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USAID/GHANA SUSTAINABLE FISHERIES MANAGEMENT PROJECT (SFMP)

Subsidies in Ghana's Marine Artisanal Fisheries Sector

October 2016

THE UNIVERSITY OF RHODE ISLAND
GRADUATE SCHOOL OF OCEANOGRAPHY

CRC
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Citation: Tobey, J., A. K. Normanyo, P. Osei, K. Beran, & B. Crawford (2016). Subsidies in Ghana's Marine Artisanal Fisheries Sector. USAID/Ghana Sustainable Fisheries Management Project (SFMP). Narragansett, RI: Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island. GH2014_POL059_CRC. 53 pp.

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This document was prepared for USAID/Ghana under Cooperative Agreement (AID-641-A-15-00001) awarded on October 22, 2014 to the University of Rhode Island and entitled; the USAID/Ghana Sustainable Fisheries Management Project (SFMP).

This document is made possible by the support of the American People through the United States Agency for International Development (USAID). The views expressed and opinions contained in this report are those of the SFMP team and are not intended as statements of policy of either USAID or the cooperating organizations. As such, the contents of this report are the sole responsibility of the SFMP Project team and do not necessarily reflect the views of USAID or the United States Government.

Cover photo: Fish landing site, Western Region (Photo Credit: Hen Mpoano)

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ACRONYMS

ADS	Automated Directives System
BFAR	Bureau of Fisheries and Aquatic Resources (Philippines)
CEWEFIA	Central and Western Region Fishmongers Improvement Association
CR	Central Region
CRC	Coastal Resources Center
DAA	Development Action Association
DSW	Department of Social Welfare
FC/FSSD	Fisheries Commission / Framework for Strategic Sustainable Development
FoN	Friends of Nation
FLIS	Fishermen Life Insurance Scheme
Fmsy	Maximum rate of Fishing Mortality
GNCFC	Ghana National Canoe Fishermen Council
GNFA	Ghana National Fishermen Association
GoG	Government of Ghana
LEAP	Livelihood Empowerment Against Poverty
MoGCSO	Ministry of Gender, Children and Social Protection
NAFPTA	Ghana National Fish Processors and Traders Association
NGO	Non-Governmental Organization
NHIS	National Health Insurance Scheme
RFLP	Regional Fisheries Livelihoods Program for South and Southeast Asia
SFMP	Sustainable Fisheries Management Program
SSNIT	Social Security and National Insurance Trust
USAID	United States Agency for International Development
UNDP	United Nations Development Program
WR	Western Region

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EXECUTIVE SUMMARY

Over the past two decades the Ghanaian artisanal fishery or canoe fisheries subsector had been characterized by increased fishing intensity, and dwindling stocks and catches. It is also heavily subsidized with weak enforcement and noncompliance with fishery management measures. Overexploitation of marine resources, the main cause of depleted fisheries, is a worldwide phenomenon and not unique to Ghana. It occurs where fisheries rules and regulations are not adequately enforced in open access situations. It harms biodiversity and fish abundance and reduces ecosystem productivity and resilience. Ghana can learn from other countries who faced the same problem and have put successful and sustainable measures in place to rebuild their fish stocks and reduce overfishing if not eradicate it.

There is the need for a two-prong approach aimed at solving the problem. The first is to confront overfishing, overcapacity and irresponsible fishing. The second is stock rebuilding measures such as closed seasons and fish sanctuaries.

The pace of overcapacity and overexploitation of fisheries resources is exacerbated by capacity-enhancing subsidies such as fuel and engine subsidies. The premix fuel subsidy and tax waivers cost the Government of Ghana US$44 million annually. It is a 'capacity-enhancing' subsidy, meaning it promotes increased fishing effort, overexploitation of fish stocks, lowers fishing productivity in the long run, and makes fishermen, boat owners and everyone in the fishery sub-sector poorer. The outboard engine subsidy is also a capacity-enhancing subsidy that is costing the people of Ghana over US$4.5 million/year.

Fisheries actors would be better off without the capacity-enhancing subsidies and funds used toward these programs could be redirected to programs that promote conservation, research, monitoring, and enforcement of fisheries which are referred to as beneficial subsidies. However, outright removal of subsidies could result in severe short-term socio-economic consequences.

Based on the analysis in this report, phasing out capacity enhancing subsidies in fisheries is recommended, while at the same time redirecting investment toward programs that will make fishermen and fisheries stakeholders better off in the medium to long term. Some of these possible alternative investment programs that are unlikely to exacerbate overfishing include, but are not limited to:

- Establishment of a closed season of between 2 to 3 months with cash compensation to the sector for not fishing
- Creation of fish sanctuaries with paid sanctuary wardens recruited from fishing communities
- Reduction of allowable time spent fishing
- Expansion of fisheries extension, stock assessment, monitoring, management, enforcement, and research efforts
- Investment in training and support for alternative livelihoods such as aquaculture, vocational training and other types of agriculture related businesses
- Enrollment in life insurance schemes
- Creation of a subsidized pension scheme and/or health insurance for fishers

Figure 1 Women fish processers

Figure 2 Fish landed at Axim Beach

1. INTRODUCTION

Historically, fish is the preferred and relatively cheap source of animal protein in Ghana. About 75% of the total domestic production of fish is consumed locally, representing 60% of the total animal protein intake. The artisanal fishery, not the industrial fishery, is the largest subsector in terms of the number of vessels and volume of fish landed.

The trend over the past decades is worrisome. A profile of fishers at 64 landing sites was recently conducted by the Sustainable Fisheries Management Project (SFMP). Results from the profile reveal that fishermen perceive a general trend where the present fish catch of small pelagic species is approximately four times less than it was prior to 1990. At the same time, they perceive an exponential rate of increase in numbers of canoes and fishermen from 1990. The declining trend means food and livelihood insecurity for fishing households and communities.

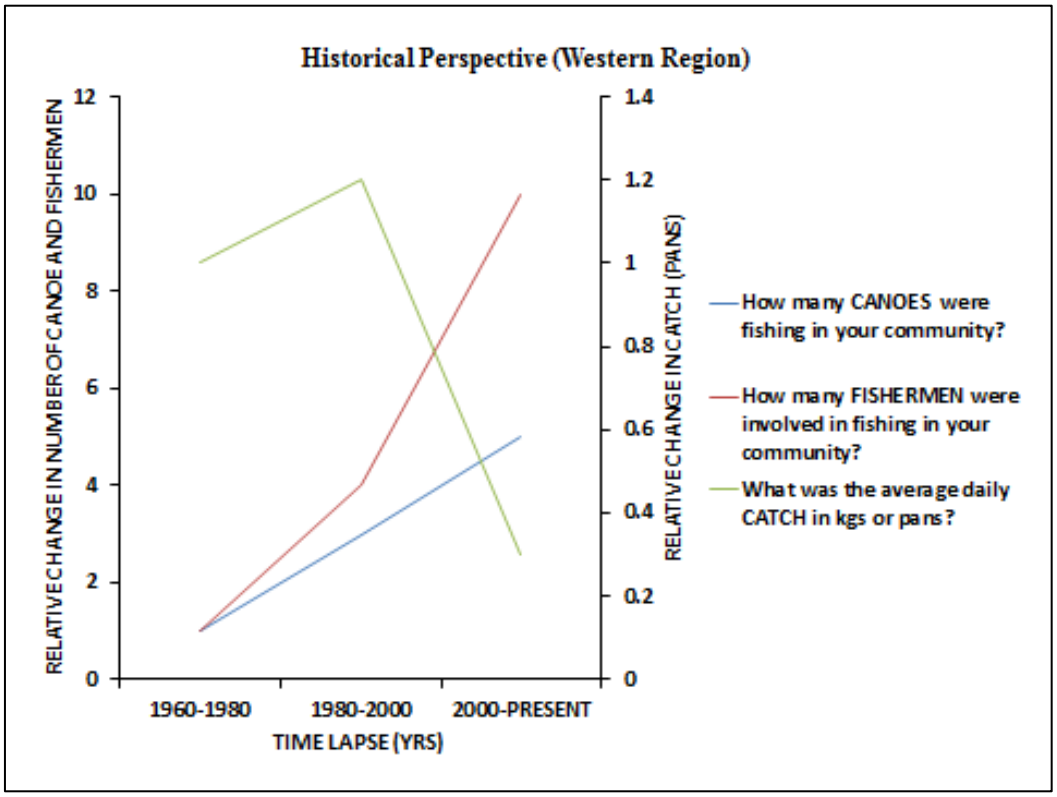

Figure 3 Fishers' historical perspective on fisheries in Western Region

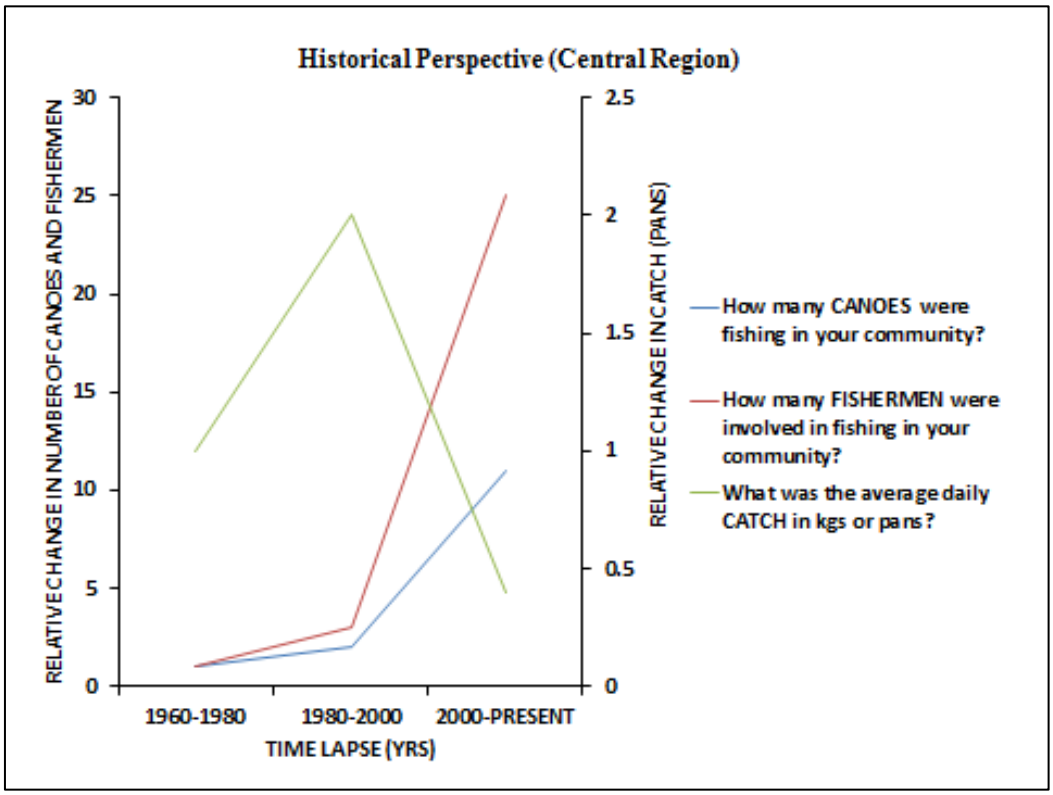

Figure 4 Fishers' historical perspective on fisheries in Central Region

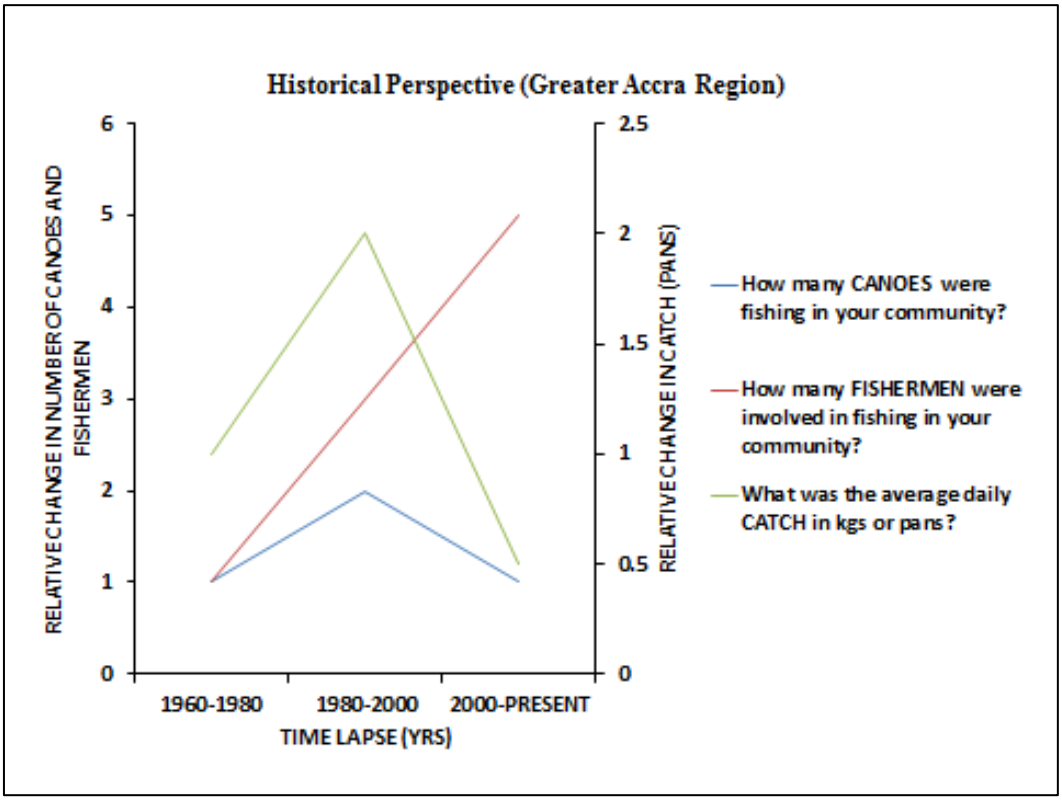

Figure 5 Fishers' historical perspective on fisheries in Greater Accra Region

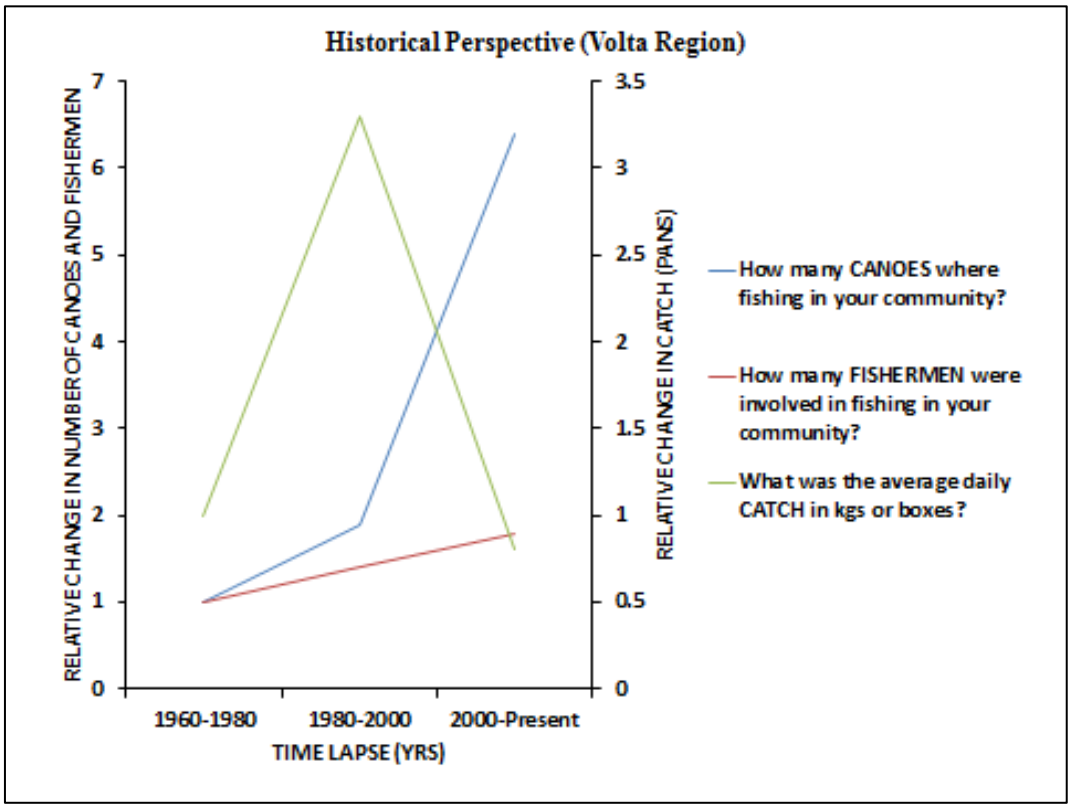

Figure 6 Historical perspective on fisheries in the Volta Region

(Source for Figures 3-6: Asare *et al.* 2015)

A stock assessment completed by SFMP tells the same story. Figure 7 shows landings of small pelagics since 1980. The main small pelagic fish species are the round sardinella (*Sardinella Aurita*), the Madeiran sardinella (*Sardinella maderensis*), anchovy (*Engraulis Encrasicolus*) and mackerel (*Scomber colias).*

Figure 8 shows fishing effort over the same period of time. Motorized fishing canoes have increased in number at the greatest rate. The small pelagic stocks are considered severely overfished. The fish biomass has fallen below the sustainable level since 1997 and continues the downward trends (Figure 9). Fishing mortality, which is a measurer related to fishing effort, remains above the level considered necessary to rebuild stocks and eventually to increase annual landings (Figure 10). The current fishing mortality is estimated at 0.7 and to rebuild stocks and achieve maximum sustainable yields, the recommended target for fishing morality (Fmsy) is 0.4.

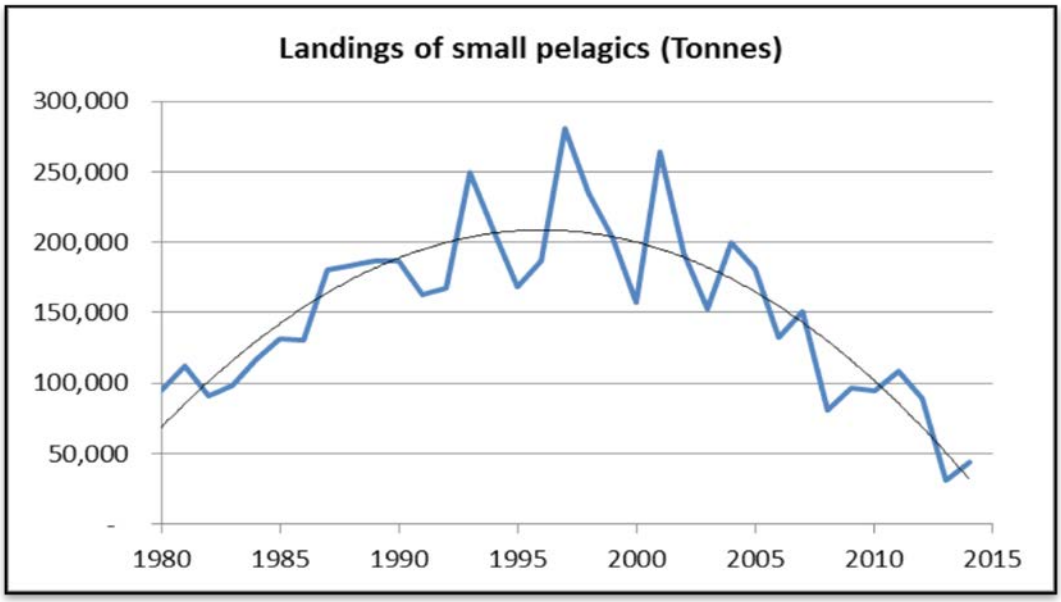

Figure 7 Landings of most important small pelagics fish in Ghana

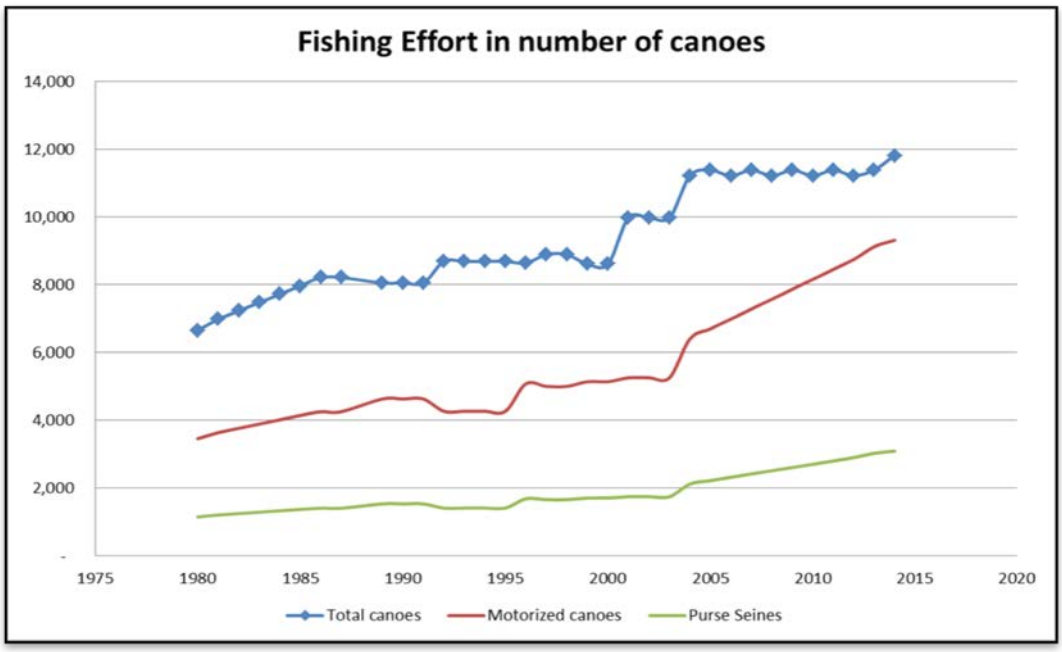

Figure 8 Fishing effort in number of canoes

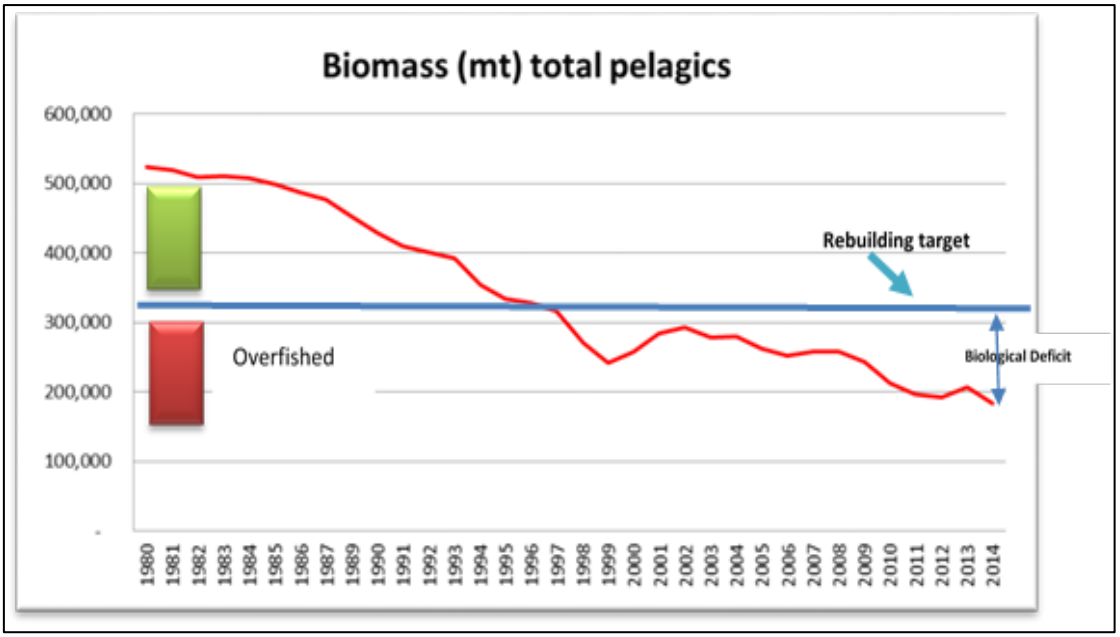

Figure 9 Fish biomass trends of pelagic fisheries 1980-2014

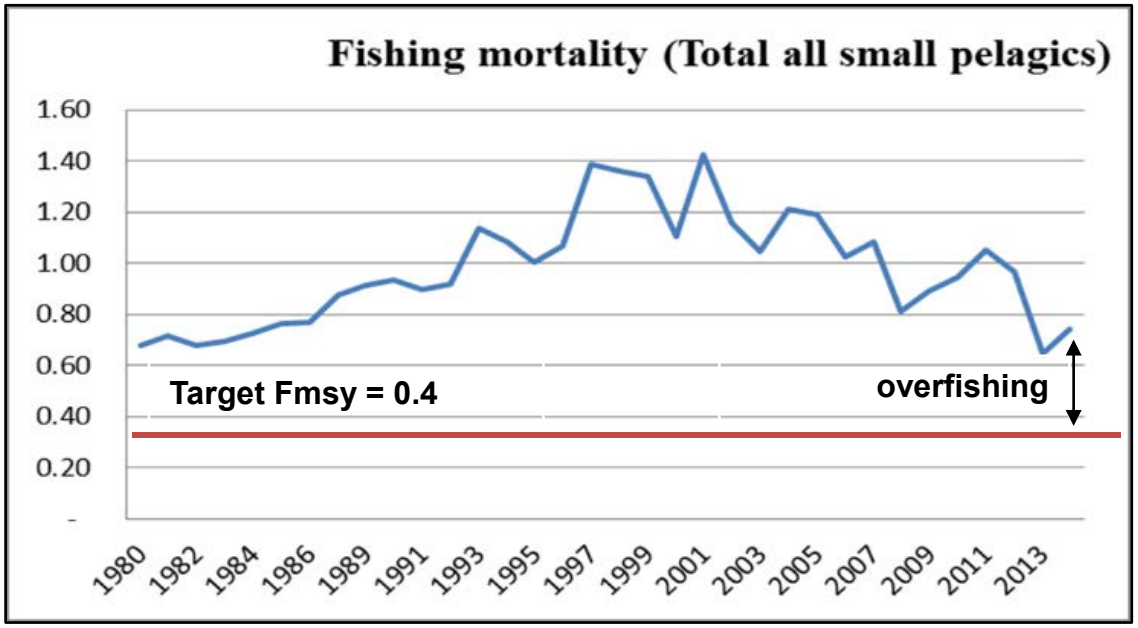

Figure 10 Fishing mortality trends of small pelagics 1980 – 2014

(Source for Figures 7-10: Lazar *et. al.*, 2016)

The SFMP Scientific and Technical Working Group made a recommendation under consideration by the Fisheries Commission and MOFAD to close the season for the month of August for all fisheries to end overfishing and reverse the trends of biomass decline.

The fishing capacity above the sustainable level and open access in the artisanal fisheries are the major causes of overfishing and diminishing returns. Overfishing is not unique to Ghana. Worldwide it is the single biggest cause of depleted fisheries. It affects the 3 billion people who rely on seafood as a source of protein and millions more that rely on healthy fisheries for

their livelihoods. It harms biodiversity and fish abundance and reduces ecosystem productivity and resilience. Poor fisheries management costs the world's fisheries $50 billion annually (World Bank 2009). Solving overfishing would rebuild depleted fisheries, increase production and create job opportunities. It could increase global fish abundance by 50% and revenues by nearly 30% (World Bank 2009).

Overfishing of marine resources is common in open access situations where fisheries rules and regulation cannot be adequately enforced. A survey (see Annex 1 and description below) carried out in May 2016 with 70 motorized boat owners gives a glimpse of the causes leading to overfishing in Ghana today. Illegal and destructive fishing practices were perceived as the main reason for overfishing and declining abundance of fish stocks (Table 1).

Table 1 Problems in the fishery noted by motorized boat owners listed in rank order

PROBLEMS	RANK
FISHING WITH LIGHT	1
PAIR TRAWLING[1]	2
FISHING WITH DYNAMITE	3
OTHER	4
SMALL MESHSIZE/ MONOFILAMENT	5
FISHING WITH POISON	6
TOO MANY CANOES[2]	7

The level of compliance with government regulations was perceived to be poorer than that of traditional rules. Only 18% of respondents believe the level of compliance with government regulations is good compared with 66% following the tenets of traditional rules.

In terms of information and knowledge, only 33% of respondents are informed and have a very good or pretty good knowledge of government fishery regulations compared to 59% for the traditional regulations.

Open access fisheries with inadequate compliance with management rules always lead to overcapacity and overfishing and diminishing returns. Providing a subsidy in this situation keeps capacity growing with increased new entrants into the fishery. Subsidies on costly components of fishing can only lead to more boats and more fishing trips resulting in more rapid depletion of fish stocks. It also results in lower catch per unit effort and lower income per vessel.

The first part of this report will provide an overview of different types of fisheries subsidies in both Ghana and globally and how conceptually they affect fishing effort and fish stocks. To generate a first approximation of the impact of the fuel subsidy on fishing effort, key

[1] Note that pair trawling is a term used by local fishermen that we suspect refers to large commercial trawlers, not necessarily the technical act of pair trawling where two boats are engaged with specially modified gear which is banned in Ghana.

[2] Only 3% of respondents perceived too many canoes as the problem. Note that this result is different than the findings of another larger survey of fishing households (USAID/SFMP household survey) where from a sample of 716 individuals, 27 % indicated increase in the number of canoes as the second most frequently given response to declines in catches with illegal fishing the most frequent response (56%) (Crawford et.al. 2016).

informant interviews were conducted across the four coastal regions of a number of managers/owners of motorized canoes to understand how the fuel subsidy influences decisions to go to sea and income from fishing. Regional fisheries dialogues in Ghana have demonstrated that there is growing support among stakeholders to reduce or eliminate the fuel subsidy, but only if the fishing community receives benefits in other ways. The second part of the report reviews potential alternative policies and programs to assist the fisheries sector, and their likely impact on fishing effort, distribution of benefits, and costs.

Figure 11 Fishing canoes

2. OVERVIEW OF SUBSIDIES IN FISHERIES

Government subsidies are pervasive in fisheries. They are defined as transfers (financial or otherwise) from governments to the fishing sector, usually justified to support and develop the local fishing industry, to promote sector development, and protect employment and income in fishing communities. In the 1950s and 1960s, subsidies supported the growth in fishing capacity and production of fish; larger boats, landing facilities, engines, and gear. As countries around the world did the same, competition for fish production resulted in declining catch per unit effort as stocks became over-exploited.

2.1 Categories of Fisheries Subsidies

A commonly accepted way to classify and assess subsidies is to identify according to their impact on the sustainability of the fishery resource. Based on this, three categories of subsidies were can be identified by Sumaila *et al.* (2013) as:

(i) Beneficial subsidies,

(ii) Capacity-enhancing (bad) subsidies, and

(iii) Ambiguous subsidies where impact on resource sustainability is uncertain.

Subsidy program types that fit into these categories are listed below (Table 2)

Table 2 Subsidy categories based on impacts to fisheries resources

Beneficial subsidies	Capacity-enhancing subsidies	Ambiguous subsidies
• Fisheries management • Research and fisheries science • Fisheries monitoring, control and surveillance • Stock assessment and resource surveys • MPAs and fish sanctuaries • Fishery habitat enhancement • Databases and statistical bulletins in support of fishery management plans	• Support on operating costs (fuel, ice, bait and other operating costs) • Gear and engine subsidies or provision • Fish landing site infrastructure provision and improvements • Port construction and improvements for fishery activities • Boat construction, repair and modernization programs • Tax exemption programs • Foreign access agreements • Below market rate loans for vessel construction • Crew insurance and vessel insurance programs	• Fisher assistance programs such as payments to not fish, income support programs, unemployment insurance, and retraining programs into other economic sectors • Vessel buyback programs • Fishers' community development programs for poverty alleviation, livelihood development, and food sufficiency

(Source: Sumaila *et al.* 2013)

Beneficial subsidies enhance the growth of fish stocks through improved management and conservation, and fisheries monitoring, research and science.

Capacity-enhancing subsidies are defined as subsidy programs that reduce the cost of fishing and thereby led to an increase the total level of fishing effort. In an open-access fishery, fishing effort will increase to the point that total costs equal total revenues. This is termed as the "Bioeconomic Equilibrium." A subsidy lowers the total cost for every level of effort and in that way increases profits in the short term once the subsidy is put in place. Over time, increased profits then lead to attracting additional entrants to the fishery and promote increasing effort. As fishing effort increases, eventually, the increased profits are dissipated due to the new entrants and a new bionomic equilibrium point is reached at lower overall yields and total revenues from the fishery. This is illustrated in Figure 12. This figure demonstrates that subsidies lowering the cost from TC1 to TC2, will also lower the bionomic equilibrium from BE1 to BE2, thus encouraging the growth of fishing effort from E3 to E4, hence the name 'capacity-enhancing' subsidies. In this case capacity enhancing means increasing fishing capacity (e.g. number of boats) and hence increased fishing effort.

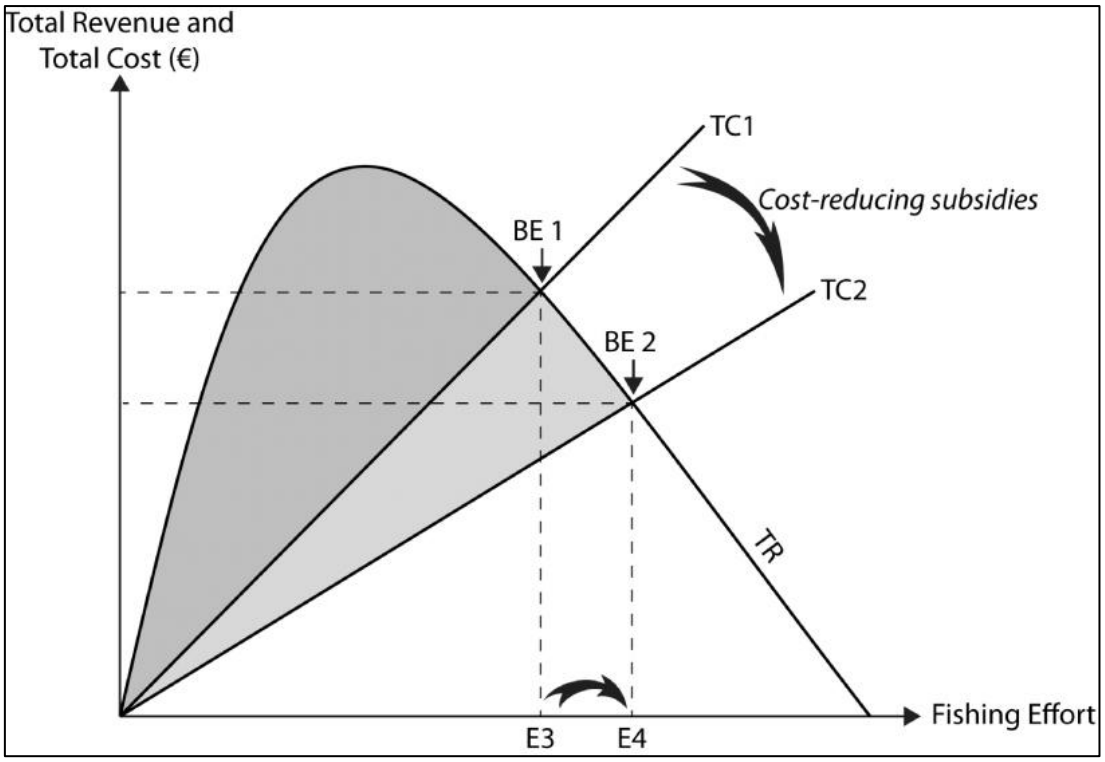

Figure 12 Effect of cost-reducing subsidies on fishing effort.

(Source: Sumaila et al., 2013)

Ambiguous subsidies are defined as programs that have the potential to lead to either improvement in fishing stocks or overexploitation. Subsidies in this category include fisher assistance programs, vessel buyback programs, and rural fisher community development programs.

- Fisher assistance programs (payments to not fish, income support programs, unemployment insurance, and retraining) may reduce fishing pressure, but they also may increase community dependence on government funds.

- Vessel buybacks are intended to reduce fishing pressure, but their effectiveness in practice is mixed. Disbursed funds can be used for further investments in fishing capacity and the fishing sector can be very clever at getting around the intent of programs and getting more boats in the water.

- Rural fishers' community development programs are geared toward the overall objective of poverty alleviation and livelihood alternatives. The effectiveness of these programs on reducing fishing effort and in effectively achieving their development objectives is mixed and unlikely to have any impact if the fishery remains open access.

2.2 Magnitude of Subsidies

The global estimate of total subsidies in the fisheries sector is US$35 billion (Sumaila *et al.,* 2013). The composition of subsides across the three categories of subsides is shown in Figure 13. Capacity-enhancing subsidies are far greater than beneficial and ambiguous subsidies in both developing and developed countries.

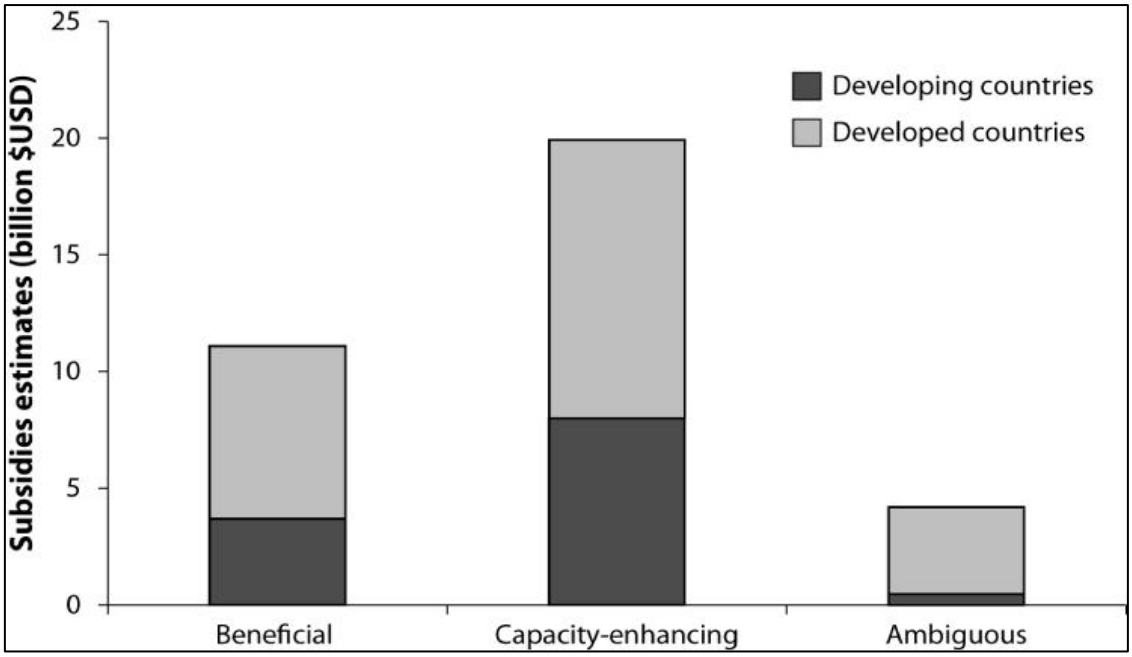

Figure 13 Global fisheries subsidies by categories in developing and developed countries

(Source: Sumaila *et al.,* 2013)

Figure 14 shows that fuel subsidies represent the largest subsidy program (22% of the global total), followed by subsidies for management (20% of the total) and ports and harbors (10% of the total). Subsidies contributed by developed countries (65% of the total) are far greater than that contributed by developing countries (35% of the total).

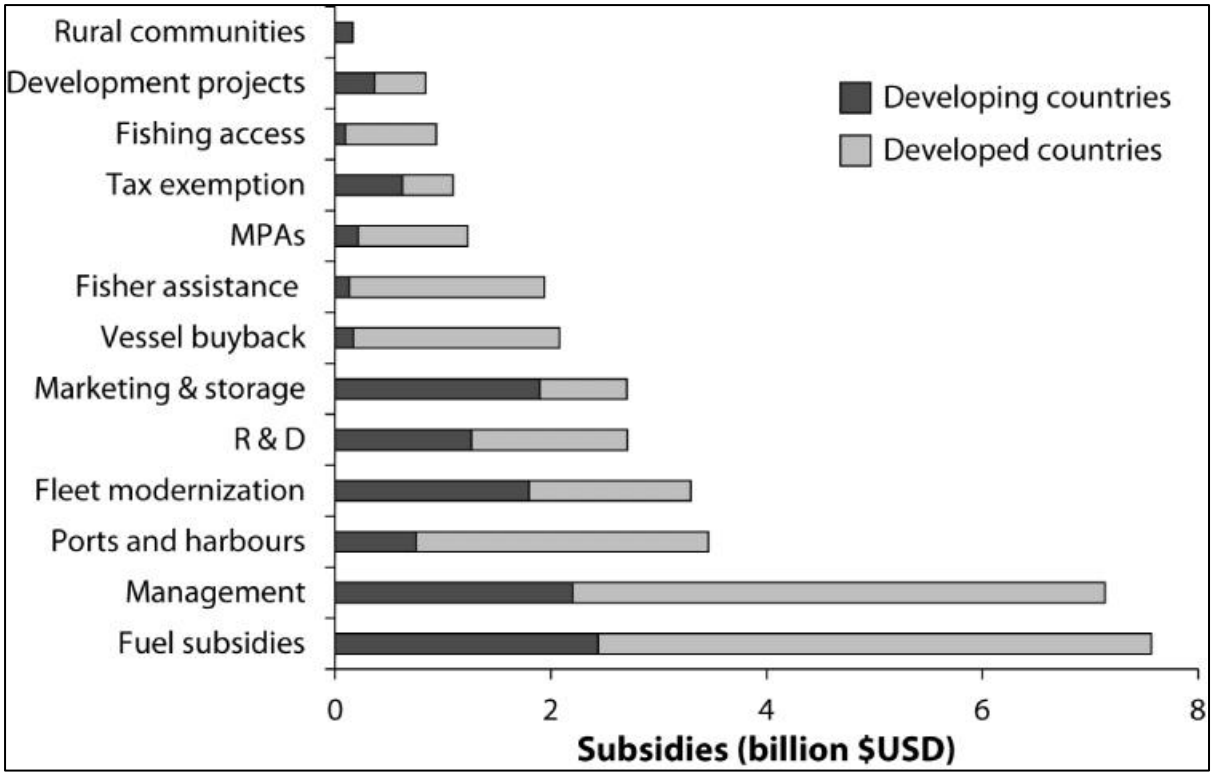

Figure 14 Composition of subsidy estimates by program

(Source: Sumaila *et al.* 2013)

Figure 15 Fishing vessels in Elmina

3. FISHERY SUBSIDIES IN GHANA

The total fisheries subsidy in Ghana was valued at US$33 million in 2003 (Sackey-Mensah 2012). More recently, it is estimated to cost up to $47 million in 2016. This value includes the programs and investments of bilateral and international donors. Of that, 63% supported capacity-enhancing subsidies and 32% supported beneficial subsidies. Subsidies that fall in the category of capacity-enhancing supported by the Government of Ghana (GoG) include:

- Fishing port construction and renovation, and subsidies for fish landing site infrastructure
- Imported fisheries inputs are not taxed
- Tax exemption programs.

Subsidies for fishing gear and engines. The GoG subsidized about 40% towards selected fishing nets and outboard motors (Sackey-Mensah 2012). In 2012, for example, 40 HP outboard motors could be obtained for GH¢4,900 (US$2,644) rather than the actual price of GH¢7,500, (US$4,000) a reduction in price of 35%. The distribution of subsidized outboard motors has continued over time (Figure 17). A June 25, 2016 Graphic Online News article indicated that the government was distributing 2,600 40-HP engines in 2016 and 1,500 smaller engines. Fishermen pay 60% of the cost, while the government pays the remaining 40 percent. At an estimated value of US$3,160 / 40-HP engine, and assuming that smaller engines are valued at US$2,000/engine, the total cost to government of this engine subsidy is US$4,486,400.

The Premix fuel subsidy program. The subsidized fuel is a pre-mix of gasoline and engine oil in an effort to prevent diversion of use in any engines such as automobiles rather than provided to the canoe sector that exclusively use outboard motorization. The subsidy on outboard motor fuel amounts to about 70% of the market cost of the fuel, or a cost to GoG of about US$44.4 million per year (see calculation of the cost provided below in Table 3).

Figure 16 Fishing vessels at entrance to Elmina

Figure 17 Delivery of 40 HP outboard motors to a fishing community in February 2016

(Photo credit: N. Lazar)

Figure 18 Signboard for a landing site pre-mix committee

(Photo credit: B. Crawford)

4. SUMMARY OF THE PREMIX FUEL SUBSIDY

A fuel subsidy for the fisheries sector was introduced in 1992 on the basis of the high cost of fuel and difficult economic conditions in the fisheries sector and in the country. A heavily subsidized product called the premix fuel was introduced only in the artisanal sector as a relief to fishing operational costs. The subsidy sometimes amounts to about 70% of the cost of fuel. Premix fuel is an in-country blend of petrol and motor oil to produce a pre-mixed fuel intended use in outboard engines used by the canoe sector. Beginning in 2009, the premix fuel was colored blue to enable its identification since some of the fuel was being wrongly diverted from use in fishing to illegal sale for other uses (Sackey-Mensah, 2012).

A national system was established to distribute the subsidized fuel comprised of a National Premix Committee and Landing Beach Committees (LBCs). The premix fuel subsidy and the Committees became a permanent institution and were never removed after the subsidy was introduced. Data from The National Petroleum Authority was used to compute total and average subsidies from 2011 to 2014 and reported in Table 3 below. Over these four years, the country consumed an average of 70.2 million liters of premix fuel per year. At an average subsidy of US$0.38, which approximates 62.6% of the ex-pump price, it amounted to a subsidy of US$44.4 million per year.

Table 3 Premix fuel subsidy calculations 2011 -2014

Item	Year				Average
	2011	2012	2013	2014	
Exchange rate (GHS/USD)	1.5125	1.7919	1.9560	2.8903	2.0377
Price of Gasoline (GHS/liter)	1.5162	1.7121	2.0500	2.9650	2.0608
Price of gasoline (USD/liter)	1.00	0.96	1.05	1.02	1.01
Price of Premix (GHS/liter)	0.5424	0.5427	0.7233	1.3923	0.8002
Price of premix (USD/liter)	0.36	0.30	0.37	0.48	0.38
Subsidy in (USD/liter)	0.64	0.66	0.68	0.54	0.63
Subsidy (%)	64.11	68.30	64.95	52.95	62.58
Premix consumption (metric tons)	45,600	58,900	53,200	47,200	51,225.00
Conversion factor 1 ton: liters	1,369.86	1,369.86	1,369.86	1,369.86	1,369.86
Premix consumption (liters)	62,465,616	80,684,754	72,876,552	64,657,392	70,171,079
Total subsidy (USD)	40,197,543	52,867,483	49,590,963	35,080,671	44,434,165

(Source: Computed using data from National Petroleum Authority (NPA) 2016)

There have been many studies and reviews of the premix fuel subsidy mainly focused on operational and management issues (the allocation, distribution, and sale of the premix fuel). Problems with its implementation include:

- Proliferation of premix fuel sale points for non-fishers. Sales points grew from 128 to 900 between 2001 and 2008 (Sackey-Mensah, 2012). This and fishers' complaints of fuel shortages are anecdotal evidence of poor management, distribution and potential diversion of the product from its intended use.

- Fuel distribution is not based on the registration or licensing of fishing boats and is therefore open to the possibility of corruption.

- The fuel subsidy is distributed based on FRAME survey results (i.e. based on the size of fishing villages and the distribution of landing sites and boats). FRAME survey results are static, but fishermen move all the time based on seasonal location of target species. Therefore, there are complaints that fishers do not receive the product on time or in sufficient quantities.

- A percent of the subsidized fuel sales is intended to flow back into community development. Anecdotal information and some complaints from fishing communities suggest that the investment in community development is less than the intended percentage in some cases. Transparency and accountability of fuel sales revenue and its use for community development is often questioned by fishers.

Fuel Subsidy Management in other Countries. There are many examples from other countries of alternative mechanisms for distributing fuel subsidies. These include rebates by governments, discounts by distributors, and smart cards held by users (Sumaila *et al.*, 2008). In Australia, fuel suppliers can claim a fuel grant from the government to sell at a discounted price to fishing cooperatives with whom they have established agreements to service (Sumaila et al, 2008).

In Malaysia, the mechanism used to allocate subsidized fuel is through an Information, Communication, and Technology (ICT) system. This system is managed by the Malaysian Department of Fisheries and by the Fisheries Development Authority of Malaysia, responsible for enhancing the socio-economic level of fishermen and fishing communities (Omar et al, 2011). It provides a service to 80,000 eligible fishermen. Fishermen, or operators of registered fishing boats use an "e-diesel" card to purchase subsidized diesel at select locations around the country (Sumaila *et al.*, 2008).

A report by the International Institute for Sustainable Development (IISD, 2013) focusing on energy subsidies in Malaysia describes how fishermen who are registered with the Department of Fisheries and the Fisheries Development Authority receive a monthly subsidized fuel quota, based on the size of the vessel. This mechanism was adopted as a result of misuse and illegal purchases of subsidized fuel by users other than fishermen. Now, each recorded transaction bears the vessel owner's name and vessel registration number and total allowable quota. Boat registration and licensing are required to participate in the system.

5. OTHER TYPES OF SUBSIDY MECHANISMS IN GHANA AND/OR GLOBALLY

The premix fuel subsidy and other capacity enhancing subsidies have a significant effect on the level of fishing effort and fish stocks. They are also a drain on GoG finances and a constraint on economic development. The subsidy amounts spent could instead be used for investments that could have positive social outcomes and long term benefits, such as health, education, professional training in other livelihoods, or fisheries management. In this section, various alternative financial transfer mechanisms to fishing boat operators are explored.

5.1 Compensation to not fish or to change fishing practices

In some instances, countries have implemented compensation schemes to alleviate the economic burden on fishers affected by fish no-take periods or regulations. According to the literature on fishing subsidies, these fall in the category of "ambiguous" subsidies, meaning not entirely clear if they reduce or increase fishing effort. For those schemes that promote improved fishing practices and not fishing in certain locations and seasons, it is most likely that they are, in fact, beneficial. Bladen *et. al*. (2014) prepared a list of such schemes (Table 4).

Figure 19 Fishing vessels in Dixcove

Table 4 Compensation schemes for marine conservation and fisheries management

Scheme	Start	Compensation provider	Compensation recipient	Compensation
Compensation for fisheries closure during fish production	1986	Brazilian government	Artisanal fishers of Brazil	Financial compensation
Sea turtle by-catch release	1998	Kenyan NGO (Watamu Turtle Watch)	Artisanal fishers of Kenya	Financial performance payments
Sea turtle by-catch release	2000	Congolese NGO (RENATURA)	Artisanal fishers of the Congo	Materials to fix/replace nets
By-catch mitigation scheme directed at sea turtles	2004	FISH: an association of California drift gillnet swordfishers	ASUPMATOMA: Mexican NGO	Financial payments
Vaquita by-catch reduction	2007	Mexican government	Artisanal fishers of the Northern Gulf of California	Gillnet permits purchased or leased from fishers
Compensation for no-fishing in specified sanctuaries to protect juvenile Hilsa fish	2005	Government of Bangladesh	Artisanal fishers	Monthly allocation of rice and alternative livelihood support
Protection of tuna spawning areas, seamounts and reefs	2008	Multiple public and private bodies acting through the Phoenix Islands Protected Area Trust	Government of Kiribati	Financial compensation

Details on compensation values for these schemes is not provided in the Bladen *et al.* (2014) paper. Data is available for the Bangladesh scheme, however, in the publication by Richman *et al.* (2016). Forty kilograms of rice per month are currently provided to registered fishers over the 4-month period when five Meghna River system *Hilsa* (shad fish) sanctuaries are closed to fishing. The cost of this program was approximately US$14 million in 2013. This includes the operational costs and the cost of the rice itself (36,926 tons). During this period 226,852 fishing households benefited from the program, so that the monthly cost of the program per fishing household was about US$15.43.

Other kinds of direct payments schemes include fishermen's unemployment insurance. Unemployment insurance may be introduced to stimulate fishermen to enter or remain in the industry.

5.2 Cash transfers to the extremely poor (Ghana)

The Livelihood Empowerment Against Poverty Program (LEAP) is a social cash transfer program implemented by the Department of Social Welfare (DSW) in the Ministry of Gender, Children and Social Protection (MoGCSO), Government of Ghana. The program, established in 2008, provides cash transfers to extremely poor households to supplement household income. In addition to direct cash payments, beneficiaries receive free health insurance through the National Health Insurance Scheme (NHIS). Eligibility is based on the following demographic criteria: households with an orphan or vulnerable child, elderly poor, or a person with extreme disability to work (Handa et al, 2013). As of 2012, 70,000 households across Ghana have benefitted from this program (Handa et al, 2013). Annual expenditure for LEAP is approximately US$20 million which is partially funded through general revenues of the Government of Ghana (50 percent), donations from DFID and a loan from the World Bank (Handa et al, 2013).

This program is not specifically directed at poor fisher households, but they may be included. This kind of program is not capacity enhancing, but it may very modestly increase the ability to purchase and slightly increase demand for fish products in the diet.

5.3 Social welfare programs for fishing communities (Philippines)

Social welfare programs for fishery stakeholders and fishing communities aim to compensate for, or offset diminishing returns from fishing while reducing fishing effort. An example is the Philippines social welfare program directed at artisanal fisheries known as the FishR program. FishR is an electronic fisherman's registration program that provides social welfare benefits and government assistance packages in exchange for registration.

Through the FishR program fishers have access to government assistance packages, including medical health insurance for themselves and their families. Fishers also have access to disaster relief aid resulting from floods, drought, oil spills, fish kill, red tide and other calamities which threaten their viability as fishermen. The Bureau of Fisheries and Aquatic Resources (BFAR), with support from the United States Agency for International Development (USAID) under the ECOFISH project, works with local governments and municipalities to implement the FishR program. With electronic registration, BFAR is able to monitor the number of fishermen at the municipal level. Economic incentives to participate in this program extends beyond fishermen, for example, local governments who register fishermen are paid 15 pesos (about 30 US cents) per registered fisherman and qualify for funding of fishery projects. Since 2014, approximately US$64 million has been allocated to the FishR program.

Social welfare programs are an ambiguous subsidy in terms of their impact on fishing effort.

5.4 Alternative (or diversified) livelihood support and vocational training for youths and for adult employment outside the fisheries sector

The livelihoods of many small - scale fishing communities that directly depend on fisheries are under increasing threat and vulnerable to poverty. One major reason behind this observation is the lack of alternative livelihoods, low literacy or lack of alternative job skills. Solutions to the problems of poverty and resource degradation have tended to center on the necessity to make small-scale fisheries more economically efficient, while finding means to conserve fish stocks through a combination of management to limit access and incentives for

current participants to leave the fishery. An example is the Bangladesh *Hilsa* (shad) fisheries management that combines regulations on periods of no fishing, compensation during fishing bans in the form of rice for fishing families, and alternative livelihood training and start up support.

Another example is the Spanish-funded Regional Fisheries Livelihoods Program for South and Southeast Asia (RFLP) which was implemented by the Food and Agriculture Organization of the UN. It sought to reduce the vulnerability of small-scale fishing communities in Cambodia, Indonesia, the Philippines, Sri Lanka, Timor-Leste and Viet Nam. One of the major areas in which RFLP worked was to develop new livelihoods opportunities for fishing families.

Some options for alternative or supplemental livelihoods that are typically supported are handicraft production, small-scale tourism, aquaculture, apiculture (bee keeping), crab fattening and grow out, small livestock keeping, vegetable gardening, and fruit production. Challenges to implementing successful alternative livelihood for fishermen include difficulty in reaching scale to impact fishing effort substantially, cost per beneficiary and lack of new business investment capital or lack of skills among potential beneficiaries.

A recent study from Ghana (Asiedu and Nunoo, 2013) indicated that over 73% of fishers interviewed were willing to switch jobs, with 27% indicating that they would not consider it. This result implies that there is a good potential for well - designed alternative livelihood schemes to succeed. However, it was also found that about 50% did not have the required skills to work outside the fishing and agriculture related areas. Therefore, any well - designed alternative livelihoods scheme will have to address how to improve suitable skills among fishers. A SFMP survey also showed low literacy rates among adults in fishing households, with only 15 percent of women respondents and 34 percent of men able to read or write in any language (Crawford *et al.*, 2016).

5.5 Insurance for fishers, boats, and gear

The government may offer insurance when private insurers decline to insure fishermen or vessels because of the perceived highly uncertain risk in the industry. An insurance subsidy enables the fishing sector to operate at lower costs than would otherwise be possible. If the revenues from fishing are sufficiently low, then these subsidies may determine whether the industry has the economic health to survive. Viewed in this way it could potentially be a capacity-enhancing subsidy but there is no empirical evidence of this effect.

Various countries around the world, including Indonesia, Malaysia, India and Republic of Korea have established insurance schemes to help protect fishermen and their crew from risks inherent to fishing.

In Ghana, a study conducted in 2013 assessed artisanal fishermen’s willingness to pay and participate in a life insurance scheme. The survey indicated that while most fishing canoe owners and crew adopt basic safety measures, such as listening to the weather forecast or informing family members of their departure to sea, few enrolled in life and health insurance policies. The study revealed that a majority of the respondents expressed willingness to participate and pay for various insurance schemes, including life group insurance (Agbekpornu *et al.*, 2014).

In April of 2016 the Ministry of Fisheries and Aquaculture Development in partnership with Star Microinsurance Services Limited launched a Fishermen Life Insurance Scheme (FLIS) for fishermen across the country. FLIS targets artisanal fishermen who have been excluded

from formal financial services due to their income levels, levels of risk, nature of their business or level of financial literacy. It provides insurance cover on the life of the fishermen and their fishing gear. To be in the program the fishing boat must be registered. The first pilot phase has been launched and includes the Greater Accra, Western and Central regions in selected landing beaches such as Half Assini, Axim, Elmina, Shama, Ankaful, Apam, James Town, and Aplabanya.

5.6 Fishermen's pension and social security schemes

Government co-supported social security and pension schemes in farming and fisheries have been introduced in some marine fishing countries. The main objectives are generally:

- To provide social security to fishers during old age or disability to them and their families
- Provide relief to dependents in the event of death of fishermen
- Encourage fishermen to continue in the fishing industry with the security of a pension and social security
- To attract young persons to the fishing industry
- Promote the habit of saving and thrift among fishermen

A fishermen's pension scheme in Sri Lanka, in which the Ministry of Fisheries makes a partial contribution to top-up individual contributions covers 42% of the fishers.

There are currently no pension and social security programs in the marine capture fisheries sector in Ghana, but talk of such programs have been in the media in the past. In December 2013, the Ghana News Agency reported in its online news outlet that "fishermen operating at the Tema Canoe Beach would soon be contributing to the Social Security and National Insurance Trust (SSNIT) pension scheme." The purpose was to ensure that fishermen retiring from active fishing would have some money to support them in their old age before death. Members of the Canoe Owners Association would be responsible for the payment of monies to SSNIT towards the pension of the fishermen operating their canoes.

6. IMPACT OF THE FUEL SUBSIDY ON FISHING EFFORT AND RESOURCE EXPLOITATION

There have been many studies of the premix fuel subsidy mainly focused on operational and management issues (the allocation, distribution and sale of the premix fuel). There has been less attention on the impacts of the subsidy on fishing effort and volume of catch. In open access fisheries with inadequate compliance with governance and management rules, there is over capacity and over exploitation. Providing a subsidy on the most costly operational component of fishing can only lead to greater fishing effort resulting in more boats and more rapid depletion of fish stocks. It also results in lower catch per unit effort which reduces income per fishing vessel. Actual historical data are consistent with these statements. Between 1991 and 2004, the number of motorized canoes increased by approximately 38% (4,631 to 6,405) and the amount of fuel per ton of fish caught increased from 3 liters in 1992 to 5.3 liters in 1993 (Sackey-Mensah, 2013). By the end 2015 there were 11,540 canoes registered. That is a 45% increase from 2004.

The premix fuel subsidy and other capacity enhancing subsidies are also inconsistent with the vision for Ghana's fisheries sector as stated in the 2008 Fisheries and Aquaculture Policy Act:

> "The sector is to contribute to socio-economic development through food and nutritional security and poverty reduction in a sustainable and economically efficient manner, within the natural limits of capture fisheries resources and environmental protection requirements, and with strongly established bases for accelerating growth in aquaculture production."

To understand the impact of the fuel subsidy on fishing effort and volume of catch, a semi-structured questionnaire was constructed and applied to fishing boat owners with outboard engines across the coast and across different types of boats and fishing gear. Interviews were conducted across a large number of fishers to understand how the fuel subsidy influences fishing effort and pressure on stocks.

6.1 Study Population Sample

The choice of the population sample was made with reference to the 2013 Ghana Marine Canoe Frame Survey. A total of 70 respondents were selected to reflect gear type and their relative concentration across the four coastal regions in Ghana. Tables 5 and 6 show respondents by region and gear type respectively.

Table 5 Distribution of respondents by Region

REGION	Number of Respondents	Percent
Volta	6	8.57
Greater Accra	20	28.57
Central	12	17.14
Western	32	45.71
Total	70	100.00

Table 6 Frequency distribution of sample by type of fishing gear

MAIN TYPE OF FISHING GEAR	FREQUENCY	%
Drifting Net	6	8.57
Poli/Watsa	30	42.86
Ali Net	14	20.00
Set Net	6	8.57
Hook & Line	10	14.29
Beach Seine	4	5.71
Total	70	100.00

Prior to conducting interviews at a landing site, a courtesy visit was made with the chief fisherman to seek permission and support for the interviews with motorized canoe owners at the landing beach. At some places the first meetings were used to agree on a date to conduct the interview.

The list below provides some characteristics of the motorized fishing canoe owners interviewed:

- 24 percent of their outboard motors were procured through the government outboard motor subsidy system
- 73 percent are members of the Ghana Canoe Fishermen's Council
- 80 percent derive their livelihood solely from fishing income
- 22% of respondents said their own canoe/gear started working for the first time within the last 4 years. This is an indication that the artisanal canoe fishery may still be attracting entry

6.2 Costs and Revenues

In terms of costs and revenues, labor gets 50% of the revenue after taking care of actual operational costs (supplies, fuel, and maintenance). The different fishing gear and target species use different amounts of fuel because the distance and time spent fishing differ. The durations range from a few hours to 10 days. Figures 20 - 23 depict operating cost per trip by type of fishing, fuel per trip, duration per trip, and total revenue per trip. Drifting net fisheries have the longest trip duration (almost 74 hours), fuel use, and revenue[3].

[3] Throughout, revenue refers to the net revenue, or profit accruing to the boat owner after labor and operational (variable) costs are covered.

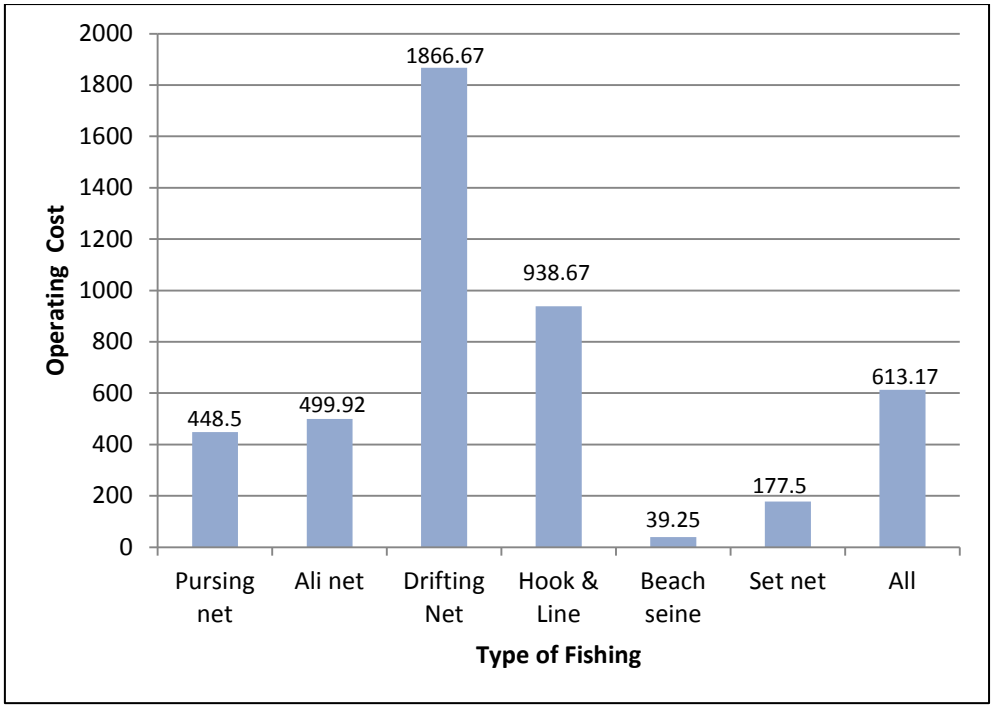

Figure 20 Operating cost per trip (Gh¢)

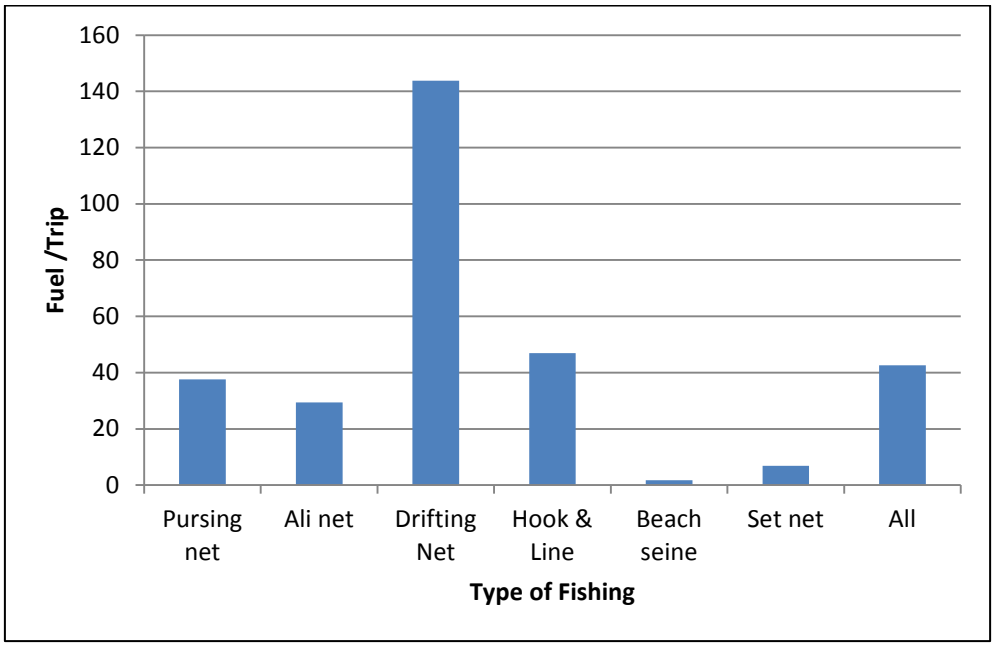

Figure 21 Fuel per trip (gallons)

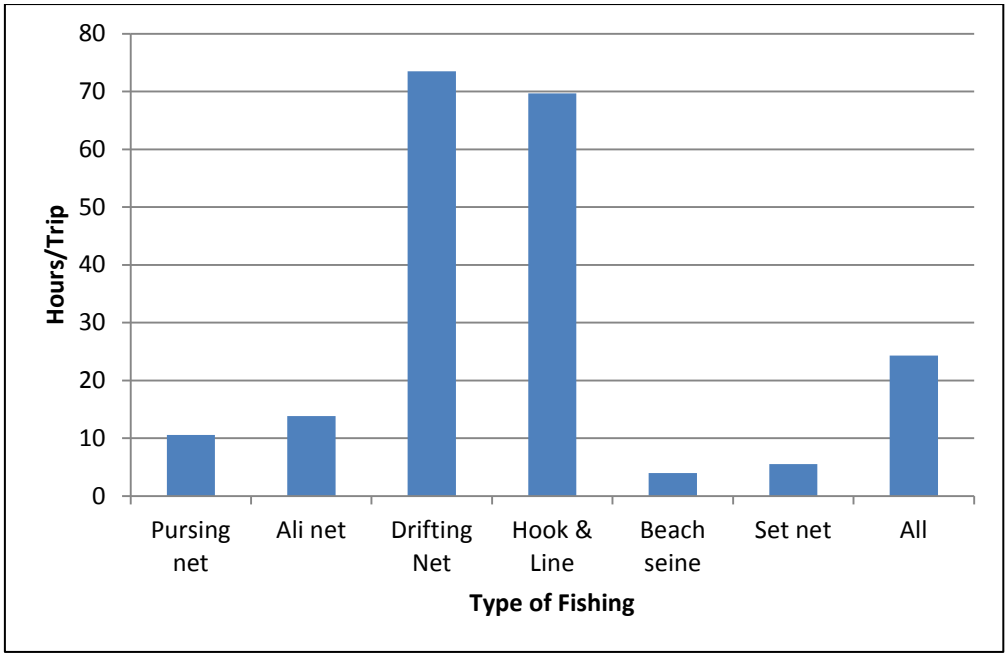

Figure 22 Hours per trip

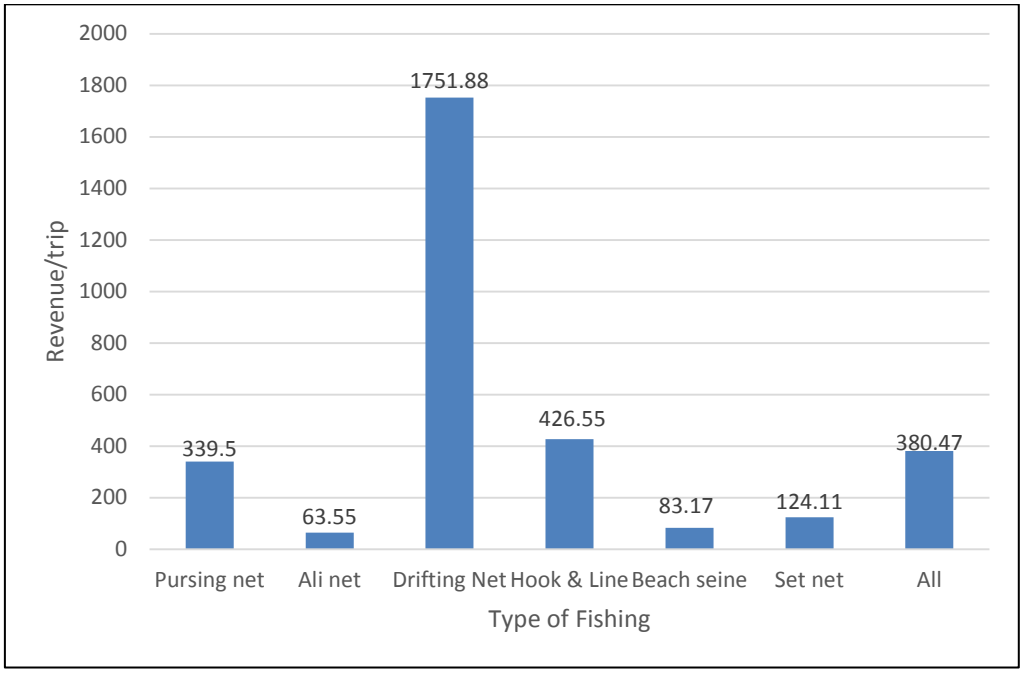

Figure 23 Boat owner's net revenue per trip (Gh¢)

To compare performance of each of the fishing types in terms of fuel use, an analysis of fuel use per hour was made. Purse seine (Poli/Watsa) canoe uses the most fuel, 4 gallons per hour. Hook and line and set net use 1.5 gallons per hour. The overall average fuel consumption per canoe per hour is approximately 2.8 gallons.

To compare performance of each of the fishing types in terms of fuel use compared to revenue, the beach seine is the most fuel efficient. Each gallon of fuel makes a profit of

Gh¢58 and the least fuel efficient gear is the *ali* net, making less than Gh¢5 per gallon of fuel. Purse seine and set nets make approximately Gh¢13 per gallon of fuel while the same gallon of fuel makes an average of Gh¢8 for drifting gillnet and hook and line fishing. These are indications that if the subsidy (currently about Gh¢8.38 (US$2.10) per gallon) is removed, many canoe owners will be operating in the red (not making a net revenue profit).

As a proportion of operational costs, fuel is the greatest cost relative to other inputs and costs, except for the hook and line fishery and beach seine fishery (Table 7). Fuel contributes over 70% to operational costs for purse seines (ali/poli/watsa). Fuel cost therefore, is responsible for their high operational cost. In terms of revenue per hour of fishing, the ali net fishery makes the least and it is also the third highest in fuel use per hour. In the situation of a fuel subsidy removal, set net, ali net and pursing net fishing would suffer the most. However, the purse seining and ali nets are those targeting the small pelagic stocks which are highly overfished. Therefore, a subsidy removal would in all likelihood reduce effort more of these gears than others and result in a greater beneficial impact on these key stocks.

Table 7 Percent contribution of inputs to operational cost

Input	Pursing net (Poli/Watsa)	Ali net	Drifting Net	Hook & Line	Beach seine	Set net	All
Fuel	73.37	70.86	55.2	42.33	38.5	80	65.5
Maintenance	14.4	13.64	15.6	11.45	1	7.5	12.7
Supplies	12.23	15.5	29.2	46.22	60.5	12.5	21.8
Total	100	100	100	100	100	100	100

6.3 Reaction to Removal of Fuel Subsidy

When respondents were asked how they would modify their level of fishing effort if the premix fuel subsidy was removed, 29% said they will stop fishing completely; 41% said the subsidy removal will not change the rate at which they fish; 16% said they would reduce their fishing effort by 50%; and 28% said they would reduce their fishing effort by between 50 and 90%. Table 4 shows how the removal of fuel subsidy will affect the various fishing gears.

Asked whether they would change their use of gear and target fishery if the premix fuel subsidy was removed, 17% replied yes, and 33% said they could not. Half of the respondents either did not know what they would do or refused to answer the question. A few however said they might migrate to neighboring countries to continue fishing.

6.4 Premix Price, Accessibility of Supplies, and Use of Premix

The price of premix fuel is not uniform across fishing villages. The premix committee in each area adds a margin for "developing" the landing beaches and for other expenses. The price of premix at the beaches therefore ranges from Gh¢7.10/gallon (in Accra and Tema) to Gh¢7.80/gallon in remote areas. The most popular price is Gh¢7.50. In some remote areas the fishers claimed they bought it at prices as high as Gh¢13.00 from middlemen. Fuel used by motorised canoes is heavily subsidised by over 50%. Sources put the price of petrol (super) at retail pumping stations at Gh¢16.

Generally, the respondents said they do not get the premix all the time at their landing site and have to look for it at other landing beaches and in some cases must obtain it from middlemen.

Asked about premix fuel accessibility, 41.2% said they always get the premix fuel when they need it. Cumulatively, 62% of the respondents got the premix fuel less than half the time they

need it, and 6% do not get it all. This agrees with the complaint of many respondents that premix fuel distribution is irregular and few and far between. It was also mentioned by some that the distribution system in some instances breeds corruption.

Respondents were also asked what percentage of their fishing trips were made without the subsidized premix fuel. Approximately 33% of respondents said only up to 10% of their fishing trips are made without the premix fuel. The percent of respondents reporting percentage of trips without premix is shown in Figure 24 below.

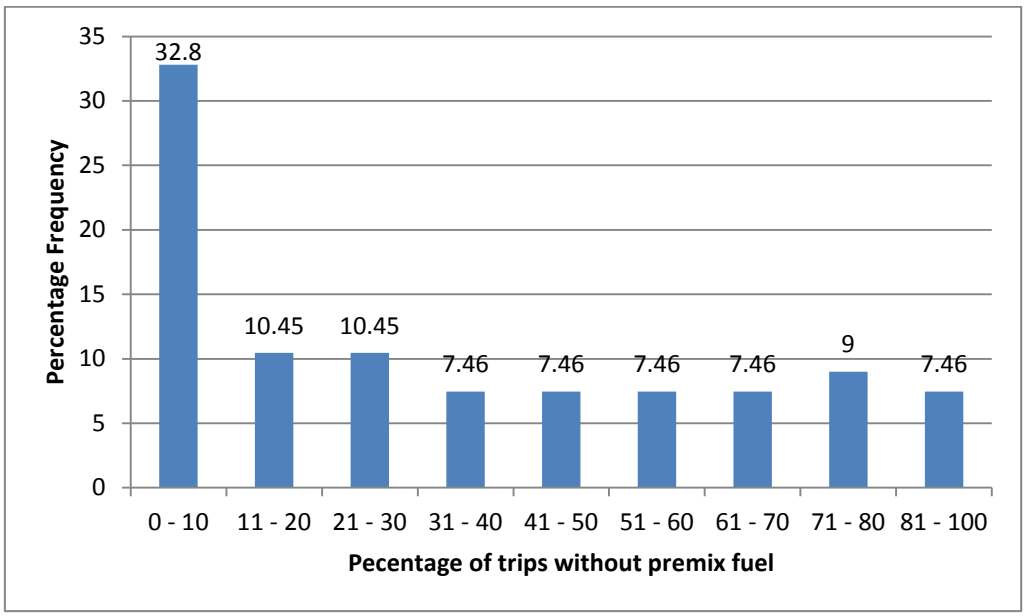

Figure 24 Percentage of trips without premix

6.5 Price of Premix Fuel at which Canoe Owners Will Stop Fishing

The respondents were asked to state the price per gallon of premix fuel at which they would completely stop fishing. 52% of respondents said they would stop fishing completely when the price of premix fuel increases by 50%. At double the current price, 75% of the fishermen said they would stop fishing assuming that fish prices stay the same.

Non-subsidized petrol at the pump is currently 110% of the current premix fuel price, or more than double the price of premix fuel. Based on responses to the question about stopping to fish, removal of subsidy would significantly reduce the pressure on stocks all other things being equal.

The loss in revenues if outboard canoe owners had to pay for fuel at Gh¢16 a gallon would be substantial. Based on the difference of premix fuel price (which varies by location), 61% of respondents would make losses on every fishing trip while the rest would be hovering around the margin of profitability. The mean profit per respondent would have reduced from Gh¢13.37 to Gh¢0.61 per gallon of fuel. All this means that removing the subsidy would be a very difficult decision by the government despite the long term benefits to small-scale fisheries as an industry.

On the question of whether they believed other motorized canoe owners would fish less in the absence of the fuel subsidy, 90% said that they believed other fishermen would fish less when the subsidy on premix is reduced or removed.

6.6 Fishermen's Perceptions on some Potential Benefits/Subsidies as Alternatives to Pre-Mix Subsidy

Sixty percent (60%) of respondents are of the view that nothing compares with the benefit that the premix fuel subsidy gives them. For those that indicated alternatives, the order of preference are insurance (13%), pension (11%), scholarships for canoe owners and crew (9%), vocational training (3%), and soft loans (3%) (Figure 25). Respondents generally were skeptical about government's ability to implement alternative support programs.

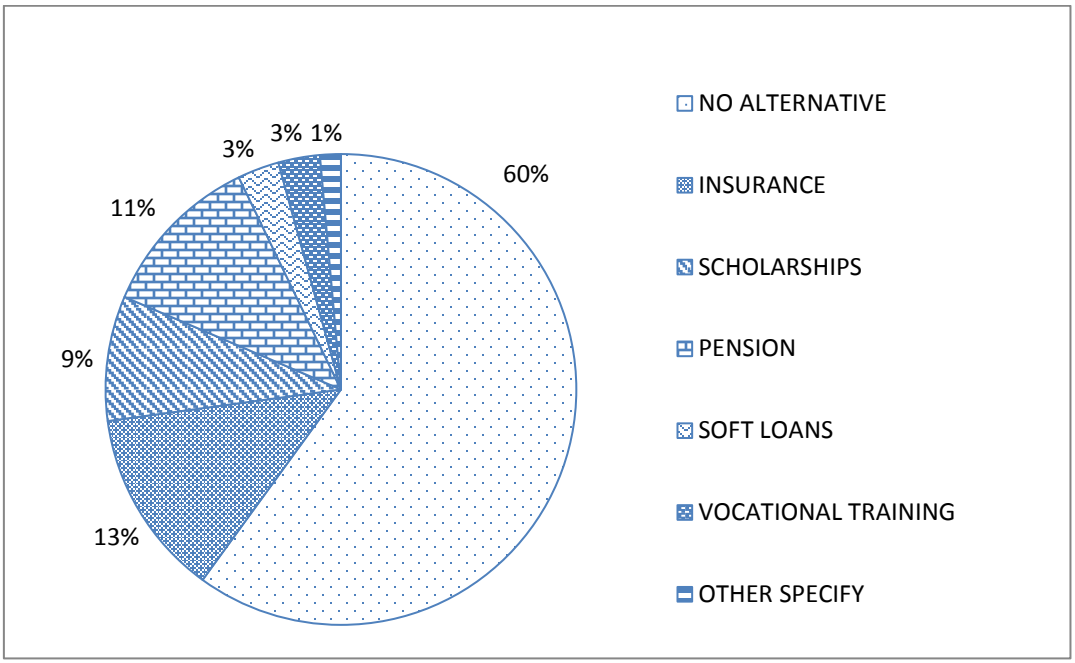

Figure 25 Preferences for alternatives to premix fuel subsidy

7. ANALYSIS OF POLICY OPTIONS

In this section various policy options are analyzed that would reduce or eliminate capacity-enhancing subsidies in favor of beneficial or ambiguous subsidies. For each option, the cost to government, socio-economic impact, and impact on level of fishing effort and fish stocks are considered. Any other important pros and cons, and necessary conditions for the policy option to happen are also explored.

7.1 No Change in Engine and Fuel Subsidies

No change in the engine and fuel subsidies implies the status quo remains. To achieve a reduction in fishing effort as detailed in the national fisheries management plan 2015-2019 will require a strong focus on input control. However, fishermen easily work around input restrictions when there is poor surveillance and enforcement capacity. Options to promote input restrictions are detailed below. The National Fisheries Plan for the Marine Sector calls for implementation of a number of input controls, some of which are summarized below.

Moratorium of new entrants

A moratorium on new entrants to artisanal fisheries could help reduce the effort in the long run as fishers grow old and retire from fishing. This will be more effective if every fisher is already known to the fisheries authorities. As a result this policy should rather be introduced when there is a considerable improvement in enforcement, compliance and fisheries management practices and would require a registry of fishermen.

Closed Season

A ban on fishing lasting two to three months every year during the period of spawning of target fish species is necessary for stock resurgence. Closed season must be determined with the inclusion of fishers. With concrete evidence of positive results of the closed season (greater abundance of fish stocks) there will be fewer critics of the policy measure.

It is important to note that a closed season does not deal with or solve the overcapacity problem. It is overcapacity that is threatening the collapse of stocks. Therefore while trying to rebuild fish stocks the overcapacity challenge must also be dealt with using appropriate tools. Otherwise the effort to rebuild stocks may not succeed or be sustained. The National Marine Fisheries Plan calls for closed seasons on all fleets except the canoe sector. Recent findings of a Science and Technical Working Group recommended a closed season on all fleets and for all species.

Fish Sanctuaries

Government could specify an area where fishing is prohibited. Similar to a National Park, this would allow marine life, including fish and habitat, full protection. The protection of the sanctuary would have costs. This will come in the form of employing, training and equipping marine guards. This will however, affect fishermen of some landing beaches and fishing villages who may have to travel longer distances to other places to fish if the sanctuaries are large. Sanctuaries are generally considered effective for demersal stocks but not necessarily effective with migratory species such as small pelagics which make up the bulk of canoe landings.

The fish sanctuary could help reverse dwindling stocks and declining catches and help support sustainable fishing. Other advantages are attracting tourism and research. Already fishing is prohibited surrounding oil platforms in the Western Region of Ghana and act as de-

facto sanctuaries. This could be expanded to cover a wider area. The National Fisheries Management Plan calls for the establishment of fish sanctuaries.

Reduce Total Number of Fishing Boats Licensed

The canoe fleet could be reduced from the current estimate in of 12,758 vessels (Akyeampong *et al.* 2013) to 9,095, which is the recommended number of canoes needed for sustainable fishing in the 2015 Fishery Management Plan. (See appendix of the Fisheries Management Plan of Ghana, MOFAD, 2015). This represents a 29 % reduction of the current estimated number of canoe vessels. In this case, unregistered or unlicensed canoes would not be allowed to fish at all and a canoe vessel reduction strategy would need to be developed and implemented. The measure would reduce total fishing effort considerably. It would however require stringent monitoring and should be co-managed with the local community in order to avoid collusion and cheating. It also requires serious outreach and education of the fishers.

The socio-economic impact of this is that fishing incomes will drop initially, but in the medium term they will be better off. When stocks recover, catch size and volume will increase.

Increase the traditional one non-fishing day a week to two days

Increasing the non-fishing time (referred to locally as fishing holiday) from 1 to 2 days in a week will amount to reducing the time available for fishing in the year from approximately 10 months to eight. That is equivalent to fishing for only three-quarters of the year. Assuming no change in fishing effort on the remaining fishing days, it would likely reduce catch in the short term but would allow for stocks to rebuild, with likelihood of increased catches several years out. It would give an added positive impact on stock rebuilding if it was combined with the closed season policy. Its impact on fishers will not be so severely felt. It may however be difficult to enforce because evidence shows that the traditional non-fishing day is loosely observed and enforced. This measure is listed in the National Fisheries Management Plan.

7.2 Eliminate Fuel and Engine Subsidies

Eliminate completely the pre-mix subsidy

Premix fuel consumption between 2011 and 2014 averaged 51,225 metric tons (equivalent to 70 million liters) and at an average subsidy of 62% of ex-pump price of US$1.01/liter of premium gasoline. This amounted to US$44.4 million annually over this period. The evidence from the field survey detailed earlier in Section 6 suggests outright elimination of the fuel subsidy will have a significant impact on fishing effort thereby reducing the pressure on stocks. The reduced effort could lead to stock recovery in the medium term. In addition, elimination of the premix subsidy would avoid a large government expense of US$44 million, and contribute to reducing the budget deficit.

The initial shock to the canoe sector likely would be severe in the short term. Canoe owners who could not afford the premix fuel at the market price would not go to sea leading to job/activity and income losses. This will affect not only the fishermen but also their families as well. It would be better if it is introduced during the low fishing season. *Ali/poli/wats*a gear fishers, the fuel guzzlers, will be most impacted. These are the gears that also target small pelagic fish which are near collapse from overfishing. However it would have a positive benefit on the small pelagic stocks due to a reduction in effort. Other fishers using hook and line, gill nets, and beach seines will be less affected. Other potential impacts include:

- Increased profitability of freshwater aquaculture fish production due to upward realignment of fish prices. Government could take advantage of this by providing incentives and the enabling environment for aquaculture fish production (as supported by the national fisheries management plan 2015-2019) as an alternative livelihood for some fishermen.

- Reduction in the demand for *Triplochiton scleroxylon* and *Ceiba petandra* (locally called *Wawa* and *Onyina* trees respectively) for canoe construction and refurbishment. On average, 467 canoes are constructed each year making use of about 934 tress (a new canoe takes an average of two trees). A reduction of canoe addition to the canoe fleet by 50% annually will save at least 467 forest trees each year. This estimate does not cover the quantity of wood used for canoe refurbishment. This would lead to some reduction in the rate of deforestation and exploitation of the preferred species for canoe construction that are becoming more difficult to source.

Timing of the elimination of a fuel subsidy needs to be considered. During a period of low fuel prices which is expected over the next several years, or declining fuel prices, would lessen the social impact on fishing households.

Eliminate the Outboard Motor Subsidy

As discussed in Section 3, it would cost the government approximately US$4.5 million in subsidies and tax waivers to distribute 4100 Yamaha outboard motors of various capacities to fishermen annually. Abolishing the engine subsidy would save Government US$4.5 million in expenses. Removal of the engine subsidy combined with premix subsidy removal, would reinforce the positive effect on fish stock recovery. Elimination of the engine subsidy would likely have a moderate impact on fishermen in the short term and increased costs would be borne by canoe vessel owners that are much better off financially than the majority of fishers who are low wage paid crew.

7.3 Phase out the Fuel Subsidy

The socio-economic impact of a slow phase out (e.g. over a 3 year period) would be less severe than the outright elimination of the subsidy. It will also provide time for industry to adjust. For instance, some may choose to exit the industry, others may move to use of gear that are less fuel intensive such as hook and line, gill nets and beach seines. With a slow phase out, it will take more time before significant positive changes in stocks are seen. A 20% reduction in the current level of fuel subsidy each year for a 5-year phase out period will save the government US$8.4 million for the first year, and additions of same in subsequent years with an end savings when fully phased out of $44 million. These savings could go to deficit reduction, or be reallocated to other non-capacity enhancing subsidies to the fisheries sector as described below.

7.4 Modify the Engine Subsidy

Instead of completely eliminating the engine subsidy, government could allocate the subsidy differently. For example, the subsidy could be removed on 30HP and 40HP engines and maintained on 8, 15 and 25HP engines for smaller size canoes and gears in order to target the smaller operators and likely less well off. Subsidies on the bigger canoes with the most fishing power benefit the more wealthy canoe owners. Some of these private sector investors in larger vessels are not true fishers but have other primary professional occupations and

income sources. Therefore those owning big canoes that use 40HP engines are not the poorest fishers and are likely more economically well off and better able to absorb the loss of the subsidy. These boats tend to use the *poli/watsa* gears that target the small pelagic species and are the most fuel inefficient. Removal of the subsidy on higher capacity engines will reduce fishing effort and pressure on these highly stressed stocks as well, yet provide a continuing benefit for poorer fishers and their households. Some canoes may choose to switch to gears that have lower fuel consumption.

7.5 Other Alternatives and their Cost

The use of savings from a reduced fuel subsidy for investment in alternative beneficial subsidies may not change the total cost to government but it can have a positive impact on stocks as it will likely lower fishing effort. In the long term this will have benefits for fishermen and increase local fish supply. Phase out of pre-mix could occur over time as other benefit programs come on line. Most of them will take time to establish.

Fishermen Insurance

There are proposals by some insurance companies to enroll fishermen in a special insurance program. The scheme would create an opportunity for fishers to accumulate funds for a lump sum payout and/or periodic payment after a period of contribution. Other features of the scheme are to provide life, permanent and temporary disability insurance and to use contributions to the scheme as a guarantee to access loans from banking institutions. The premium is a daily contribution ranging from GhS3 to GhS10 for a 20-day month (Table 8). The scheme provides an option for a closed season payout ranging from GhS132 to GhS440 annually per beneficiary depending upon the premium chosen and regularity of contribution.

The government can take advantage of this insurance scheme and use the saving from a fuel subsidy removal to pay part or the full premiums on behalf of fishermen who enrolled into the scheme. In this case, the insurance company pays the fishermen during a closed season. The premium for all the fishermen range between US$6.3 million (for the minimum GhS3 per day premium) and US$21 million (for the maximum GhS10 per day premium).

Another option is for government to pay the fishermen, who have enrolled in the insurance scheme, the closed season compensation. Paying all 140,000 fishermen the closed season compensation will amount to between US$4.62 million and US$15.4 million.

Table 8 Insurance premium and closed season payouts

Closed Season Compensation	Daily Premium			
	3	5	7	10
Closed season pay-out per person (GhS)	132	220	308	440
Number of fishermen	140,000	140,000	140,000	140,000
Total pay-out (GhS millions)	18.48	30.8	43.12	61.6
Total pay-out (US$ million)	4.62	7.7	10.78	15.4
Premium				
Monthly premium per capita (US$)	$15	$25	$35	$50
Total annual premium (9 months) (US$ millions)	4.725	7.875	11.025	15.75
Total annual premium (12 months) (US$ millions)	6.3	10.5	14.7	21

Compensation for Removal of Fuel Subsidy

The Livelihood Empowerment Against Poverty (LEAP) program paid between US$16 and US$26.5 a month to eligible beneficiaries in 2016. Using this model and paying the nearly 140,000 fishermen between US$16 and US$26.50 each a month for one year will amount to between US$26.88 million and US$44.52 million. The upper estimate is roughly equivalent to the current amount spent on the fuel subsidy. Part of that amount could be used as insurance premium supplement for the fishermen from which an enhanced insurance payment could be made to fishermen during a closed season. Since fishermen are still free to go fishing a fraction of the amount could be paid to them.

Table 9 shows the various scenarios of the cash pay-outs. The first set of scenarios applies the same level of payout as LEAP, whereby the payment is based on the number of eligible persons in the household, from one to four or more. Scenario 5-8 assumes a smaller payout at 20 % of the LEAP rate for from one to four or more dependents assuming there was only a partial 20 % reduction in the fuel subsidy for example, the compensation payout would therefore be less. Assuming every fishermen's household received a payment, and not knowing the average number of dependents, the costs would range somewhere between the one dependent to four or more dependent estimates.

Table 9 Scenarios of compensation for elimination of fuel subsidy

Scenarios	Monthly Pay-out US$ (GhS)	Number of fishermen	Total Monthly Pay-out US$m	Total Annual Pay-out US$m
Assuming same payout as LEAP				
1 dependent	16 (64)	140,000	2.24	26.88
2 dependents	19 (76)	140,000	2.66	31.92
3 dependents	20 (88)	140,000	3.08	36.96
4 or more dependents	26.5 (106)	140,000	3.71	44.52
Assuming 20% of LEAP payout				
1 dependent	3.2	140,000	0.448	5.38
2 dependents	3.8	140000	0.532	6.384
3 dependents	4	140000	0.56	6.72
4 or more dependents	5.3	140000	0.742	8.904

Pension scheme

Government may institute a pension scheme for fishermen. Government could use the saving from subsidy removal as seed money for the scheme. Beneficiaries of the scheme should be limited to only those who register and declare their catch. This will be the beginning of formalizing catch and effort statistics. The benefit is not immediate and most fishers will not wait that long. However the pension idea is good since it is supposed to cushion the fishers when they are old and cannot fish.

The daily minimum wage in 2016 is approximately US$2 (GhS8). This amounts to US$54 a month of 27days of work per month. In Ghana, the employer pays 13% of the wage on behalf of the employee while the employee pays 5.5% to the social security fund. Assume that government pays the 13% of the minimum wage on behalf of each fisherman to the Social

Security Fund (SSF). This will amount to US$84.24/fisher/ year. Thus, central government would contribute US$11.79 million to the SSF on behalf of all marine fishermen in Ghana annually.

National health insurance scheme

Using the same mechanism, insurance companies can enroll fishermen into National Health Insurance or establish a special health insurance scheme for the fishermen. Some of the savings from the fuel or engine subsidy could be used to pay the health insurance premium on behalf of fishers. The annual premium per person is GhS22 (US$5.5). This would amount to a cost of US$770,000 per year.

Invest savings in improved resources for law enforcement or improved stock assessment or to fund co-management committees

It should be noted that the options discussed above will not eliminate illegal fishing. In fact removal of subsidies is more likely to intensify illegal fishing. Savings from the removal of the fuel subsidy could be channeled into educating fisherfolk, co-management processes and improving surveillance. This will reduce illegal fishing and improve compliance of fishing regulations.

Figure 26 Women processing fish

8. SUMMARY OF POLICY OPTIONS

All of the policy options mentioned in Section 7 are summarized below:

Table 10 Summary of policy options

Policy Option	Cost to Government	Socio-economic impact	Impact on stocks/ effort
Maintain current fuel subsidy	US$44M annually	Status quo remains: dwindling revenues/ profits in fisheries Gradual but steady increase in losses will increase poverty in fishing communities in the medium to long run	Effort remains same or continues to increase -Stocks collapse beyond recovery in the short to medium term
Closed season of between 2 to 3 months	2 months of no fishing and therefore no sale of premix saves US$7M Cost of outreach, monitoring and enforcement	Severe, especially if it falls within the peak period	Will significantly reduce the pressure on stocks Stocks recover in the medium term
Fish Sanctuaries	Cost of personnel employment, training and equipping	Severe for fishermen at excluded zone who have to travel longer distances to fish Source of youth employment, marine tourism and research	As a reserve, it will serve as a source of restocking the other areas and therefore help reverse dwindling stocks and declining catches and help support sustainable fishing
Reduce the number of canoes to 71 % of current fleet size	Savings of up to 29% reduction US$12.8 M on reduced premix sales Part of savings from reduced premix supply used to finance licensing and monitoring costs	Initially, Revenues/ profits reduce Rising fish prices coupled with stock resurgence improves revenues in medium term Profitability in aquaculture rises and generates employment Would be difficult to enforce	Cut total fishing effort (# canoes) by 29% Eliminates latent capacity of underutilized canoes that fish only part time Pressure on stocks reduced considerably Fish stocks recover in the medium term
Reduce allowable time spent fishing: Increase the traditional one non-fishing holiday a week to two days a week	Cost of monitoring and enforcement	Less severe than closed season and subsidy removal and so may not require payment of compensation Difficult to monitor and enforce	Pressure on stocks reduced considerably Reduced annual total catch initially but may pick up as stocks recover in the medium to long term

Policy Option	Cost to Government	Socio-economic impact	Impact on stocks/ effort
Eliminate the pre-mix subsidy	Virtually no monetary cost Politically risky Government saves US$44M	Initial shock to the canoe sector would be severe. Realignment of prices may make aquaculture more profitable and create aquaculture growth	Cut back on effort reduction in number canoes fishing Stocks recover in the medium term Stock recovery will be faster if the phase out of subsidy is not gradual
Slow phase out of the pre-mix subsidy by reducing the total amount of subsidy provided	A planned reduction of the premix fuel subsidy by 20% of current level for 5 years will reduce government spending by US$8.4 M in the first year and $44 Million annually after 5 years.	Less severe socio-economic impact that outright elimination of fuel subsidy	Effort reduces but at a much slower rate Slower stock recovery
Eliminate engine subsidy	Saves over US$4.5 M annually	Socio-economic impact would be felt from the medium to long term.	Its impact on stock will be slower and less severe, less significant than that of subsidy removal on pre-mix fuel. It will reinforce stock effect when combined with premix subsidy removal in the long run
Eliminate subsidy on 40 HP engines and expand subsidy on smaller engines	Saves US$1.22 M	Socio-economic impact will be less severe for poorer fishers and their households Increase in number of smaller canoes	It will reduce fishing effort and pressure on stocks
Reduce fuel subsidy and use government savings to invest in alternative beneficial or enhanced subsides (see details below)	No change in cost	The time line for the benefit to the fishers depends on the type of program the saving from the subsidy is invested in. Some of these program will take time to mature	Reduction in fuel subsidy will lower fishing effort and have a positive impact on stocks
Compensation for removal of fuel subsidy. Cash transfers of between	Between US$26.9 M and US$44.5 M	This will lessen the socio economic impact of the removal or phase out of the fuel and or engine subsidy	

Policy Option	Cost to Government	Socio-economic impact	Impact on stocks/ effort
US$16 US$26.5 per person per month for one year to 140,000 fishermen			
Compensation for gradual phase out of fuel subsidy. Cash transfers of between US$3.2 to US$5.3 per person per month for one year to 140000 fishermen	US$5.38 M to US$8.9 M per year for a 5-year phase-out program	This will lessen the socio economic impact of the phase out of the fuel and or engine subsidy	
Cash transfers during closed season of between 2 – 3 months	US$1.9 – 2.8 M per year	This will lessen the socio economic impact of loss of revenue during the period of the ban	
Payment of insurance premium on behalf of fishermen	US$6.3 – US$21 M per year	Beneficiaries enjoy closed season payout from insurance that receive the premium on behalf of beneficiaries	
Pension scheme Assumption: Government pays US$7.2 a month on each registered fisher into a social security fund	US$12 M per year	Will not have any immediate impact on livelihoods Long term benefit to fishers who will be retiring	Could help improve national catch statistics if social security contribution paid by government on behalf of the beneficiary is tied to catch declaration
National Health Insurance	US$ 770,000 per year	Reduces burden of health care need on fishers' households	
Invest in alternative livelihood schemes e.g. aquaculture	Up to the subsidy amount	It will become a source investment and employment	Fishing effort and pressure on stocks will reduce in the medium to long term
Invest savings in improved fisheries management (monitoring and enforcement, fisheries research, and co-management	Up to the subsidy amount	Few jobs available People of the fishing communities educated to appreciate the issue at hand	Improved law enforcement and co-management will complement other efforts and have a positive impact on stocks

9. RECOMMENDATIONS

The premix fuel subsidy costs the Government of Ghana US$44 million annually. It is a 'capacity-enhancing' subsidy, meaning it promotes increased fishing effort, overexploitation of fish stocks, lowers fishing productivity in the long run, and makes fishermen, boat owners and everyone in the fishery sub-sector poorer. The outboard engine subsidy is also a capacity-enhancing subsidy that is costing Ghana about US$4.5 million/year.

Fisheries actors would be better off in the long term without the subsidy. Funds spent toward these programs could be redirected to programs that promote fisheries conservation, research, monitoring and enforcement or other benefits for fishing communities that do not directly contribute to overfishing. Based on this analysis, we recommend phasing out capacity enhancing subsidies in fisheries, and redirecting efforts and investment toward programs that will make fishermen and fisheries stakeholders better off in the medium to long term. Taking from the Summary Table above, this includes:

- Consideration of a closed season of between 2 to 3 months with cash compensation to the sector for not fishing during this period
- Creation of fish sanctuaries with paid sanctuary wardens recruited from adjacent fishing communities
- Reduce allowable time spent fishing
- Improved fisheries extension, stock assessment, monitoring, management, enforcement, and research
- Invest in training and support for alternative livelihoods
- Subsidized pension scheme and/or life or health insurance for fishers

Figure 27 Processed fish

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Figure 28 Fishing vessel on Ghanaian Beach

Photo by Jennifer Yost.

ANNEX 1

MOTORIZED CANOE OWNER or CAPTAIN QUESTIONNAIRE ON FISHING SUBSIDIES

Sample #: ……Date: …….
How was this respondent selected/identified?

[Sex: M/F..…….. Main type of fishing ……..……..…]

Landing beach: ……

Location (Region/District or Municipality/Town) ……..

1. Are you the motorized canoe owner? Yes ___ No ___
2. Do you go to sea on your boat to fish? Yes ___ No ___
3. How often do you go to sea to fish rather than let the crew handle that? Select from the scale below:

Always	Often	Sometimes	Mostly not	Never

4. How many motorized canoes do you own? ……. What is the length and/or type of canoe?

   …..……..…….

5. Are you a member of the Ghana National Canoe Council? …… If yes, for how long have you been a member? …….

A. OUTBOARD ENGINE

6. Please provide the following information about your outboard motors (best 3 if more than 3)

(a)	(b)	(c)	(d)		(e)	(f)
	HP	Year of Purchase	Cost (GH¢)	Was it new or used?	Did you get the engine from the government engine subsidy program?	If from the engine subsidy program, how much would it have cost at open market price?
1.						
2.						
3.						

7. Please explain how the outboard motor subsidy works? How is someone able to get a subsidized outboard motor?

……

……

B. TARGET FISH AND INCOME

8. Target fish, length of fishing trips, and average revenue by season.

Quarter	Target fish (local name) (type of fish mostly caught)	Hours spent per fishing trip	Fuel use per trip (gallons)	After all costs, including crew share, what is the lowest, best, and most frequent amount of Cedis in your pocket?		
				Lowest	Best	Most Frequent
Jan-March						
April-June						
July-Sept.						
Oct-Dec.						

9. Approximately what percentage of your annual income is from fishing? (use the marbles)

……..

10. What other work do you do (in order of importance)?

……

C. FISHING COSTS (OPERATIONAL)

11. How is labor paid for in your fishing operation? If labor is paid by sharing the catch, what is the sharing formula?

…… ……..

……

12. Rank or give a percentage to your typical operating costs (use the marbles):

Type of Input	Percentage of operating cost
1. Fuel	
2. Maintenance (of boat, gear, engine)	
3. Fishing supplies: - Food ____ - Ice____ - Cost of loan ____ - Beach fees ____ - Bait _____ - Charcoal _____ - Batteries _____ - Other (specify)	

13. Please give an estimate of your total operating cost per trip……

D. THE PREMIX PROGRAM

14. If premix is not available from the regular source for one year, how does it change how often you fish? Mark on the ladder below from "no change" in fishing effort, to "no fishing."

No change									Stop fishing completely

15. If you stopped fishing with an outboard engine because the fuel subsidy is ended, would you turn to other kinds of fishing activity? (boat without engine, seine netting from shore, etc.)

16. What is the price of premix per gallon? …….. What is the price of fuel at the fuel station? ……..

17. On a scale of 1-10, how often are you unable to get premix fuel when you need it?

Can always get it									Almost never get it

18. What percentage of your fishing trips are made without the subsidized premix but with 'super' fuel from the filling station and added oil? Mark the ladder below:

Never									Buy from filling station always

19. What is good and what is not good (like/dislike) about the premix fuel program?

…….....……

……..……

20. Without the premix fuel subsidy (i.e. if they have to buy the fuel from the fuel station), do you believe that other canoe owners would fish less?

21. At what price of fuel per gallon would it be impossible for you to fish altogether (i.e. the point where you will stop fishing or leave the canoe idle)? Mark the ladder below:

Premix fuel price									Double premix fuel price	More than double

22. Is there a different kind of support to you, your family, or the fishery that you would like to see the government invest the subsidy amount in as an alternative to a pre-mix subsidy? Select from the following:
    (a) No alternative, fuel subsidy is the only and best option _____
    (b) Provide insurance for damages to boat and health insurance for boat crew _____
    (c) Scholarship/support for school costs for family of boat owner and crew ____
    (d) Pension program to help owner and crew when they no longer are fishing _____
    (e) Soft loans _____
    (f) Vocational training _____

E. FISHERIES MANAGEMENT

23. For the fish stocks that you fish for, what do you see as the 2 most important problems in the fishery? Select from the following:
    (a) Light fishing ____
    (b) Small mesh size/monofilament net ____
    (c) Pair trawling ____
    (d) Dynamite fishing ____
    (e) Poison (DDT) fishing _____
    (f) Too many boats (free entry for all to fish) ____
    (g) Other (specify) :

24. Do you know what the government fishing regulations are? Select from the scale below:

Very well	Pretty well	Somewhat	Not very well	Not at all

25. Do you know what the traditional fishing rules are at your landing site? Select from the scale below:

Very well	Pretty well	Somewhat	Not very well	Not at all

26. What do you think the level of compliance is of traditional fishing rules?

Very good	Pretty good	Somewhat good	Not very good	Not good at all

27. What do you think the level of compliance is of government regulations?

Very good	Pretty good	Somewhat good	Not very good	Not at all

28. How many people depend on you for their upkeep (How many people do you look after?)?

29. How old may you be?.....

30. How long ago since your first canoe/gear started going fishing?……

31. If you are married what work does your spouse do?.....

32. What is your level of formal education? ……..…