategy in Abumey community is fishing (men) and fish processing (women). Farming was one of their main livelihood strategies. Crop farming is now virtually non-existent, as the community cannot farm along the riverbanks. There are however small backyard gardening.

Vulnerability Context
Fishing activity is undertaken throughout the year. However, bumper catches are usually in the months of November – March and June to August with a minor fishing period between April to May. Lean fishing periods are January, September and October. The months that are considered most vulnerable are the minor fishing months and the lean fishing periods. During

the lean season, the women fish processors move to Yeji and Kete-krachi to buy fish for processing. The men do not migrate.

Financial strength
The use of social revolving credit (susu schemes) exists but is limited to periods in the bumper seasons. The community's financial strength is derived from fishing (50%), fish processing (35%), animal rearing (2.5%), petty trading (10%), and artisanal trade (sewing, hairdressing, etc) form 5%. The Abumey community derives as much as 85 percent of their income from fishing activities.

The community has no access to formal credit from banking institutions. They however have savings with the Anum Rural Bank and the Ghana Commercial Bank at Akosombo. The community has never benefited from the Poverty Alleviation Fund from the District Assembly Common Fund, although they were asked to open accounts to that effect.

Social Strength and Weakness
There are men and women groups at Abumey. There is a Community Based Management Committee that exits for co-management of fisheries resources. Executive members represent various stakeholders and are elected. There is a Women's group, Abumey Miwoenenyo Women Association, that function to encourage self-help and how to properly handle processing of fish. The leadership selection is by election. The women can buy fish for processing on credit from their men (husbands) and sometimes obtain credit from moneylenders. About 80 percent of children of school going age are at School. The enrolment of boys is greater than that of girls. The enrolment rates sometimes falls to below 50 percent getting to the end of the year because parents could not pay the school fees.

On the use of the incomes generated, the community on the average spends 25 percent of the generated income on food, 35 percent on education, 20 percent on health, repairs of houses (15%) with clothing and attendance of funerals representing 2.5 percent respectively.

Children in the community have to walk/travel to Akosombo to attend school. Child mortality as at 2003 indicates that 3 children below age 5 died among an estimated age bracket of 600. This represents a child mortality rate of 0.5 percent. Common diseases in the community include Measles, Fever, Hernia, chicken pox, convulsion, bilharzias, and malaria.

Human Strength
Individual fishers and fish processors in the community possess other skills. These skills include Carpentry**,** Masonry**,** Tailor/Dress Making, Hair Dressing, Auto Mechanic, Drivers and Draughtsman. Among the fishers are people with different levels of education with most fishers and fish processors with the ability to communicate in English. Their main occupation was farming but the land has been taken away from them through prohibition by the VRA. The areas below the dam are declared disaster areas; hence resettlement along the riverbanks just below the dam is not encouraged.

Physical Strengths and Weakness
Most families own fishing canoes, nets and fish traps. Housing is traditional but are solid structures. Each household has a house. Akosombo, Atimpoku and the adjoining towns constitute large market sources for the community.

There is no clinic or electricity in the community. The roads to the community are poor. There is no pipe borne water. The community has no schools of their own.

The most important natural strength available to the community is the inland lake for fishing. The river, during the bumper season allows plenty of fish catch.

Natural weaknesses in the community include depleting fish catch, erosion of riverbank and the inability to farm along the riverbed.

The community has some access to institutional services. These include MOFA staff of the fisheries department visiting to offer advice, access to Community Health/Nurses, the police comes to offer pieces of advice, and The Path (an NGO) once distributed used clothes to the community.

Livelihood Outcomes and Aspirations
The Community over the years has been stable socially. There has been better nutrition for the children. However, over the last couple of years, there has been a declining fish catch and an increase in the migration of the youth to the cities.

The people in the community have accumulated assets like radios and TVs. Since theirs is a settler community, most of their durable assets are in their hometowns. Savings at the bank are their main asset but fluctuate within the year.

The livelihood aspirations of the Abumey community include access to electricity, a clinic, good roads, portable water and a community school. These aspirations are however constrained by the VRA prohibition and quit orders.

5.2 Kpando District: Dafor-Tornu Community

The Dafor-Tornu Community is about 15 km north of Kpando, the district capital.

The principal livelihood strategy in the community is fishing (men) and fish processing and farming (women). The alternative livelihood strategies in the community include petty trading. The area is known for the cultivation of sweet potatoes.

Vulnerability Context
Fishing activity is undertaken throughout the year. However, bumper catches are usually in the months of December to July with a minor fishing period between August to November. Lean fishing periods are the months between August and November. During the lean season, the men migrate to nearby places such as Biobio Island and Kpeve to fish. Some other fishermen

prepare their lands to crop sweet potatoes, groundnuts and cassava. The women, for most part of the year, do crop farming besides the fish processing.

Financial strength
The use of social revolving credit (susu schemes) exists but is limited to periods of funerals. The community's financial strength is derived from fishing (50%), fish processing (25%), food cropping (15%) and petty trading (10%). The Dafor-Tornu community derives as much as 75 percent of their income from fishing activities.

The community has no access to formal credit from banking institutions. The community has once benefited from the poverty alleviation fund (PAF) from the district assembly in 2000. Only eight people benefited from a one million cedi credit. They have applied for social investment fund (SIF) credit but did not receive any help.

Social Strength and Weakness
There are men and women groups at Dafor-Tornu. There is a fishermen's group, Dafor-Tornu Fishermen Association, although not affiliated to the national umbrella body. The association exits to mobilize resources to buy fishing inputs for members. Executive members are elected and comprise of a Chairman, Vice chairman, Secretary, Treasurer and Porter. There is a Women's group, Fishmongers Association, that function to mobilize funds for assistance to members in times of need. The leadership selection is by election. About 75 percent of children of school going age are at School. The enrolment of girls is greater than that of boys.

On the use of the incomes generated, the community on the average spends 5 percent of the generated income on food, 30 percent on education, 25 percent on health, repairs of houses (10%), repairs of canoes (20%) with clothing and attendance of funerals representing 5 percent respectively.

Child mortality as at 2003 indicates that 3 children below age 5 died among an estimated age bracket of 250. This represents a child mortality rate of 1.2 percent. Adult mortality rate in 2003 was two deaths in 1000 adults. Common Disease in the community includes Onchocercasis, Bilhazia, Piles, Hernia and malaria.

Human Strength and weaknesses
Individual fishers and fish processors in the community possess other skills. These skills include Carpentry for canoe making and bakery for men and Dress Making and Hair Dressing for the women. Among the fishers are people with different levels of education with most fishers and fish processors with the ability to communicate in English. Land is scarce and the most predominant land arrangement is the sharecropping. The community is skilled in the cropping of sweet potato, a major crop in the area.

Physical Strengths and Weakness
Most families own fishing canoes, nets and fish traps. Housing is traditional but are solid structures. Each household has a house.

There is no clinic or electricity in the community. The roads to the community are poor. There is no pipe borne water. There is no market in the community. The community has only a primary school.

The most important natural strength available to the community is the inland lake for fishing. The river, during the bumper season allows plenty of fish catch. The rainfall pattern in the area is favorable for crop farming. The dry season is normal.

Natural weaknesses in the community include depleting fish catch, erosion of riverbank and the scarcity of land for farming. There is occasional flooding; making the only bridge that links the community and the rest of the district impassable. Access to woodlot is a major problem

The community has some access to institutional services. These include MOFA extension staff visiting to offer advice, access to Community Health/Nurses. NADMO advised the community to nurse tree seedlings but has failed to come to purchase them. The area is marked for the Rural Electrification Project but still pending.

Livelihood Outcomes and Aspirations
The Community over the years has seen stable social environment. There has been better nutrition for the children. Their crop production has also been increasing. However, over the last couple of years, there has been a declining fish catch with an increase in the migration of the youth to the cities.

The people in the community have accumulated assets like bicycles and corn mills. People are also converting their thatched roofing to aluminum sheets. Petty trading is also springing up in the community. The livelihood aspirations of the Dafor-Tornu community include access to woodlots for construction purpose, electricity, a clinic, good roads, portable water and a community school. The community also aspires to have a fishing input shop to facilitate access to inputs for their fishing operations.

5.3 Gomoa District: Ablekum near Apam

Ablekum is located 8 km East of Apam, off the Winneba – Cape Coast Road in the Gomoa District in the Central Region along the Atlantic Ocean. The principal livelihood strategies in Ablekum community are fishing and fish processing. The alternative livelihood strategies undertaken in the community include Crop Farming, Harvesting of Woodlots for selling, Petty Trading, Dress Making and Hair dressing.

Vulnerability Context
Fishing activity is undertaken throughout the year. However, the major fishing period is the months of July – September with a minor fishing period between January to February. Lean fishing periods are March to June and from October to December. The months that are considered most vulnerable are therefore these lean fishing months. In the lean season, the community does not migrate to other places to fish. Rather during the lean season, the community prepares lands for cultivation and planting. The crop farming is undertaken

between April/May to August (main farming season). Crops cultivated are maize, tomatoes and onions. They also rear sheep, goats and poultry as backyard activity.

Financial strength
The use of revolving credit schemes (susu schemes) is limited in the Ablekum community. The community's financial strength is derived from fishing (20%), fish processing (20%), crop farming (40%), petty trading (10%), Wood gathering (5%) and remittances from relatives living elsewhere (5%). It appears that the Ablekum community derives as much income from food cropping as from fishing activities.

The community has no access to credit from banking institutions. The community has never benefited from the Poverty Alleviation Fund from the District Assembly Common Fund and only once benefited from ADRA (NGO), food for work programme.

Social Strength and Weakness
The Ablekum community has a spirit of communal labour. There is an Ablekum Community Based Management Committee that exits for co-management of fisheries resources. Executive members represent various stakeholders and are elected except the Chairperson who is the Chief Fisherman. The Chief Fisherman is part of the traditional authority and the position inherited. There are Youth Groups of which positions are elected. About 60 (300 out of 500) percent of children of school going age are at School. The enrolment of boys is twice that of girls.

On the use of the incomes generated, the community on the average spend 45 percent of the generated income on food, 20 percent each on education and health, with clothing, attendance of funerals, repairs of houses and repair of boats representing 5 percent respectively. Child mortality appears to be relatively high. As at November 2004, 10 children below age 5 have died among an estimated age bracket of 150. This represents a child mortality rate of 6 percent. Adult Mortality for the comparable period is 15 deaths among 1000 adults. This represents an adult mortality rate of 1.5 percent. Common Disease in the community includes Measles, Asthma, Fever and Hernia.

Human Strength
Individual fishers and fish processors in the Ablekum community possess other skills These skills include Carpentry**,** Masonry**,** Tailor/Dress Making, Hair Dressing, Auto Mechanic, Drivers and Draughtsman. Among the fishers are people with different levels of education with most fishers and fish processors with the ability to communicate in English.

Physical Strengths and Weakness
Most families own fishing canoes, nets and fish traps. Land is owned communally. Housing is traditional but are solid structures. Each household has a house. Winneba and Apam constitute large market sources for the community.

There is no clinic, electricity or police station in the community. The roads to the community are poor. There is pipe borne water but flows are irregular. The community has no schools of their own.

The most important natural strengths available to the community are the sea and land for crop cultivation. The sea, during the major season allows plenty of marine fish catch. The land supports the cultivation of maize, tomatoes and onions in good seasons.

Natural weaknesses in the community include poor rainfall pattern affecting crop farming, depleting fish resources, sea erosion and the depletion of woodlots.

The community has access to institutional services. These include MoFA staff visiting to offer agricultural extension advice, access to Community Health/Nurses, Teachers for Education, Department of Social Welfare for child welfare issues, Community Tribunal and ADRA (an NGO) once allowed them to benefit from food for work programme.

Livelihood Outcomes and Aspirations
The Community over the years has been stable socially. There has been better nutrition for the children. However, over the last ten years, there has been a decreasing fish catch, in the last 3 years due to poor rainfall, decreasing farm yields an the migration by the youth to the cities is on the increase.

The people in the community have accumulated assets like radios, TV, extension to houses and more canoes. The livelihood aspirations of the Ablekum community include access to electricity, a clinic, good roads, cottage industries and access to credit.

5.4 Tema District: Sakumono

Sakumono is located in West of Tema Township in the Greater Accra Region along the Atlantic Ocean. The village interfaces with a modernized community, the Sakumono Estates. The principal livelihood strategies in the Sakumono community are fishing, fish processing and peri-urban farming. The alternative livelihood strategies undertaken in the community include petty trading, dress making and Hairdressing.

Vulnerability Context
The community has a peculiar type of fishing. They engage in Beach Seine, which is the drawing of cast nets, set nets and traps from the shore. Fishing activity is undertaken throughout the year. However, the main fishing period is the months of October – January. Between February and July, the community engages in crop preparation and farming mainly in vegetables and maize. This period coincides with the minor season for fishing hence only minor fishing is carried out. Between July and October, they combine crop farming and harvesting of produce. The months that are considered most vulnerable are the months between February and July. In the lean season, the community does not migrate to other places to fish. Rather during the lean season, the community prepares lands for cultivation and planting. Crops cultivated are tomatoes, pepper, garden eggs, onions and maize.

Financial strength
The use of revolving credit schemes (susu schemes) is limited in the community. To the men in the community, their financial strength is derived from fishing (50%) and crop farming (50%). The women derive their financial strength as follows: fish processing (45%), crop farming

(35%), petty trading (15%), and from other sources (5%). It appears that the Sakumono fishing community derives as much income from food cropping as from fishing activities.

The community has no access to credit from banking institutions. Some members in the community has have ever applied for bank loans and were refused. Since, most people in the community have never attempted to source for credit from the formal banks. They have never benefited from the Poverty Alleviation Fund from the Municipal Assembly Common Fund.

Social Strength and Weakness

The Sakumono community has a spirit of communal labour. There are as many as eight (8) different groups and Associations. There is a Sakumono Community Based Fisheries Management Committee that exits for co-management of fisheries resources. Executive members are elected except the Chief Fisherman. The Chief Fisherman is part of the traditional authority and the position inherited. The other Groups have positions for officers elected. Most of the children of school going age are at School.

On the use of the incomes generated, the community on the average spend 30 percent of the generated income on food, 10 percent each on education and health, clothing (15 percent), attendance of funerals (5 percent), maintenance of houses and maintenance of nets represent 10 and 5 percent respectively. The remaining is saved or reinvested in other things. Child mortality appears to be relatively low. Common Disease in the community includes malaria, diarrheas, cough, hernia and stroke.

Human Strength

Individual fishers and fish processors in the community possess other skills. These skills include Carpentry**,** Masonry**,** Tailor/Dress Making, Hair Dressing, welding and tie and dye. Among the fishers are people with different levels of education with most fishers and fish processors with the basic middle school level education.

Physical Strengths and Weakness

Most families own fishing nets and fish traps. Housing is solid blocks with concrete roofing. Each household has a house.

The most important natural strength available to the community is the sea and the Sakumono Lagoon. The sea, during the major season allows plenty of marine fish catch. The land supports the cultivation of tomatoes, pepper and onions in good seasons and under local irrigation.

Natural weaknesses in the community include poor rainfall pattern affecting crop farming, depleting fish resources, sea erosion and the depletion of woodlots. Lands for crop cultivation are all sold up for building purposes. The community therefore utilizes these plots for farming, knowing that they could be ejected at any time.

The community has access to institutional services. These include MOFA staff visiting to offer agricultural extension advice, access to Community Health/Nurses and Teachers for Education.

Livelihood Outcomes and Aspirations
Family life in the community over the years has been stable. However, over the last ten years, there has been a decreasing fish catch.

The livelihood aspirations of the Sakumono community are to have an alternative livelihood in Aquaculture. There are some initiatives on this with the authorities concerned. Other aspirations include an improved landing beach, credit facilities, a nursery school and a senior secondary school.

Table 17 summarizes the contributions of the surveyed artisanal fishery communities to their districts in terms of contribution to market revenues, employment numbers, the number of fish processors/traders and stock of outboard motors. These contributions are as a result of the livelihood aspirations of the artisanal fisher folks.

Table 17: The Role of Artisanal Fisheries Sector in the Livelihoods of Districts Surveyed

Basic Indicators	Districts Surveyed				
	TEMA	GOMOA	KPANDO	ASUOGYAMAN	Data Source
Total Population	511,459	194,792	112,961	74,142	GSS 2002
• No. of Fishermen (artisanal)	5,195	5,238	2,920	1,770	DOF
• No. of Fish Processors/Traders	5,038	5,122	4,366	2,040	DOF
• % Share of Artisanal in Total	1.016	2.69	2.58	2.39	
Total Amount of Fish Landed (MT)	130,258	16,091	148	NA	DOF 2003
Total output by artisanal (MT)	47,958	13,031	148	NA	DOF 2003
Total Contribution to Local Revenue					
• Total Revenue	20.983 bn cedis	5.671 bn cedis	2.602 bn cedis	545.796 m cedis	DIST. ASSEM
• Total Market Toll	255.408 m cedis	27.857 m cedis	92.266 m cedis	13.434 m cedis	DIST. ASSEM
• Total Fish Revenue (artisanal)**	12.8 m cedis	1.39 m cedis	4.61 m cedis	0.67 m cedis	
Total Investment in Fishing Activity					
• Outboard++	60 (321)	80 (258)	6 (39)	5 (17)	DOF
• Cold stores	43	3	--	1	DOF
• Premix Outlets	18	13	18	4	DOF / PREMIX COMM
• Harbours / Ports	1	--	--	1	DOF
• Others (Fish Markets)	1	1	2	1	DOF
Contribution to Local Fish Protection					
• CBMFC	4	6	--	--	LOCAL COMMUNITY

Notes: (**) Assumed 5% of Market Toll (see Appendix notes) (++) Figures in parenthesis is the stock of outboard motors from the Canoe frame survey, 2002. The other figures are 2004 Government distributed outboard motors.

6.0 Enhancing the contribution of Fisheries in National Accounts and Linking Fisheries Sector to Development Planning Institutions in Ghana

6.1 Improvements in the SFLP Draft document

The SFLP Draft document identifies several basic indicators that could help assess, at least cost, the contributions of the fisheries sector to economic and social development of a country. The focus, however, is more on the quantification of the value of direct use contributions of fisheries sector to economic development. From the literature on the overview of methodologies for valuing contributions of the fisheries sector, it is evident that other indirect use values arising from the fisheries sector needs to be incorporated. For instance, certain watershed areas in Ghana have been designated as Ecologically Protected Zones. Perhaps revenues accruing from tourist activities in these areas must be imputed to the fisheries sector.

Secondly as suggested by Bene (2003), people's access to the fisheries resource, rather than the resources themselves, play a crucial role in vulnerability to poverty. A crude indicator or measure of people's access to the fisheries resource will be the extent and coverage of fisheries licensing, particularly on inland fishing activities.

Thirdly, there are imputed import substitution (replacement value) contributions. The value of fisheries landed serves as a substitute to an otherwise value of fish that would have been imported. How much would it cost to import substitutes of similar protein content? In treating the value of fish (marine and inland) caught in Ghanaian waters, sight should not be lost of this contribution in conserving foreign exchange.

6.2 Strengthening Links with National Accounts Office of Statistical Service

The most important input required from the Directorate of Fisheries to the work of the National Accounts Office is timely data reporting. In this regard, there should be a strengthening in the area of data collection and management. Officers working on the various sub-sectors in the fisheries data management unit should work closely with the national accounts unit of the Statistical Service. There is the need for the creation of a committee made up of the Directorate of Fisheries and the GSS to review data collected and expand data coverage as inputs into the national accounting data. For instance, currently, GSS relies on the Directorate of Fisheries for fish catch/landings data only and they (GSS) use their own price data on the fisheries sector generated from market surveys. There should be the participation of Directorate of Fisheries in the kind of data collected and reported.

The Directorate of Fisheries, through the committee established with the GSS, could expand the coverage of data currently employed in the computation of the GVA in fisheries. For instance, the potential of fish catch in the other lakes, lagoons and reservoirs are enormous for them to be left unaccounted for in the fisheries value added computations. Data on non-direct use, however, may still remain outside valuation considerations.

6.3 Strengthening Links with National Development Planning Commission

The National Development Planning Commission is the body responsible to advice the President on development planning policy and strategy. The National Development Planning Commission has a Public Sector Management Division (PSMD) that liaises with sector ministries including MoFA in the administration of development including plan preparation. In addition there is the Economic Policy Division and the Production and Technology Policy Division. The Fisheries Directorate needs to lobby to strengthen its representation in the standing committee in MoFA that liaises with the PSMD. Not only will a representation of the Directorate of Fisheries on any standing committee of MoFA with NDPC enhance its linkages with the NDPC, it would afford an effective dissemination arena to articulate the contributions of the fisheries sector in the national planning process.

7.0 Conclusions and Recommendations

7.1 *Findings of the Study*

The main findings of the study are as follows.

- The fisheries sector contributes enormously to the economic and social development of the country. There is a case, however, for arguing that the contribution of fisheries to the national economy is not currently reflected in the official GDP statistics. By estimating value added by each of the fisheries sub sectors and comparing with the estimates from National Accounts data, there appears to be an overall 5.2 percent underestimation of the fisheries value in 2001 and 4.9 percent underestimation in 2002.
- The fisheries sector contributes immensely to the food security needs of the country. Its contribution to the livelihood aspirations of millions of Ghanaians is enormous. An important lesson from the SLA is that the ways fishing activities contribute to household's livelihoods are complex and cannot be reduced to basic statistic indicators.
- No one specific methodological approach suffices to estimate the contributions of the fisheries sector to economic and social development. The various analytical frameworks reviewed offer a set of complementary techniques which when properly applied, can help to improve understanding of the contribution of fisheries sector to national economic development and to the livelihoods of the local populations.
- The GSS computation of the Gross Value Added in Fisheries in National Accounts utilizes quantity data of fisheries landed supplied by the Fisheries Department of MoFA. Data on prices, however, are obtained through the SRID of MoFA and through market surveys by the GSS.
- There are data deficiencies in the fisheries sector that needs to be collected to strengthen the assessment of the contributions of the fisheries sector. For instance data on inland fish catch other than the Lake Volta needs strengthening.
- In computing gross value added in the fisheries sector, GSS uses a value added ratio of 0.493 for the marine sector and 0.999 for the inland fish. The implications are that cost of input use in the marine sector, excluding capital consumption allowance, is 50.7 percent of the value of output in the marine fisheries sector.

7.2 *Enhancing Fishery sector and Directorate of Fisheries of MOFI Contribution to Food Security and Economic Development*

Fishing is of particular importance to the protein needs of Ghanaians. Fish is the preferred and cheapest source of animal protein and represents a large proportion of the animal protein intake by the Ghanaian populace. Increasing fish production, generate employment and improve household incomes of fisheries communities is faced by dwindling fish resources and the national objective of preserving the fish resource base.

Financial resources are therefore required to enhance the sustainability of fisheries resources through proper planning, control and management. The Directorate of Fisheries of MoFI needs to be resourced effectively.

Planning, control and management requires the existence of data. Without adequate production and market surveys, planning based on extrapolations from old surveys could continue to under/over estimate production under changing fishing gears and technologies.

It is crucial that the budgetary allocations to the Directorate of Fisheries be increased to carry out these strategic planning and control interventions. The Directorate of Fisheries should be able to strengthen their presence in the Community Based Fishery Committees as a major step in influencing grassroots decision-making.

7.3 *Enhancing dissemination and use of methodology in estimating the contributions of the fisheries sector by NCU*

The methodology in computing the basic indicators are simple as outlined in SFLP Draft Document but certain key indicators can be disseminated to attract the attention of national policy planners.

Some key statistics that can be computed to attract the attention of national policy planners include:

- *Replacement value in US Dollar terms.* This is the value of fish catch landed and valued in US dollar terms. It reflects the amount of foreign exchange saved as a result of the local supply. This amount can be expressed as a percentage to total import value.
- Percentage of Fisheries contribution to GDP. It must be noted that the Fisheries Directorate would have to push, convincingly through regular surveys, the average landing price that must be used for computing the GVA by the GSS.
- Percentage fishery exports as a share of total merchandise exports

Murray (2003) provides several channels through which the Directorate of Fisheries can disseminate information on the contributions of the fisheries sub-sector to economic and social development of the country. Some of the outlets listed include newspaper articles, visible representation of the Directorate of Fisheries in the National Accounts Unit of the GSS, In-house publications and through the FAO. It is hoped that the Directorate of Fisheries will avail itself to these opportunities in a cost effective manner

7.4 *Computing Guidelines for the contribution of the Fisheries sector to Economic and Social Development in Ghana*

The SFLP Methodological Guide for assessing the role of Small scale fisheries in the economies of West African countries provide detailed basic indicators for appreciating the role played by the fisheries sector.

In this section, the study provides a guideline for computing the GVAs in the fisheries sector (marine + inland) and the computations of the shares of the artisanal fisheries sector in total fisheries GVA and in total GDP.

Table 18: Computational Guidelines for the Contribution of Total Fisheries, Artisanal Fisheries in Gross Domestic Product (TEV analyses)

Computational Procedure		Source of Data
1. Gross Value Added: Fisheries Sector		
(i) Marine Catch (MT)* **0.493***Marine av. Landing price/kg	**A**	DoF / Fish landing sites
(ii) Inland Catch (MT)*0.999*Inland av. Landing price/kg (Volta Lake + Aquaculture)	**B**	
(iii) Add 5 percent of inland fish GVA to account for other fish caught in other lakes, rivers, etc	**C**	GSS
Total GVA = A + B + C		**Note**: *Frequent surveys could help determine the values of the constants used in the computations*
(iv) Share of Artisanal GVA		
(a) Marine GVA *0.73 (artisanal share in marine catch)	**D**	
(b) Inland GVA * 0.90 (artisanal share in inland catch)	**E**	
Share of artisanal GVA in total Fish GVA = (D+E) / (A+B+C)		
Share of Fish GVA in GDP = (A+B+C) / GDP		
Share of artisanal GVA in total GDP = (D+E) / GDP		
2. Estimation of Fish Processing, Storage, Marketing, etc		
Value of Fish in Transport and Storage = 0.12 * subsector transport, storage of Service Sector GDP		GSS, National Accounts.
Value of Fish in Wholesale and Retail trade = 0.15 * subsector wholesale and retail trade of Service Sector GDP		**Note**: *The constants are computations of GSS (see body of report)*
Value of Fish in Manufacturing = 0.02 * Manufacturing GDP		
(*Alternative computation is to use the SFLP guide but that involves a lot of survey work*)		

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Appendix 1: **ASUOGYAMAN DISTRICT**

Personnel Consulted at the District.

Asuogyaman District (Atimpoku)

1.	Dr. Veronica Mensah	District Director of Agriculture, MoFA, Atimpoku
2.	Mr. Christian Nii Amponsah	District Development Officer, MoFA, Atimpoku
3.	Mr. Fafa Asafo	MIS, MoFA, Atimpoku
4.	Mr. Akoena	Deputy District Planning Officer, Atimpoku DA
5.	Dr. Braimah	IPIC/SFLP Office, Atimpoku
6.	Mr. Peter Frey	District Cooperative Officer, Atimpoku

Asuogyaman District—Abumey Fishing Community (Focus Group discussants)

1.	Mr. Charles Gbetey	Headman
2.	Nana Gershon Awudi	Chief Fisherman
3.	Mr. Moses Agbemafley	Unit Committee Chairman
4.	Mr. Francis Adzani	Assemblyman
5.	Togbi Agblegah	Fisher
6.	Madam Helen Plipa	Fish processor
7.	Madam Agnes Aglebe	Fish processor
8.	Madam Juliet Kuditey	Fish processor
9.	Madam Horlali Apley	Fish processor
10.	Madam Cecilia Kugbley	Fish processor

Facilitators: Dr. Daniel Bruce Sarpong
Mr. Samuel Quaatey
Mr. Christian Nii Amponsah
Mr. Peter Frey

Personal communication with the Accountant and Deputy District Planning Officer, ADA

There are 3 main markets under the district, excluding Akosombo market. These are Senchi, Frankadua, and Labolabo. A fourth market, Sappor Junction is the latest market, opened as a result of the VRA Marine Market where most of the revenue from fish goes. The VRA market is not under the Asuogyaman District Assembly.

From the fish segment, the main revenue comes from fish and processed fish. Attempts to license canoes on the Lake Volta in the district failed because most the fishers were settlers and highly mobile. Access roads to fishing communities are also not good hence fishers rely on canoes to transport fish to distant markets such as Torkor, Gemeni, Kpandu. Fish processors also take fresh fish from the landing sites in the district and take them to Kpong and Accra without paying levies to the district assembly.

Revenue from market tolls, of which levies on fresh fish and processed fish form a part, is only about 1-5 percent of internally generated funds (rates, fees, fines, licenses, investment on income, etc). Agricultural produce, however form about 30 percent of the market tolls generated.

Estimates made by Mr. Nii Amponsah, DDO on the potential value of fish catch at one community, Combined Torkor a fishing community near Akosombo in 2002/2003.

Fish Clupeidal (One Man Thousand) only

- Average 40 canoes fishing twice a day (morning/evening) for the whole year but using 350 days in a year
- Minimum 5 rubber paint gallon (approx, 4.5-5kg per bowl) per each landing = 10 kg
- Price is approximately 7000 cedis/5kg at the time

Rough Estimate of value of One Man Thousand only landed at Combined Torkor only

(10kg x 350 days x 7000 cedis x 40 canoes) = approximately 980 million cedis.

To obtain value added, one needs to subtract the value of intermediate inputs from the estimation. Alternatively multiply the 980 million by a value added ratio for inland fishing if available. It is assumed to be 0.999.

A crosscheck calculation was made with the Assemblyman and Headman at the Abumey Community.

- Average 100 canoes operating for each day in the year (350 days)
- Average 5 bowls (approximately 5 kg per bowl) per day landing per canoes
- Each bowl cost 6000 cedis

Estimate 100 canoes x 5kg x 6000 cedis x 350days = 1.05 billion cedis

Using 40 canoes x 5kg x 6000 cedis x 350 days = 420 million cedis per year for only clupeidal (One Man Thousand).

Appendix 2: KPANDU DISTRICT

Personnel Consulted at the District.
Kpandu District (Kpandu)

1.	Mrs Cecilia Gbolo	District Director of Agriculture, MoFA, Kpandu
2.	Mr. Winfred Agbley	District Development Officer, MoFA, Kpandu
3.	Mr. James Kale	Prin. Tech. Assistant, Fisheries, MoFA, Kpandu
4.	Mr. Victor Adde	District Budget Officer, Kpandu DA
5.	Mr. Godwin Dzansi	Acting District Cordinating Director, Kpandu DA

Kpandu District—Dafor-Tornu Fishing Community (Focus Group discussants)

1.	Mr. Kito Dorvi	Headman (Chairman of Community Based Lake Management Committee)
2.	Mr. Emmanuel Amedofu	Fisherman
3.	Mr. Alex Dorvi	Fisherman
4.	Mr. Egbezutsor Tsipoanya	Fisherman
5.	Mr. Kpogo Agyeman	Fisherman
6.	Madam Cecilia Tsipoanya	Fish processor
7.	Madam Awusi Fornyikpor	Fish processor

Facilitators: Dr. Daniel Bruce Sarpong
Mr. Samuel Quaatey
Mr. James Kale
Mr. Winfred Agbley

Personal Communication with the District Budget Officer, Kpandu District assembly

Averagely, the DA collects about 6 million cedis per week in terms of market tolls. In the district, fisherfolks has refused to pay landing fees and licensing fees. Of the total internally generated revenue, the percentage of levies from exportation of fish from the district forms about a maximum 8 percent. Fish revenue in total market toll is about a maximum 5 percent.

Estimate of value of landings of Clupeid at Torkor only (Mr. James Kale). Note that these are official recordings only

- Average 572 canoes/12 months of 192 days in 12 months = 3 canoes per day
- Each bowl cost 6000 cedis (approx. 4.5 kg)

Estimate 3 canoes x 4.5kg x 6000 cedis x 192days = 15.6 million cedis per year

- Average 14,204kg landings of clupeid for year 2003

Using 14,204 kg x 6000 cedis/4.5kg = 18.94 million cedis per year for only clupeid (One Man Thousand).

Appendix 3: **Gomoa District**

Personnel Consulted at the District, Apam

Gomoa District

1.	Mr. Francis Nutakor	District Director of Agriculture
2.	Mrs. Geofied Sam	DDO Development Officer MIS
3.	Mr. Samuel Odum	D.D.O., Fisheries
4.	Mr. Eric Akomea	Budget Officer
5.	Mr. Mensah	District Finance Officer
6.	Mr. Nfordjo	Planning Officer

Gomoa District—Ablekum Fishing Community (Focus Group discussants)

Facilitators: Mr. Samuel Quaatey
Mr Geofred Sam
Mr. Samuel Odum

Appendix 4: **TEMA MUNICIPALITY**

Personnel Consulted at the Municipality.

Tema Municipality

1.	Mr. Emmanuel Aryee	Municipal Director of Agriculture
2.	Mrs. Matilda Quist	Regional Development Officer-in-Charge, Fisheries
3.	Mrs. Abena Serwah Asante	D.D.O., Fisheries
4.	Mr. Bright Ametepe	TMA Accountant, Tema
5.	Mr. Samuel Aryee	Municipal Finance Officer, TMA

Tema Municipality—Sakumono Fishing Community (Focus Group discussants)

1.	Mr. Daniel Sogbordzor	Secretary, Community Based Fisheries Management Committee (CBFMC)
2.	Mr. Stephen T. Sogbordzor	Chief's representative on CBFMC
3.	Mr. Kwasi Otuboa	Chief Fisherman
4.	Mr. Larte Adamani	Organizer, CBFMC
5.	Mr. Ofori Kpodo	Financial Secretary
6.	Mr. Tetteh Oguara	Fisher (member)
7.	Madam Dede Sogbordzor	Fish processor (Women's Leader, CBFMC)
8.	Madam Agnes A. Cobblah	Fish processor

Facilitators: Dr. Daniel Bruce Sarpong
Mr. Samuel Quaatey
Mrs. Abena Serwah Asante
Ms. Ivy Mettle (Graduate Student, Agric Administration, UG)

Personal communication with the Municipal Director of Agriculture

Currently, there is no data collection at Weija although fish is caught from the lake. The share of fish tolls in total market tolls in the municipality is at most 1 percent. The Tema Fishing Harbour is under GHAPOHA hence any revenue collected goes to that unit.