

FUEL SUBSIDY IN GHANA'S MARINE ARTISANAL FISHERIES SECTOR

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ABSTRACT

Subsidies given directly to Ghana's marine artisanal fisheries have been identified as capacity enhancing subsidies. Of most importance is the premix fuel subsidy which is defined as difference between the price per litre of fuel paid by the artisanal fishers and the national price applied to fuel purchases for other uses. This subsidy program, however, is faced with a lot of challenges. Using the analytical part of the Logical Framework Approach, the causes of the bad influence of the fuel subsidy were identified as negative social, economic and environmental factors. Also the problem of insufficient governance/management system was arising from inadequate fisheries institutional capacity. In a desirable situation, improvement on the influence of fuel subsidy will result in decreased social deviance, improved cost and most importantly, the sustainable usage of the fisheries resources, which will reduce over exploitation. In order to achieve this, sufficient governance/management system was strategically selected as the most relevant, feasibly and easy objective. The West African Regional Fisheries Program (WARFP) adequately addresses this through its components: Good Governance and Sustainable Management of the Fisheries and Reduction of illegal fishing.

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ABBREVIATIONS

EEZ	Exclusive Economic Zone
GDP	Gross Domestic Product
FAO	Food and Agriculture Organisation
FC	Fisheries Commission
UNEP	United Nations Environmental Program
MOFA	Ministry of Food and Agriculture
MFMD	Marine Fisheries Management Division
MFRD	Marine Fisheries Research Division
WARFP	West African Regional Fisheries Program
CPUE	Catch Per Unit Effort
WTO	World Trade Organization
SCM	Subsidies and Countervailing Measures
OECD	Organization for Economic Cooperation and Development
MEY	Maximum Economic Yield
ODA	Overseas Developing Agencies
ICCAT	International Commission for the Conservation of Atlantic Tunas
VMS	Vessel Monitoring System
GoG	Government of Ghana
DFID	Department for International Development
LBC	Landing Beach Committees
LFA	Logical Framework Approach
MCS	Monitoring, Control and Surveillance

1 INTRODUCTION

The Republic of Ghana is a West African state bordered by Côte D'Ivoire to the west, Burkina Faso to the north, Togo to the east and the Gulf of Guinea to the south (Figure 1). It has a total land area of 238,527 km², a coastline of nearly 550 km and a continental shelf of about 24,300 km². The country's Exclusive Economic Zone (EEZ) has an area of 218,100 km² (FAO 2007). The population of the country is about 24.7 million as at 2010 (Ghana Statistical Service 2012). The land area is divided into 10 administrative regions of which four are coastal regions.



Figure 1: Map of Ghana (Ghanaweb).

Agriculture is the dominant sector of the Ghanaian economy. It is source of employment for about 50% of the labour force and contributes about 30% of the GDP (World Bank 2011).

Fish is the country's most important non-traditional (main traditional commodities being: gold, cocoa and timber) export commodity and accounts for about 5% of the agricultural GDP and 3% to national GDP (GAIN 2011). In 2010, the country generated about US\$ 255 million from fish export (44,145 t). On the other hand to supplement the local fish supply, 192,000 t was imported valued at US\$ 137 million (Fisheries Commission 2011).

Fish is the preferred and relatively cheap of source 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 national fish per capita consumption is estimated to be about 20-25 kg per annum, higher than the world average of 16 kg (GAIN 2011).

The artisanal fishery is the largest subsector in terms of the number of vessels, which are mainly dugout canoes. It also contributes the largest in terms of the volume of fish landed in the country and this is mainly for domestic use. The artisanal subsector

receives highly subsidized fuel called premix fuel and other fishing inputs while fish production remains relatively the same.

Justification

According to World Bank and FAO (2008) the justification offered for subsidies ranges from protection of infant industries, through national food security and prevention of fish spoilage to social rationale, such as preservation of traditional livelihoods and poverty reduction. However, fisheries subsidies have become a leading international issue for a simple reason: fish stocks around the world are facing an increasing crisis of depletion and inappropriate subsidies are a major factor of the problem (UNEP, 2008). Adding to this, while all fisheries subsidies would theoretically be “not harmful” in the presence of truly effective management, very few if any fisheries today are subject to management systems that are sufficiently “effective” to ensure that fisheries subsidies will not harm fisheries resources (UNEP, 2004).

Goal and Objectives

The goal for this study was to identify and analyse the effects of fuel subsidy in Ghana’s marine artisanal fisheries sector and suggest possible measures to mitigate the bad influence of the fuel subsidy. The research questions for this study included:

1. What is the efficiency of the fuel subsidy in Ghana’s artisanal marine sector?
2. What are the influences of the fuel subsidy?
3. Is the subsidy supporting the right/wrong behaviour, is it economic and environmentally sustainable?
4. What are the possible measures to avoid the bad influence of the fuel subsidy?

A detailed description of Ghana’s fishing industry is given focusing on the artisanal sector. Highlights are made on the challenges in the marine artisanal sector for better understanding. Literatures on global and regional fisheries subsidies are reviewed. Detailed review is done on marine fisheries subsidies with major focus on the capacity enhancing subsidies, which includes the fuel subsidies. This was followed by the development of subsidies in Ghana’s marine fisheries with a special emphasis on the artisanal fuel subsidy programme.

The results of this research will provide a basis for further studies on subsidies and fisheries sustainability in Ghana’s fishing industry.

2 STRUCTURE OF GHANA’S FISHERIES SECTOR

The fishing industry in Ghana is based on two main water resources; the marine and freshwater (inland). The marine fisheries sector is usually categorized into three subsectors namely the industrial, semi-industrial (inshore) and the artisanal (canoe) fisheries. The freshwater fisheries comprise of Volta Lake and aquaculture subsectors, which includes reservoirs, fishponds and cages (MOFA 2012).

2.1 Inland fishery and Aquaculture

Lake Volta is the main source of freshwater fish in Ghana. With a surface area of about 8,480 km² and 5,200 km of shoreline it contributes about 90% by volume of the total inland fishery production in Ghana. Fish production has increased from about 40,000 tons (t) in 1993 to over 83,000 t in 2010 (Figure 2). The Volta Lake fishery provides employment to over 80,000 fishers and 20,000 fish processors and traders who are mostly women. Currently, there are about 17,500 active canoes which are made from planks (thus this fishery is solely artisanal) and operating from about 2,000 fishing villages. The main fishing gears used are gill nets and cast nets, traps and hook and line targeting species such as the Cichlids (38.1%), *Chrysichthys* spp. (34.4%) and *Synodontis* spp. (11.4%), (FAO 2007, MOFA 2012). The Volta Lake fishery is an open access type of fishing, where the canoes are neither registered nor licenced.

Aquaculture in Ghana, is only located in fresh water bodies. It can be described as emerging and developing fishery. Although this is a new industry, it is gradually gaining roots and spreading across the country. The types of production by volume include cage production (85%), Pond culture 8% whiles dams, dugouts and reservoirs contribute about 7%. Currently, there are over 1,000 fish farmers having about 5,000 ponds with a total surface area of 680 ha and there are over 1,500 cages operating within a surface area of about 240,000 m³ (Fisheries Commission 2012, MOFA 2012). Although catches from the Lake Volta was increasing in the early 1990's, there has been stable catches within the last decade (Figure 2).

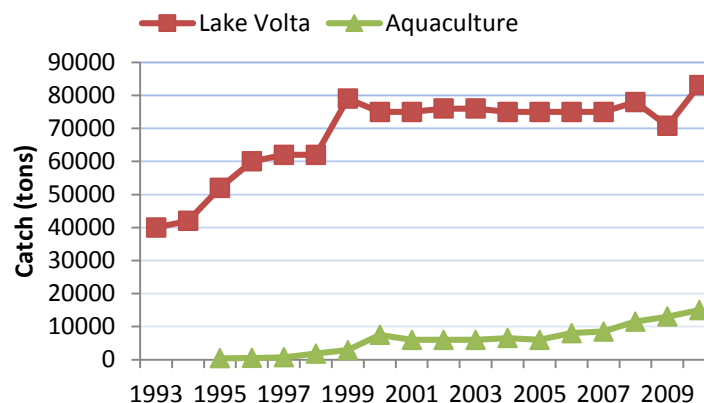


Figure 2: Inland fishery production from 1993-2010.

On the other hand, production in aquaculture has been encouraging. Fish production increased from 6,000 t in 2006 to over 18,000 t in 2010. The main fish cultured are tilapia (especially *Oreochromis niloticus*) and catfish.

2.2 Marine Fisheries Sector

This sector is categorised into small scale (artisanal), semi-industrial (inshore) and industrial fishery (shrimpers, bottom trawlers, specialized tuna fisheries). As required by law (Fisheries Act 625), the artisanal canoes and semi industrial boats (except for trawlers) are eligible to fish within the 30 m depth zone whiles the industrial fleets must fish beyond this zone (Figure 3).

Ghana Coastal Zone



Figure 3: Coastline of Ghana indicating the fishing zones (MOFA 2012).

Due to the nature of the coastline, the 30 m depth zone is narrow in most areas. As such most artisanal canoes and semi industrial boats travel beyond this zone making them susceptible to the large industrial vessels.

The marine fisheries contribute significantly to the nation's total fish production. In 2010 and 2011, it contributed about 72% and 74% to the total fish production respectively (Fisheries Commission 2012).

2.2.1 Industrial Fisheries

The industrial sector comprises large, steel-hulled, foreign-built trawlers, shrimpers; tuna bait boats (pole-and-line) and tuna purse-seiners (MOFA 2012). In 2011, the industrial fleet was made up of 81 bottom trawlers, 2 shrimpers, and 43 tuna vessels (Fisheries Commission 2012). The vessels operate from Tema and Takoradi where there are deepwater ports. The industrial vessels have freezing facilities for preserving fish on board and can stay for months at sea (FAO 2004).

The trawlers which ranges in length between 14 and 50 m with engines ranging from 100 to 1000 horse power (hp) target species from the family Sparidae (mainly *Pagellus bellottii*, *Pagrus caeruleostictus*, *Dentex sp*) Pomadasyidae (*Pomadasyus incisus*, *P.jubelini* and *Brachydeuterus auritus*), Sciaenidae (*Pseudotolithus senegalensis*), Mullidae (*Pseudupeneus prayensis*) Lutjanidae (*Lutjanus fulgens* and *L.goreensis*) Serranidae (*Epinephelus aeneus*) Polymenidae (*Galeoides decadactylus*) and Lethrinidae (*Lethrinus atlanticus*) (MOFA 2012).

The trawl fishing, which was lucrative in the 80's and early 90's due to high CPUE, is faced with low profitability in recent years. Currently it is considered to be over capitalized. The main cause identified as the large number of operating vessels (World Bank 2009). In the last decade there has been drastic increase in the number of vessels (Figure 4). Between 1999 and 2008 the number of trawlers doubled from 37 to 73 producing about the same quantity of fish.

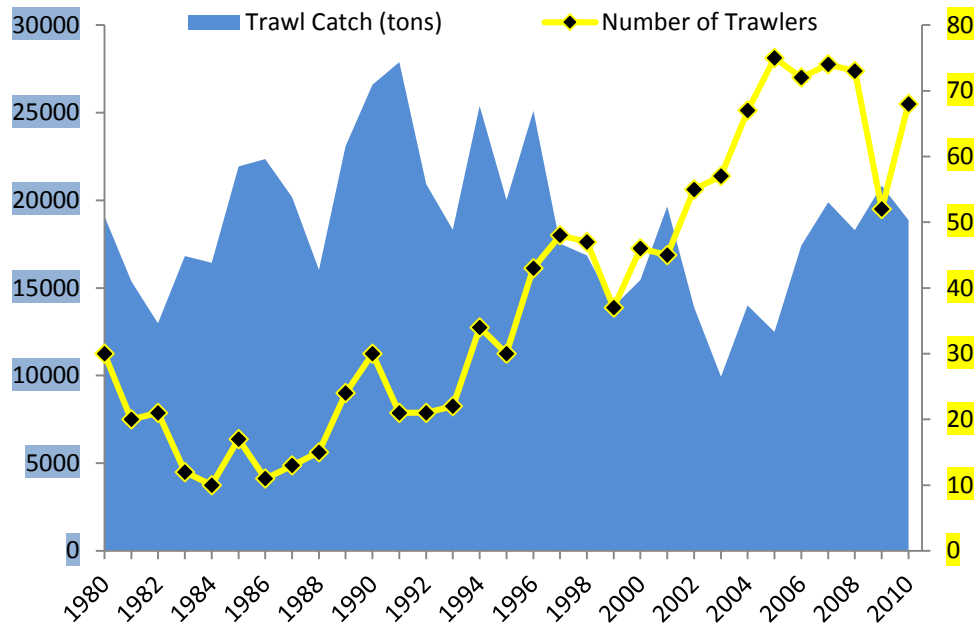


Figure 4: Annual fish landings from Industrial trawlers with their relative number of vessel from 1980-2010.

Fish production peaked in 1990 and is in fast decline in recent years. According to the World Bank, (2011) a fleet of about ten sound trawlers would sufficiently harvest the quantity of 2008 landings. Due to this situation, the MOFA has called for a ban on the registration and licensing of new industrial trawlers.

The tuna vessels on the other hand target the large pelagics, which are mainly tuna and tuna-like species (bill fishes). The main commercial tuna species are the yellowfin (*Thunnus albacares*), skipjack (*Katsuwonus pelamis*) and bigeye (*Thunnus obesus*). The International Commission coordinates stock size assessment in the whole Atlantic for the Conservation of Atlantic Tunas (ICCAT). Recent assessments indicate that yellowfin and bigeye tuna resources in the Atlantic are being optimally exploited but it appears that skipjack is under-exploited (MOFA 2012).

Tuna catches between 1980-1997 was slightly lower than 40,000 t/year, afterwards the average tuna catch between 1997-2010 increased to about 70,000 t/year with a relatively slight increase in the number of vessels (Figure 5).

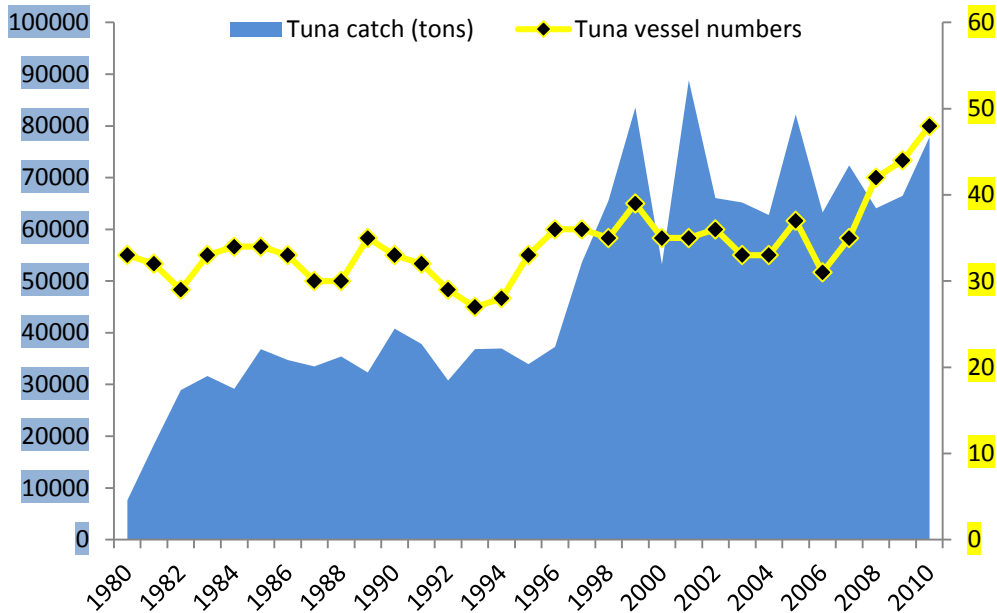


Figure 5: Annual tuna landings with relative number of vessels of tuna fishery from 1980-2010.

Tuna vessels land approximately between 18 to 22% of the total annual marine fish catch. As required by the Fisheries Law about 10% of the landed catch must be sold locally, thus in 2009 and 2010 approximately 25,000 and 31,000 t of tuna was sold in the local markets for domestic use. Averagely, 60-70% of the landed tuna is processed into loins or canned mainly for export (MOFA 2012).

The Marine Fisheries Management Division (MFMD) and the Marine Fisheries Research Division (MFRD) of the Fisheries Commission manage the industrial fleets according to the Ghana Fisheries Act, 625. All industrial vessels are registered and these division renews the licenses annually.

2.2.2 Semi industrial/Inshore fisheries

Fishing in this subsector is done with locally built wooden vessels ranging between 8 and 37 m in length and fitted with inboard engines of up to 400 hp. The vessels are multipurpose and are used for both purse seining and bottom trawling. They operate as purse seiners during the upwelling periods (major period July-September and minor upwelling season December-January) and switch to bottom trawling for the rest of the year (FAO 2004). However, bottom trawling is only allowed in waters beyond the 30 m depth. Due to their ability to preserve fish at sea using ice, fishing trips usually vary between three and five days. The species caught in this subsector include seabreams (mainly *Pagellus bellottii*, *Pagrus caeruleostictus* and *Dentex canariensis*), snappers (*Lutjanus sp*), red mullet (*Pseudupeneus prayensis*), cassava fish (*Pseudolithus senegalensis*), burrito (*Brachydeuterus auritus*) and groupers (*Epinephelus aeneus*) (FAO 2004). In the early 80's catches were relatively high (Figure 6) and catches peaked in 1986 at 22,000 t but fell to about 7,400 in 1989. Since then production has not recovered again.

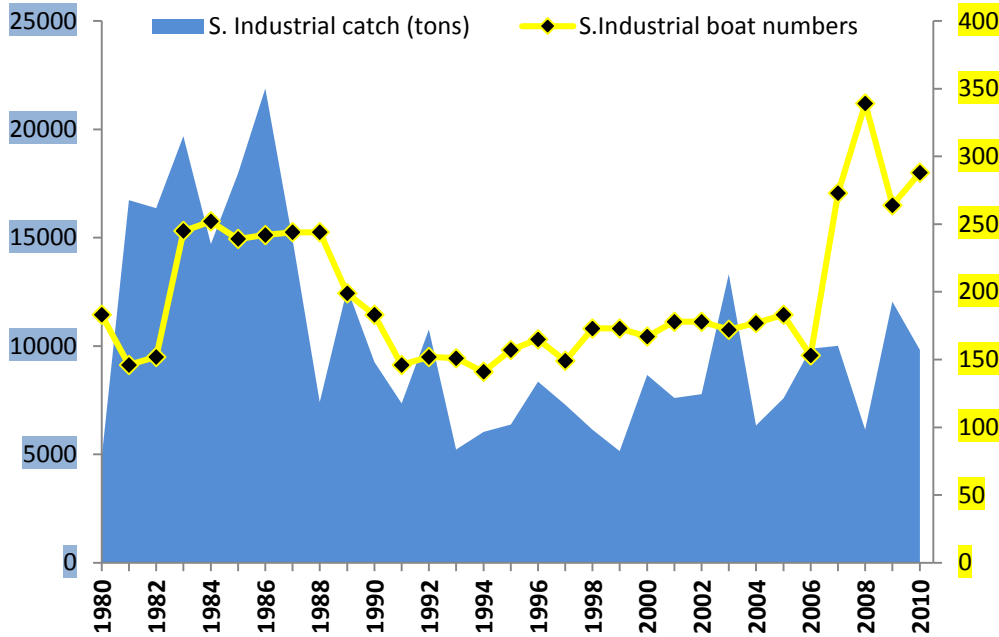


Figure 6: Annual catches of Semi-industrial fishery with their relative boats numbers from 1980-2010.

The fall in the catches subsequently resulted in a decrease in the number of boats from 242 to 146 in 1986 and 1991 respectively. Number of boats were stable until 2006 when the number increased from 153 to 339 in 2008 with a relatively lower catches. The inshore sector together with the trawlers will likely be significantly reduced after implementation of a phase reduction plan from the on-going West African Regional Fisheries Program (WARFP). This subsector is registered and licensed. Renewal of licences is done by the regional fisheries directorates in which they operate, that are the Greater Accra, Central and Western regions.

In the last decade, there has been a significant increase in Ghana marine capture fisheries in terms of the amount of effort applied. This has resulted in overcapacity and overfishing raising concerns about the management and regulation of Ghana's marine fishing industry (World Bank 2009).

It is worth mentioning that one of the major challenge/limitation arising from fisheries management in Ghana is the issue of fish data collection and management, this is evident in fish data comparison with the FAO from 1986-2010 (Figure 7).

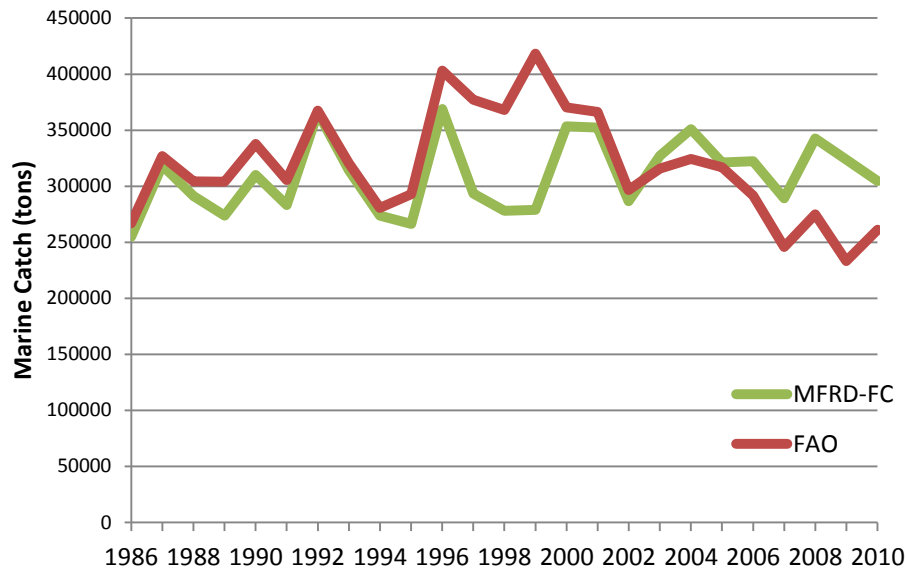


Figure 7: Variations in marine catch data from FAO and MFRD 1986-2010.

Significant among these data is the catch difference of about 100,000 t in the years 1998 and 1999 and 50,000 t in 2008-2010. However, for the purposes of this work, data collected from the MFRD and MFMD will be used although most are unpublished.

3 MARINE ARTISANAL FISHERIES SUBSECTOR

The artisanal fisheries subsector is the most important with respect to volume of fish landed. Although there are fluctuations in the catches (Figure 8) due to seasonal variations, it contributes significantly not only to the marine catch but to the total national production.

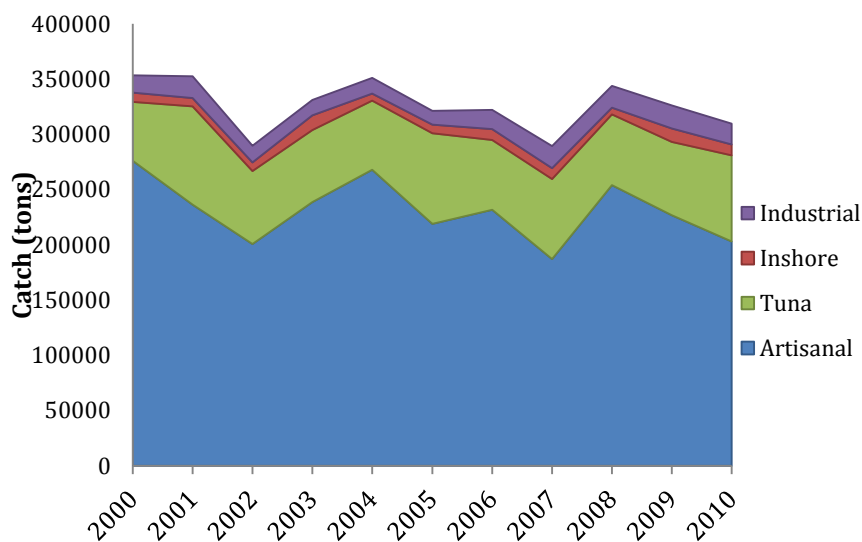


Figure 8: Fish Landings for the four marine subsectors from 2000-2010.

Over the last decade, this subsector produces averagely about 231,000 t per year and this accounts for approximately 65 to 75% of the national marine fish production. Artisanal fisheries catches mainly small pelagic fish species such as the

sardinellas, mackerels and anchovy which are of relatively low economic value as compared to the large pelagics landed by the tuna vessels and the demersals landed by the bottom trawlers.

3.1 Overview of marine artisanal fisheries

The 124,000 marine artisanal fishermen in Ghana with their 11,200 canoes operate from about 300 landing sites that are generally sandy beaches with no infrastructure and the improved landing facilities at Tema, Elmina and Sekondi/Takoradi. The fishermen use several types of fishing gears, including: purse seine nets, beach seine nets, set nets, drifting gillnet and hook and line (see appendix for details). About 50% of the dugout canoes are fitted with outboard motors with engine power of up to 40 HP (Armador *et al.* 2006). The artisanal sector by volume accounts for about 90% of total landings of the small pelagic resources annually (FAO 2007).

The purse seines and beach seines are used to catch mainly small pelagics while purse seines are also used to exploit adult sardinellas and chub mackerel during the upwelling periods. Other targeted species include burrito (*Brachydeuterus auritus*), red snapper (*Lutjanus fulgens*), grey snapper (*Lethrinus atlanticus*), mullet (*Pseudupeneus prayensis* and *Mugil spp.*) and ribbonfish (*Trichiurus lepturus*), *Parapenaeopsis atlantica* and *Penaeus kerathurus* (both adults and juveniles).

Hook and line canoes operate in deep waters of about 80 m on hard bottoms; some of these canoes carry ice enabling fishermen to preserve fish for about three days at sea. Their targeted species include: seabreams (mainly *Dentex gibbosus*, *Pagrus caeruleostictus* and *Dentex canariensis*) snappers (*Lutjanus fulgens*, *Lutjanus goreensis*) and groupers (*Epinephelus aeneus*).

Drift gillnets are used offshore and target principally large pelagics such as sharks (*Carcharhinus spp.*) tunas (*Thunnus albacares*, *Thunnus obesus*) sailfish (*Istiophorus albicans*) and swordfish (*Xiphias gladius*). Artisanal gears are also used to exploit molluscs and crustaceans.

The Lagos motorized canoes are specialized for hook and line fisheries. They are fitted with insulated containers to preserve on-board high valued fish under ice. These canoes are equipped with electronic fish finding devices such as echo sounders (FAO 2007). Most of the catch landed by this subsector is consumed locally, as boiled, fried, smoked, grilled, salted or dried.

Women are active in the marine artisanal fisheries sector where they are strongly involved in post-harvest activities but not in fishing. They use traditional processing methods and trade domestically and in neighbouring countries. Some small and medium scale enterprises export smoked products to Africans living in Europe and USA. This trade is an important source of income and therefore of power. Women are also involved in micro credits scheme under which they lend money to fishermen in times of needs, leading to a strong relationship between the women and the fishermen (Tetteh 2007).

3.1.1 Major Challenges in the Artisanal Sector

According to Ghana's Fisheries Act 2002, Act 625, Section 52, it states

“52. (1) A person shall not use a canoe for fishing in the fishery waters unless a licence has been issued for the canoe for the purpose of fishing. (2) A fishing licence shall not be issued for a canoe unless the canoe (b) has been registered with the Commission through the District Assembly of the area where it is to be used; and (c) bears the markings of identity allocated to it by the Commission”.

The FC indicated in its 2010 annual report that a pilot program to register and emboss registration numbers on 1,000 canoes in the Western, Greater Accra, Central and Volta regions was completed in 2010. Despite the on-going activities to register canoes and issue fishing licences to fishermen, Ghana's artisanal fisheries are open access compromising management efforts.

Ghana's marine fishing activity is influenced annually by two upwelling seasons (major and minor) and this accounts for the variations/fluctuations in the annual catches (MOFA 2012).

The trend in the fish landings can be appreciated when the number of canoes is taken into consideration. Only three national surveys have been done to estimate the number of canoes operating in the history of the marine artisanal fishing sector (Table 1). For the rest of the years estimations were obtained from the MFRD and MFMD.

Table 1: Number of operational canoes from 1980 to 2010.

	1980	1983	1986	1989	1992	1997	2001	2004	2010
No. of Canoes	8,472	6,938	8,214	8,052	8,688	*8,895	*9,981	*11,219	12,125

*Numbers enumerated during canoe frame surveys in the indicated years

The trend in the survey years shows increasing number of canoes (Figure 9). There was an increase of over 26% within eight years (1997-2004). Comparatively, catches within these years were relatively same showing slight decrease.

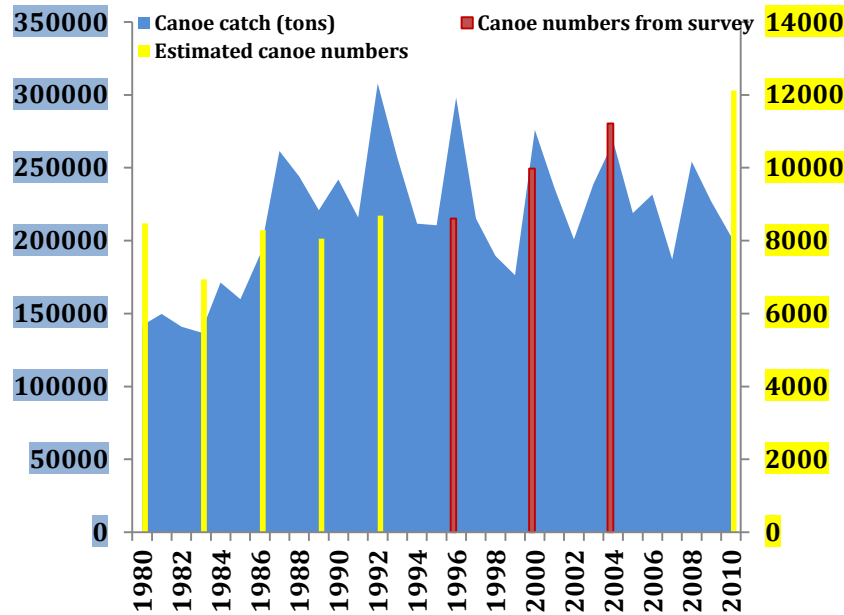


Figure 9: Annual canoe landings with of number of canoes from 1980-2010.

Currently, the number of operational canoes is estimated to be over 12,500 while catches are in decline.

Due to the low management and monitoring in this sector, boat building is not regulated. The WARFP project seeks to control the number of canoes by calling for a freeze in the sector after all operational canoes have been registered.

According to the MFRD, this increase in the number of fishing fleet results in over-capacity and over exploitation of fish stocks and ultimately reduces profits and viability of the industry (Figure 10).

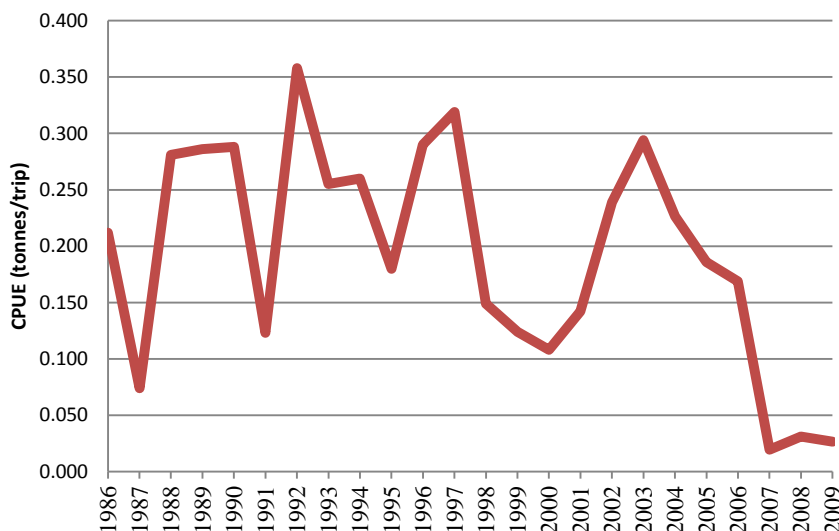


Figure 10: Decreasing CPUE in Artisanal fisheries from 1986-2009.

The decreasing catch per unit effort (CPUE) in this sector indicates how over-capacity leads to over-exploitation and subsequently decreases profitability. Over the last ten years, the average CPUE has fallen by one third (World Bank 2011).

Another issue of major concern is the use of bad fishing practices; such as the use of light, dynamite and undersized mesh net in some of the coastal regions. The Fisheries Commission attributed the reduction of the artisanal fish production from 226,755 t (2009) to 222,659 t (2010) to the use of light, which is a prohibited fishing method. In the Fisheries Regulation 2010 (L.I. 1968) Sections 11 (1),

"A person shall not within the fishery waters of this country (a) use any fishing method that aggravates fish by light attraction, including use of portable generator, switchboard, bulbs beyond 500 watts or bulbs whose cumulative light intensity attracts fish, and long cable to facilitate light production or any other contrivance for the purpose of aggregating fish by light, (c) use explosives, obnoxious chemicals and any other prohibited fishing methods which render fish more easily caught".

Despite the availability of laws and regulations regarding this sector (Fisheries Act 2005 and Fisheries Regulation 2010), enforcement is a challenge resulting in the management being ineffective. According to the World Bank (2011), the root cause of the declining profitability of Ghana's fisheries is as a result of the GoG inability to control access to the resources.

4 GLOBAL FISHERIES SUBSIDIES

Research studies conducted worldwide acknowledge that many global commercially valuable fish stocks are in decline (Khan *et al.* 2006, UNEP 2008). The bulk of commercially valuable fish stocks is either overexploited or near its limits. The effects this brings do not only affect the economies of regions (developed and less developed). It also affects the near commercial extinction of fish stocks has effects on the ecosystem and sometimes irreparable damage to marine resources (UNEP 2004, Schrank 2003). In 2003, it was estimated to affect about 200 million people who depend on the fisheries as a source of employment (directly and indirectly) and those that rely on the fisheries as a relatively cheap source of protein (Schrank 2003).

4.1 Overcapacity, overfishing and fisheries subsidies

At the core of this overcapacity and overfishing crisis is a range of governmental policies that have increased production and trade in fish, including direct and indirect subsidies to the fishery sector. Fisheries subsidies can potentially be harmful to fish stocks by contributing to overcapacity (where capacity refers to vessels, gears and labour and how all these are put to use) and overfishing, particularly in the absence of effective management (UNEP 2004, and Khan *et al.* 2006). Fisheries subsidies contribute (stimulate) to overcapacity and overfishing in two macro ways (Khan *et al.* 2006);

- i. Subsidies that reduce the cost of fisheries operation both in terms of capital and operational cost provides an incentive for fishers to increase their catch and

- profit, with an aggregate impact to further stimulate effort and compound resource overexploitation problems
- ii. Revenue enhancing subsidies makes fishing enterprises far more profitable even when the fishery resources are in decline.

In the presence of effective management, fishing subsidies can also contribute to the achievement of sustainable fisheries if rightly designed and effective precautions are put in place (UNEP 2004).

Subsidies to the fisheries sector in both developed and developing countries have existed for hundreds of years. In the late eighteenth century, Scotland was subsidizing its herring and whale fisheries. In the nineteenth century, North Atlantic fishing nations and Japan began subsidizing their fisheries with more modern vessels to enable increase their harvest from international waters like other nations. In the 1950s and 1960s, more nations subsidised heavily their boat-building industry because the more subsidies you gave, the more fish you got. By the middle of the twentieth century, more governments were supporting their commercial fishing through conversion of fishing fleets to powered ships. Also, the replacement of oar and sail vessels, as well as through direct capital grants, loans and assistance for major port improvements (Chen 2010, Sumaila and Pauly 2006).

Fisheries subsidies first came onto the international agenda in the 1990s, following studies conducted by the FAO, UNEP, WWF and the World Bank, among others. The studies revealed a significant level of subsidization and suggested strong links to fisheries depletion (UNEP 2008).

Although a lot of discussions and reviews on fisheries subsidies have been done, fisheries subsidies remain a delicate and complex issue (Schrank 2003). Explaining, it is delicate because governments (both developed and less developed nations) consider having valid reasons for introducing their subsidies and thus “subsidies are what each member nation considers them to be”. As a result of this, eliminating subsidies becomes a highly local political issue and as such no nation would want others intruding on its domestic policies (Schrank 2003).

In explaining the complexity of Fisheries subsidies, Schrank (2003) claims that there is no agreement even on what a subsidy is, or how subsidies can be measured and on how the effects of subsidies can be measured. Adding that in the policy realm, there is no agreement on when subsidies are useful and when they are harmful. Part of the reason for the lack of agreement is the complexity of the problem of evaluating the effects of subsidies on the sustainability of fish stocks, ecological (environmental) sustainability, socioeconomic development, international and internal trade. Part of the reason for lack of agreement on such basic issues as the definition of a subsidy is that since subsidies are now being targeted for elimination, it may be politically unwise to admit that a policy implies a subsidy Schrank (2003) and UNEP (2004).

4.1.1 Definition of Fisheries Subsidies & Classification

Although there is no one accepted definition on what fisheries subsidy is, fisheries subsidies are provided for generally three reasons (Khan *et al.* 2006). Namely;

- i. To support and develop local fishing industry;
- ii. To protect employment and to improve income distribution in fishing communities;
- iii. To manage the marine environment

In defining fisheries subsidies, World Trade Organization (WTO) Agreement on Subsidies and Countervailing Measures (SCM) explains that a subsidy exist if there is a “direct or potentially direct transfers of funds from governments to firms or individuals (e.g. grants, loans, loan guarantees, equity infusions), government revenue foregone (e.g. tax waivers or deferrals), government provision of goods and services, other than infrastructure, at less than market prices, and government support of prices and incomes. Adding that to be a subsidy, the action must confer a benefit on the firm or individual, and it must be specific to an industry or group of industries” (Schrank 2003).

The SCM Agreement addresses two separate but closely related topics, WTO (2013). These are; a) multilateral disciplines (rules) affecting whether or not a subsidy may be provided by a member; and b) the use of countervailing (mitigating) measures to offset effects caused by subsidized imports. Thus, WTO SCM Agreement focuses on global subsidies “other than infrastructure” that impact (positively or negatively) trade mainly import and export. Concerning fishery subsidies, there have been limited notifications to the WTO in terms of “the amount of subsidies reported, the range of subsidies covered, and the quality of information provided “as stated by (Sumaila & Pauly, 2006) from (WWF 2001).

Following the FAO Expert Consultation in 2000, Westlund (2004) defined fisheries subsidies as government actions or inactions outside of normal practices that modify (by increasing or decreasing) the potential profits by the fisheries industry in the short, medium or long-term and classified fisheries subsidies in four main areas;

1. Direct financial transfers – Such as investment grants (to purchase vessels or for modernization), grants for safety equipment, vessel decommissioning programs, equity infusions, income guarantee schemes, disaster relief payments, price support, direct export incentives, etc.
2. Services and indirect financial transfers – Examples are investment loans on favourable terms, loan guarantees, special insurance schemes for vessel and gear, provision of bait services, indirect export promotion support, inspection and certification for exports, specialized training, extension, ports and landing site facilities, payments to foreign governments to secure access to fishing grounds, government funded research and development programmes, international cooperation and negotiations, fuel tax exemptions, investment tax credits, deferred tax programmes, special income tax deductions, etc.
3. Regulations – On import quotas, direct foreign investment restrictions, environmental protection programmes, gear regulations, chemicals and drugs regulations, fisheries management, etc.
4. Lack of intervention – Which includes free access to fishing grounds, lack of pollution control, lack of management measures, non-implementation of existing regulations, etc.

These classifications were proposed in the FAO's Guide for Identifying, Assessing and Reporting on Subsidies in the Fisheries Sector and were subsequently used by Khan *et al.* (2006) in their paper on 'Fuel subsidies to fisheries globally: Magnitude and impacts on resource sustainability'.

According to the Organization for Economic Cooperation and Development (OECD) subsidies, financial support, economic assistance or government financial transfers are the most commonly used names for payments that governments provide to the fisheries sector. Here, eight program classifications are recognized: (i) management, research, enforcement and enhancement; (ii) fisheries infrastructure; (iii) investment and modernization of vessels and gear; (iv) tax exemptions; (v) decommissioning of vessels and license retirements; (vi) expenditures to obtain access to other countries EEZs; (vii) income support and unemployment insurance, and (viii) other government financial transfers as expressed in Khan *et al.* (2006) (OECD 2000).

In defining subsidies UNEP (2004) analyses and summarizes fisheries subsidies of eight basic kinds. However, the detailed classification is shown in appendix 2:

1. Subsidies to fishing infrastructure (construction of port facilities);
2. Management services (monitoring and surveillance, management-related research);
3. Subsidies to securing fishing access (government-to-government payments that cover significant portions of the cost of access to foreign fishing grounds);
4. Subsidies to decommissioning of vessels (vessel or license retirement);
5. Subsidies to capital costs (grants, loan guarantees, or tax incentives encouraging fleet renewal or modernization);
6. Subsidies to variable costs (subsidies on fuel, bait, insurance, or other operating costs);
7. Income supports (special unemployment insurance or "lay up" payments)
8. Price supports (government market interventions to guarantee a minimum price on fish products).
- 9.

Using these classifications, the UNEP assessed their potential impact on fish stock using two major variables (UNEP 2004): a) level of fleet capacity expressed as "overcapacity, full capacity or less than full capacity" and type of management regime categorized broadly as "open access, catch control and effective management" regimes. This study concluded that five categories of fisheries subsidies specifically (subsidies to fisheries infrastructure, subsidies for access to foreign waters, subsidies to capital costs, subsidies to variable costs, and price support subsidies) can generally be considered harmful to fisheries resources. For the purposes of this study, more highlight will be on subsidies to variable costs which includes fuel subsidies on Ghana's marine artisanal fisheries which has an open access type of management.

Khan *et al.* (2006) and Sumaila *et al.* (2010) also classified and summarized fisheries subsidies into three broad categories. These are, (i) "beneficial or Good" (ii) "capacity-enhancing or bad" and (iii) "ambiguous or ugly subsidies" with twelve program types. Detailed classification is given in Appendix 3.

This categorization was done based on economic theory adapted from Munro and Sumaila (2002). In this theory, the economist views the fishery resource as natural

capital. As such, fishery resources in a particular region can be regarded as a portfolio of natural capital assets capable of generating a stream of economic benefits (both market and non-market) to society over time.

Thus if “natural capital is renewable then one can within limits engage in ‘investment’ in the natural capital assets, such as refraining from harvesting and allowing the resource to rebuild to a biological optimum. Similarly, one can also engage in ‘disinvestment’ in the natural resource, through activities such as biological and economic overfishing that take the fishery resource away from its optimal use” (Khan *et al.* 2006, Sumaila *et al.* 2010).

A. Beneficial or Good subsidies; these are subsidies that contribute to investment in the natural capital assets by maximizing economic rent to social optimum. This is done through management and law enforcement activities and other activities that seeks to improve/develop the fishery resources. These include;

- Fisheries management programs and services
- Fishery research and development.

These activities provide information such as on stock sizes and estimates the vessel capacity needed for high CPUE. It benefits the industry by making fishing profitable. It also ensures food security for nations.

B. Capacity Enhancing or Bad subsidies are subsidy programs that lead to disinvestments (reduction) in natural capital assets once the fishing capacity develops to a point where resource exploitation exceeds the Maximum Economic Yield (MEY). Includes,

- Fuel Subsidies;
- Foreign access agreements;
- Boat construction renewal and modernization programs;
- Fishing port construction and renovation programs;
- Fishery development projects and support services;
- Marketing support, processing and storage infrastructure programs.
-

Khan *et al.* (2006) explain with fisheries economics theory that in an open access fisheries like in the case of Ghana’s marine artisanal fisheries, where fishing cost is assumed to be proportional to fishing effort, effort will continue to increase even though revenues per unit of effort are declining, and that ultimately revenues will decline until they equal costs.

C. Ambiguous or Ugly subsidies on the other hand are subsidies that lead to either investment or disinvestment in the fishery resource. Impacts of these subsidies can be either positive or negative on the fisheries resource. Examples includes;

- Fisher assistance programs;
- Vessel buyback programs; and
- Rural fishers' community development programs.

Although subsidies in this classification may be ambiguous, they are not necessarily ugly since they aim at alleviating poverty and improving livelihood however, effects from these subsidies are sometimes undetermined/unknown. Thus, for the purposes of this work the ‘ugly’ will be replaced with ‘uncertain’.

In all the definitions and classification of subsidies mentioned above, the variations can be attributed to the purpose for which the various analyses of subsidies have been undertaken. They basically seem to be explaining the same things that is; a transfer/support/incentive from one entity (usually government or Overseas Developing Agencies ODAs) to another entity (fishing industry) so as to influence (increase or decrease) the activity of the fishing industry.

Although many classifications have been as mentioned above, only Khan *et al.* (2006) and Sumaila *et al.* (2010) have categorised subsidies given in the fisheries sector under three broad names, which is to a greater extent subject to debate.

Distinguishing between the classifications mentioned above, the WTO Agreement on Subsidies and Countervailing Measures becomes an exception in that it does not consider the provision of infrastructure (in this case fishing harbour/ports facilities, fish landing sites) as a subsidy. This is because national governments and ODA's consider harbour constructions generally as developmental projects, which have economic and social effects rather than a subsidy.

As in the case of Mozambique, the improvement of Maputo Fishing Port facilities could help solve the poverty problem associated with fishers resulting from "high post-harvest losses". Also this rehabilitation would increase the declining industrial fleet (there had been reduction from 353-263 from 1999-2000) thus, foreign exchange earning will be improved from the export of catches landed by the sector (Nyambir 2002).

The criteria for defining infrastructure subsidy should include whether the fishing industry is the primary beneficiary and whether a reasonable user fee is paid for the services provided by the infrastructure (UNEP 2004).

4.2 Global Fisheries Subsidies

In 1992, the FAO estimation of the total global fisheries subsidies as US\$ 54 billion was criticized to be too high. Milazzo's (1998) estimation of US\$ 14-20 billion was also generally assumed to be on the low side by most fisheries practitioners. In bridging this gap, studies done by Khan *et al.* (2006) and Sumaila *et al.* (2006) estimated that the sum of non-fuel and fuel subsidies (US\$ 26 billion and 6.3 billion respectively) ranges between US\$ 30-34 billion. This estimation was based only on the global marine capture fisheries and for year 2000. Recent study by (Sumaila *et al.* 2010) re-estimates total global fisheries subsidies for 2003 as between US\$ 25 and 29 billion.

From these studies, it estimated that bad subsidies contributed the highest (about 65%) in both year 2000 and 2003 and these are provided by both developing and developed nations (Figure 11).

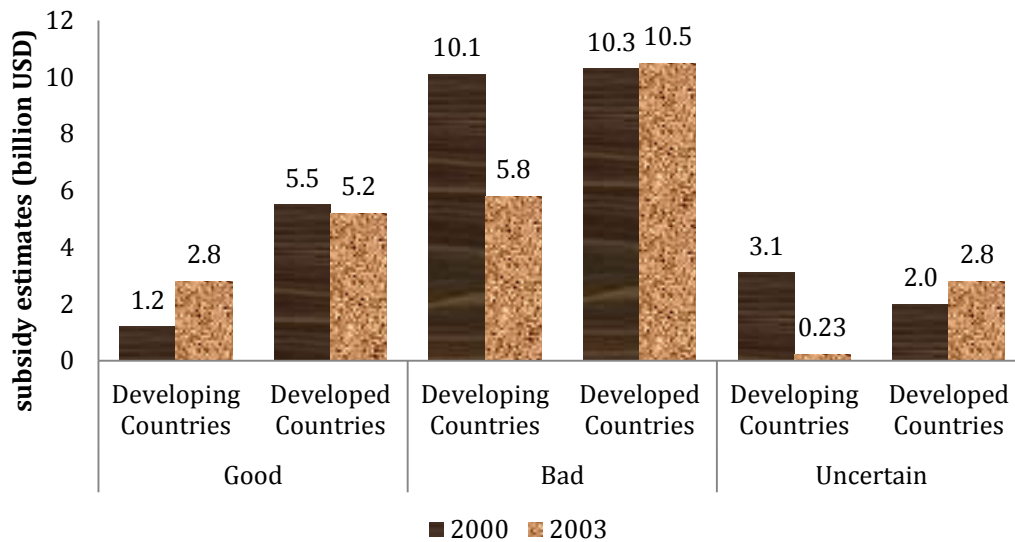


Figure 11: Fishery subsidy estimates by two categories. Source; Khan *et al.* (2006), Sumaila *et al.* (2010) and Sumaila *et al.* (2006).

Developed nations give more with regards to good subsidies such as towards fisheries management and research as compared to developing nations which includes Ghana. In estimating global fisheries subsidies by geographical regions in 2003 (Figure 12), Asia provided the largest amount of about US\$ 15.7 billion, with more than 65% in the bad subsidies category. Europe the next highest, provided about US\$ 4.6 billion, with about 50% in the bad subsidies category as well. Africa (which includes Ghana) provided the least of about US\$ 780 million with about 60% in the bad subsidy category (Sumaila *et al.* 2010).

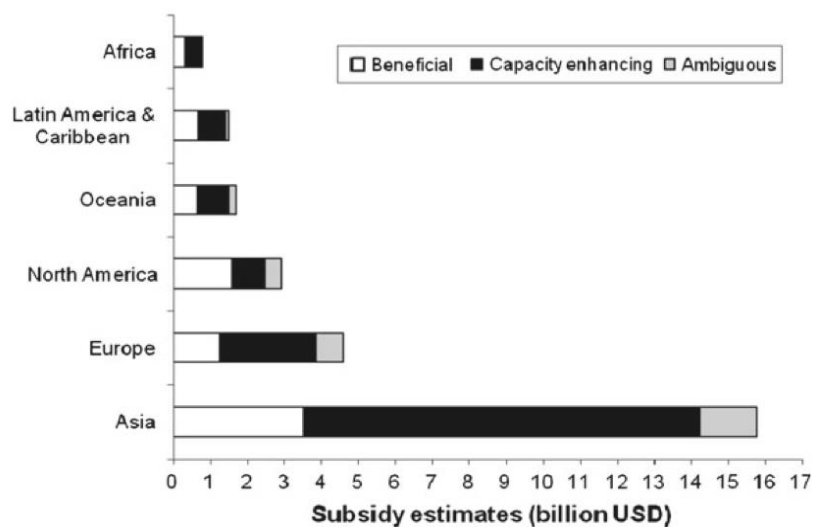


Figure 12 Subsidy amounts by major geographic regions for 2003. (Sumaila *et al.* 2010).

It is interesting to note that although the African region provided the least of global fisheries subsidies in 2003, it is the contrast when the subsidy intensity (the ratio of subsidy estimates to the value of catch/value) is measured across the different geographical regions (Figure 13). Asia which contributes about half of the global catch/value is about the lowest when subsidies are expressed on a per dollar of landing scale.

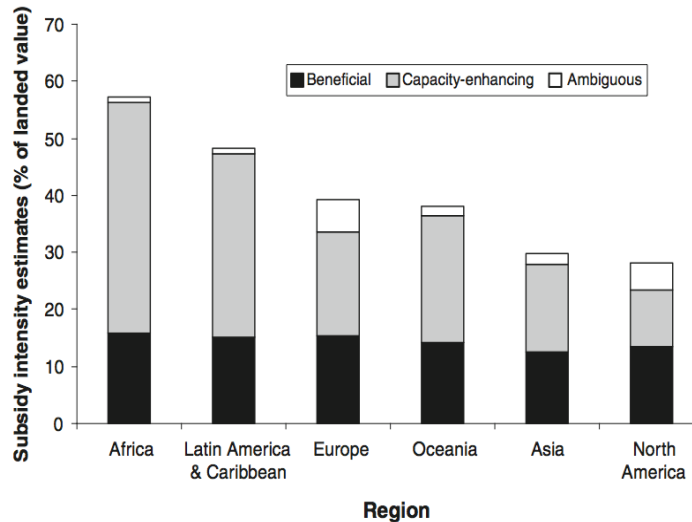


Figure 13: Subsidy as a percentage of total landed value for major geographic regions in 2003. Source (Sumaila *et al.* 2010).

Africa is considered to provide the highest of about 65% due to relatively smaller catch/values (Sumaila *et al.* 2010).

Most important is the fact that bad/capacity enhancing subsidies (which includes fuel subsidy) constitutes majority of government funding in almost all the regions apart from North America.

From literature (Sumaila *et al.* 2010), capacity enhancing subsidies contribute to over capacity and over exploitation which eventually leads to reduction in natural capital assets (Figure 14). There is also high economical cost arising from fuel and foreign access agreements subsidies. In 2003, governments in Africa provided/received more funding towards activities which leads to reduction in natural capital assets.

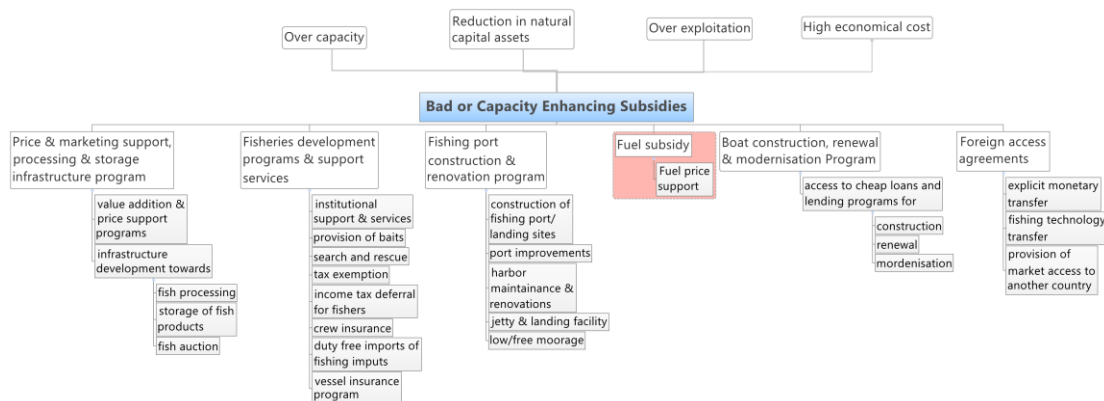


Figure 14: Capacity enhancing subsidy programs and their effects.

Africa’s total bad subsidies for 2003 estimated at US\$ 466 million. Namibia provided the highest (US\$ 72 million) which is about 15%. Ghana on the other hand contributed about 5% by providing about US\$ 21 million (Sumaila *et al.* 2010). For the purposes of this study a detailed review on fuel subsidy will be given.

4.3 Fuel Subsidies

The fisheries fuel subsidies, which is referred to either as subsidies to variable costs (UNEP 2004) or as a Capacity Enhancing/Bad subsidies is defined here as the difference between the price per litre of fuel paid by fishers and the national price applied to fuel purchases for other uses in a given economy (Sumaila *et al.* 2010).

Fuel constitutes a substantial component of the cost of fishing although the proportion varies with the type of fishery. In some commercial fisheries, cost of fuel can reach up to 60% (of operational cost) like in Hong Kong or about 50% in Senegal's motorised canoe fleets (Sumaila *et al.* 2008). In Ghana, the cost of fuel in the marine artisanal sector has not been determined.

Only about three studies have been done in an attempt to estimate the total funds provided by governments as global fuel subsidies in the marine capture fisheries. These studies however, were done and reviewed by the same authors, which can be a form of limitation. Global fuel subsidy in the fisheries is estimated to be in the range of US\$ 4.2–8.5 billion per year and compose about 15-30% of total global fishing subsidies, (Sumaila *et al.* 2008, Sumaila *et al.* 2010).

Thus confirming estimation for year 2003 to be US\$ 6.4 billion (Sumaila *et al.* 2010). Of this total, developed nations provided the highest of about 76% (US\$ 4.88 billion) and the rest was provided by developing nations.

Although the fuel subsidy is generally considered as bad, its impact on fish resources depends on the size of the subsidy, the management systems and the bio-economic parameters in the fishery which includes fleet capacity and efforts (UNEP 2004).

In an effective management system which allocates individual fishing quotas, the impact of fuel subsidy on fish resources will be much lower compared to an open access system like Ghana's marine artisanal fishery. This is because the number of fishing trips is more likely to increase and subsequently lead to over fishing.

5 GHANA'S FISHERY SUBSIDIES

Subsidies to the fishery sector in Ghana date back to the late 1940's when after the creation of the Fisheries Department, two surfboats powered with 15 horse power engines were imported. Other subsidies introduced include, a boatyard in Sekondi, later the introduction of outboard motors in early 1958 which led to the subsidization of fuel to be used in these engines in 1990. The improvement enabled fishermen to reach fishing grounds quickly and have access to grounds, which were earlier on not accessible (Antwi 2006).

Although not many studies have been done in Ghana's fisheries subsidies, Sumaila and Pauly (2006) identified and classified subsidies given in Ghana's marine fisheries under three broad types namely the beneficial or good subsidy, the capacity-enhancing or bad subsidy and the ambiguous or ugly subsidy.

A re-classification on (Sumaila and Pauly 2006) has been done here to incorporate all other existing subsidies given in Ghana's fisheries industry.

Ghana like all other fishing nations provides subsidies towards fisheries management and research. Additionally, some programs undertaken are funded by (ODA's) such as the FAO (Table 2). In 2003, support towards management and research was about US\$ 11.3 million, much higher the amount in 2000, which was US\$ 7.1 million, Sumaila and Pauly (2006) and Sumaila *et al.* (2010). These amounts constituted about 16% and 32% of total amounts provided in 2000 (US\$ 46 million) and 2003 (US\$ 33 million) respectively. Comparatively, according to OECD 2004 report, Iceland for example invested 45% of its total subsidies funds (US\$ 53 million) towards fisheries management and research in 2000 (Sumaila and Pauly 2006).

Natural capital assets require effective management. Cost involved to effectively manage fisheries resources is very high. Considering the diverse nature and size of Ghana marine fisheries, the absence of a vessel monitoring systems and the weak research unit poses a threat to the fish resources (Table 2).

Table 2: Good or Beneficial subsidies in Ghana's fisheries.

Types of Subsidy		
A. Beneficial or Good Subsidy	Examples	Source
1. Fisheries management programs and services;	Resource surveys by the MFRD with support from the FAO and ICCAT.	(Sumaila and Pauly 2006)
	Fridtjof Nansen resource surveys.	(Sumaila and Pauly 2006)
	FAO assistance in the implementation of the Code of Conduct for Responsible Fishing.	(Sumaila and Pauly 2006)
	Introduction of the Vessel Monitoring System (VMS) in 2005, currently this system is not in use.	FC
	Government of Ghana (GoG) in September 2008 signed a US\$ 40 million contract with Poly Technologies Incorporated (PTI) for two patrol vessels funded by MOFA dedicated to fisheries to enhance national fisheries Governance.	(Defence Web Co. 2012)
	Establishment of Marine police and the Enforcement unit to assist in monitoring and enforcement of the fisheries laws and regulations.	MOFA
2. Fishery research and development	DFID funded fisheries research with the National Resources Institute.	(Sumaila and Pauly 2006)
	Towards fisheries development, the University of Cape Coast (UCC) secured an amount of GH¢ 13 million (US\$ 6.89 million) for the construction of the National Fisheries College, which is in progress.	(Ghana Business News 2012)

Investment to fisheries management expenditure in Ghana is very low. Compared to OECD countries whose average expenditure is 17% of revenue from the sector, Ghana's expenditure is about 0.2% of total income from the fishing industry (World Bank 2011).

On the other hand, funding to bad subsidies constituted about 69% and 63% of the total amount of subsidies provided in year 2000 and 2003 respectively. Apart from subsidies to foreign access agreements, Ghana supports all the capacity enhancing programs (Table 3).

Funding towards capacity enhancing subsidies is also from two sources. Internal funding is from the GoG while external is from ODA's. Particularly from GoG is the support towards fuel subsidies and fishing inputs such as out board motors and fishing nets for the artisanal sector.

Currently, only one uncertain subsidy programme is supported in Ghana (Table 4). Funding towards this sector is comparatively low. Sumaila & Pauly, (2006) estimated that about US\$ 7 million was invested into this subsidy in 2000. Although this is on the higher side, in 2003, amount reported was relatively low of about US\$ 810,000 (Sumaila *et al.* 2010).

5.1 Marine Artisanal Fisheries Subsidies

A detailed description on subsidies given in Ghana's marine artisanal fisheries will be given for the purposes of this work. The Fisheries Act 2002, Act 625, Sub-part III, Section 51 states the requirements for the development of the artisanal fishing;

“51. (1) The Commission shall in the implementation of its functions under this Act take such action as it considers necessary to protect and promote artisanal and Semi – industrial fishing including the following: (a) the provision of extension and training services; (b) the registration of artisanal fishing vessels and any class of related fishing gear; (d) the promotion of the establishment and development of fishing, processing and marketing co-operative societies; (e) promotion of the development of artisanal fishing landing facilities”.

Thus, due to the importance of the artisanal fisheries sector and its contribution to the economy and development of the country, the GoG provides direct and indirect support towards the development of the fishery sector. However, it is sometimes difficult to draw a line between its responsibility as a government and as an actor developing the fishing industry using subsidies as a tool for that (Antwi 2006).

Table 3: Capacity Enhancing or Bad Subsidies in Ghana's marine fisheries.

Types of Subsidy		
B. Capacity Enhancing or Bad Subsidies	Examples	Source
1. Fuel subsidy	Subsidised premix fuel to fishers (marine artisanal and inland fishers only)	FC
2. Boat construction renewal and modernization programs;	Fishery sector support through fishing input with a total grant of US\$ 5 million from China.	(Sumaila and Pauly 2006)
	Fishing vessel restructuring program partly funded by DANIDA and GoG	(Sumaila and Pauly 2006)
	Dutch grant of 500,000 Euros towards fiberglass boats.	(Sumaila and Pauly 2006)
3. Fishery development projects and support services;	Development projects funded by various Overseas Development Agencies (ODAs).	(Sumaila and Pauly 2006)
	World Bank fisheries sector's capacity and institutional projects, example on-going West African Regional Fisheries Project.	(Sumaila and Pauly 2006) and FC
4. Fishing port construction and renovation programs;	Infrastructure development subsidies towards the Albert Bosomtwe Sam Fishing Harbour Complex funded by Japan.	(Sumaila and Pauly 2006)
	In 2008, the Ministry of Fisheries secured a loan of US\$ 148 million from the Chinese Government to construct two additional fishing harbours and 12 modern landing. N.B these are yet to materialise.	(Modern Ghana 2008)
5. Price & Marketing support, processing and storage infrastructure programs	UNDP pilot project sponsorship towards smoke fish exporting strategy.	(Sumaila and Pauly 2006)
	EU funded initiatives with the fish export sector with storage facilities etc	(Sumaila and Pauly 2006)
6. Fishery development projects and support services. Such as Tax exemption programs;	GoG subsidizes about 40% towards fishing inputs (fishing nets, out board motors).	(Sumaila and Pauly 2006)
	All agro-industries and agro-processing (including fish farming, fishing companies & processing) have five years tax holiday.	Ghana Internal Revenue Service
	Ghana as a member of the ACP countries enjoys privileges such as zero tariffs on exports of fish and fishery products to developed countries.	(Antwi 2006)
	Currently there are no tariffs on fish imports and exports, except a small levy of US\$ 1 and 3 per ton for import and export respectively, which is a contribution to the Fisheries Development Fund.	FC
	All importations of agricultural inputs (including fisheries inputs) are not to be taxed.	Ghana Revenue Authority

Table 4: Ambiguous or uncertain subsidies given in Ghana's marine fisheries.

Types of Subsidy		
C. Ambiguous or Uncertain Subsidies	Examples	Source
1. Rural fisheries community development programs	The Integrated Coastal and Fisheries Governance program led by the Coastal Resources Centre, World Fish Centre and Ghana based Friends of the Nation (FON) funded by USAID which covers 6 coastal districts in the Western Region.	(USAID 2011)

The subsidy identified is limited to one of the four coastal regions.

In identifying and classifying subsidies given directly to Ghana's marine artisanal fishery using Sumaila and Pauly (2006) method, it can be put under one broad heading called capacity enhancing or bad subsidies. It can also be classified into three of the eight different groups adapted from the UNEP (2004). These are:

Fishing port construction and renovation programs/Subsidies to fishing infrastructure: Artisanal fishers operate within the two main fishing harbours; which are the Tema and the Albert Bosomtwe Sam Fishing Harbour which was constructed in 1999 at Sekondi, using a Government of Japan loan of US\$ 13 million. The harbour is equipped with a cold store, an ice-making plant, offices, a jetty for canoes and a net drying area (FAO 2004).

Tax exemption programs/Subsidies to capital costs: fishers and fish processors receive low rate loans through commercial and rural/community banks. Also fishers receive at reduced prices outboard motors and selective fishing nets at reduced prices. In April 2012, the government announced a subsidy on the price of 40 HP outboard motors from GH¢ 7,500 to GH¢ 4,900 to help boost the fishing season which is expected in late June that is a price reduction from around US\$ 4,000 to US\$ 2,644 per motor. Also 13 fishing communities, comprising 2,000 artisanal fishermen, were provided with echo sounders, a fishing device that made it easy for the fishermen to locate shoals of fish at sea (Daily Graphic 2012).

Fuel subsidy programs/Subsidies to variable costs: GoG provides special fuel called "premix" at subsidized prices to the artisanal fishing sector.

In the 1970s and the 1980s, Ghana was faced with a lot of challenges such as political instability, fuel shortages (when available the prices was high) which lead to general economic difficulties in the country (Akyeampong 2007) and (Atta-Mills *et al.* 2004). Although some political stability was achieved in Ghana early 1990s, the poor economic conditions persisted (Atta-Mills *et al.* 2004). This probably affected the motorised artisanal fishers who had to combine it with the high cost of fueling thier canoes. As a result the artisanal fishing communities pleaded with the then Provisional National Defence Council (PNDC) government to come to their aid (although this is not from literature, source is from interaction with fishers and FC). This situation confirms that in some cases, "the decision to provide fuel subsidies is influenced more

by political and social concerns, rather than on the sustainability of fisheries resources (Sumaila *et al.* 2008).

The intervention is what led to the introduction of the premix fuel subsidy. Thus, between 1990 & 1992, a heavily subsidized product called the premix fuel was introduced only in the artisanal sector as a relief on their operational cost so as to improve their activities. Management of this fuel is done by the National Premix Committee whiles at the community level it is done by the Landing Beach Committees (LBC's). For administrative purposes, community development programmes as well as the welfare of the fishermen, the LBCs are permitted to put slight margins on the sales price.

Premix fuel is an in-country blend of fuel and it has similar properties to gasoline but with an octane number of 82 (Chase Petroleum Ghana Limited). Interview with a stakeholder indicates that for every litre of premix fuel, there is 29 part petrol and 1 part marine gasoline. The Tema Oil Refinery, in August 2009, changed the colour of premix fuel to blue, when it became obvious that some persons were diverting the heavily subsidized commodity meant solely for the fishing communities, for their selfish gains (Ghanaian Journal 2010).

The GoG, since 1992 has invested huge amount of resources into the premix subsidy program annually. In 1992, while all fuel consumers were purchasing at a pump price of US\$ 0.88/litre, fishers enjoyed a subsidy of about 72% while purchasing at US\$ 0.27/litre (Horemans 1996).

According to Directorate of Fisheries the GoG spent a total of US\$ 35.3 million (143 million litres) as subsidy on fuel between 2001 and 2004 at an average subsidy of US\$ 0.25/litre for artisanal fishery. Thus there is a subsidy of approximately 63% on litre of fuel sold to the fishermen (Antwi 2006).

In 2011, the FC reported that the GoG supplied 45.3 million litres of premix fuel through the various LBC's in the marine artisanal sector with subsidy on a litre of premix fuel about GHC 0.50 (US\$ 0.26). Currently, a gallon (4.5 litres) of premix fuel is sold at US\$ 1.32 – 1.42 that is (US\$ 0.29-0.32/litre) whilst the pump price for a gallon of petrol is US\$ 4.77 that is (US\$ 1.06/litre). Thus, for every litre of premix fuel, there is a subsidy of approximately 70%.

5.2 Current Issues on Premix Fuel Subsidy

Although a lot of governmental reviews/discussions have been done on this topic, the main concentration has only been on issues such as how to control the allocation, distribution & sale of the premix fuel. Additionally, reviews on the delivery system, ensuring the artisanal fishers (core beneficiaries) receive the product on time, in sufficient quantities and at approved National Petroleum Authority prices has been made.

An example is a finding of a committee set to investigate issues of premix fuel in 2009. The committee found that; the allocation, distribution and sale of premix fuel, has been challenged by numerous problems (MOFA 2011). By the end of year 2008, the original idea had been diluted to the extent that (MOFA 2011):

- There was a proliferation of premix fuel sale points owned by individuals rather than the fisher groups. Premix fuel sale points grew from 128 in 2001 to about 900 in 2008. There was uncontrollable corruption in the premix fuel administration;
- There was rampant diversion of the product from the intended destinations;
- There were shortages to the disadvantage of the fishers;
- Premix was used to adulterate regular petrol to the detriment of motorist;
- There was general dissatisfaction among fishers, particularly with the mode of sale of the product.

Although the finding above aims at improving the current situation in the premix fuel distribution and also seeks to address issues of corruption, accountability and transparency however, a greater concern and attention must be on the impact of this fuel subsidy.

Impacts of subsidies in small scale, particularly artisanal fisheries, deserves more detailed analysis on (ecological, social and economic impacts) as a contribution to the international discussions and negotiations on fisheries subsidies including the WTO (UNEP 2004).

Khan *et al.* (2006) also made recommendation for further studies and these are; a) To assess the impact of subsidies on resource exploitation and sustainability in different fishery sectors, i.e., artisanal and industrial fishing sector b) To examine the impact of subsidies on industrial profits and c) To investigate the impact of subsidies on exports, food sufficiency and livelihoods in artisanal fisheries.

Considering the importance of Ghana's marine artisanal sector, the challenges mentioned above and the amount of fuel subsidy being invested by the GoG into the subsector it becomes necessary that a comprehensive study/research be carried out.

6 METHODOLOGY

The main source of data used for this project was a combination of both individuals and corporate/institutions journals, articles and other publications. Only few interviews and discussions were done with some experts. Discussions with two economic experts were held in Iceland. Officials from Ghana's FC and an individual stakeholder (reliable and knowledgeable source) associated with Ghana's marine artisanal fisheries were consulted.

The Logical Framework Approach (LFA) adapted from the European Commission was the main tool used for the analysis. The LFA is considered as a formal procedure used within project cycle management for project planning and management. The LFA has proven useful in research studies and projects as well, like it is in this work. It involves four stages, which are identification, formulation, implementation and evaluation & auditing of a project but this work will focus on the identification stage. In this process, the problem is identified with the aid of the LFA and it is analysed from the existing situation. The problem is then examined by the relevance in solving it and identification of further potential objectives and strategies is designed.

The LFA, which is associated with results based management helps analysing and organising information in structured way. This raises important questions and identifies weaknesses so that “decision makers can make informed decisions based on their improved understanding of the project rationale, its intended objectives and the means by which objectives will be achieved”. Simply put, the LFA serves as an ‘aid to thinking’.

This tool has two main parts; the LFA, which is the analytical process involves stakeholder analysis, problem analysis, objective analysis and the strategic analysis. The Logical Framework Matrix is the second part and the final step which analysis the objectives and how they will be achieved. However, this project will only focus on the analytical part due to time constraints and the Logical Framework Matrix will not be included.

Stakeholder Analysis – which is the first step identifies individuals, groups or institutions that may have a relationship (directly and indirectly) with the project. These are further grouped into key, primary and secondary stakeholders in order of how they are/will be affected by the project. Although this analysis can be done with secondary data sources, consultation with experts is need for much detailed analysis.

Problem/Situation Analysis – is closely linked to the stakeholder analysis. It identifies the negative aspects of an existing situation. After that the cause and effect relationship between the focal problem is established. Identification of the “right ” problem although sometimes difficult (major limitation) is very important. A clear problem analysis serves as a bases for the development of relevant and focused project objectives.

Analysis of Objectives – is a technic to describe the future situation that will be achieved once the identified problems have been solved. It identifies potential solutions by turning the negative aspects of a given situation to a positive one. This technic illustrates the means to an end relationship. Furthermore, it becomes a base for strategic evaluation and selection of projects to work on.

Analysis of Strategies – is the final step of the analytical stage of the LFA. This analysis involves selecting the strategy(ies) which will be used to achieve the desired objectives.

Using information from literatures, these analyses were done in consultation with supervisors from Iceland and some key stakeholders from Ghana.

Most secondary data used where obtained from the MFRD and MFMD are unpublished with some inconsistencies, thus, considered as limitation to this project. Also, the LFA, which is a participatory approach, was done with very few stakeholders due to distance barrier.

7 ANALYSIS

7.1 Stakeholder Analysis

This was undertaken to identify all groups that are impacted or affected (directly/indirectly) by the fuel subsidy taking into consideration their respective roles and interests, concerns and capacities. Considerations were also given to vulnerable groups such as the women (processors) and children (Table 5).

Key stakeholders were identified as the marine artisanal fishermen (with motorised canoes), FC, National Premix and Landing Beach Committee. The fishermen are people who maintain their livelihood mainly through fishing. They benefit directly from the fuel subsidy since it reduces their operational cost. The premix committees manage the distribution and sales of the subsidised fuel. Management of the fisheries resources is done by the FC.

Primary stakeholders include fish traders and processors who are mostly women. They earn their livelihood by buying ‘subsidised’ fish for supply mainly to the domestic market and subsequently to the consumers (individuals, hotels, exporters etc.) who are considered as secondary stakeholders.

7.2 Problem Analysis

The focal problem associated with the premix fuel subsidy in Ghana’s marine artisanal sector was identified as the ‘bad’ influence of fuel subsidy. This situation has been rooted/caused by other negative problems in areas of social, economic and environmental (Figure 15). See appendix for details.

Negative social factors, which are inefficient management of the subsidised fuel, lack of transparency in the premix committees and negative political influence have resulted in smuggling of the fuel to neighbouring countries and high corruption in the sales of the subsidized fuel.

Economically, inefficient use of government funds to subsidize fuel prices does not reflect the economic cost of fuel. One of the immediate consequences of subsidy implementation is the increase in fuel consumption. According to Horemans (1996), after the subsidy was introduced in 1992, the relative amount of fuel per ton of fish increased from 1.68 litre/ton of fish caught in 1991 to 3 litres in 1992 and subsequently to 5.32 litres in 1993. Additionally, between 1991 and 2004, the number of motorised canoes increased about 38% (4,631 to 6,405). This indicates that fuel is wastefully used and fishing intensity is increased with repercussion on the environment.

Subsidising over 6,400 canoes act as a drain on GoG finances and restrain economic development. This subsidy amounts can be used in improving other sectors such as health and education, which will likely have a higher social yield.

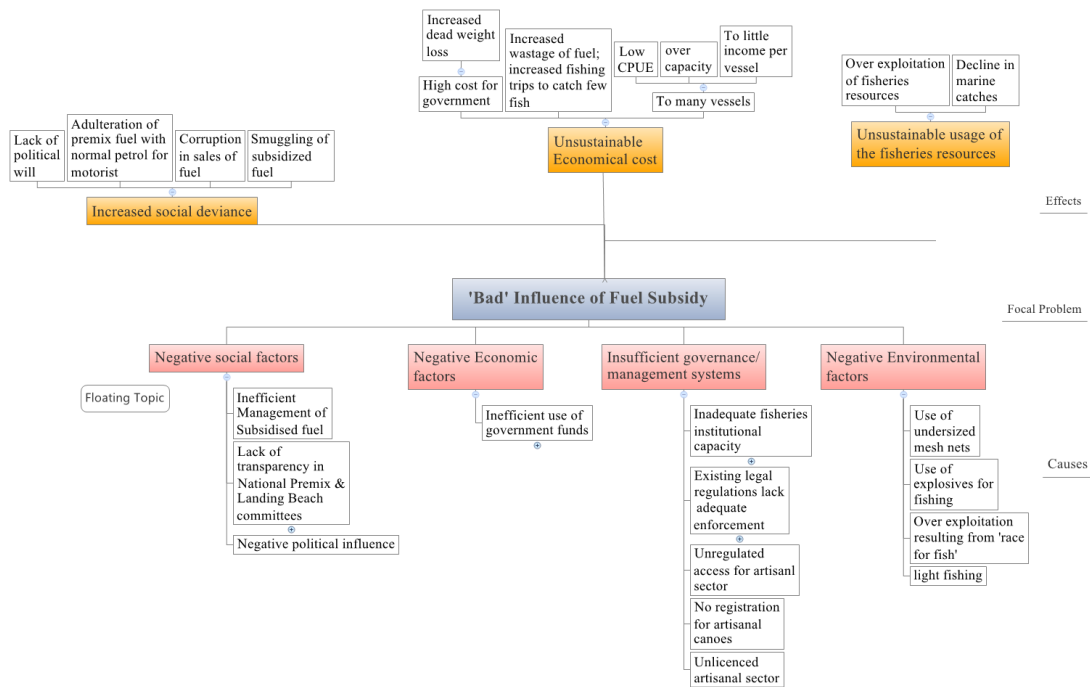


Figure 15: The problem tree showing the cause and effect of bad influence of the fuel subsidy.

In an open access fisheries like Ghana, which is as a result of insufficient governance and management systems over capacity and over exploitation already exist. As such, maintaining fishing efforts by giving subsidies only support unsustainable usage of the fisheries resources which leads to depletion of fish stocks. It also results in low catch per unit effort which reduces the income per vessel. These findings reflect the observations made by the World Bank (2011). It identified that the failure of the GoG to control access to the fisheries resources is the root cause of the declining profitability of the fisheries.

7.3 Analysis of Objectives

Here all the negative situations of the problem tree were reformulated into positive situations that are desirable and realistically achievable. As such the influence of the fuel subsidy will be improved in the presence of a sufficient governance/management systems and positive social, economic and environmental factors. This will subsequently sprout to decrease social deviance, improved cost and sustainable usage of the fisheries resources (Figure 16). See appendix for details.

Although negative behaviour of people cannot entirely be changed, individuals to a greater extent will be responsible in the presence of efficient management of the subsidised fuel. Penalizing social deviances will reduce smuggling and adulteration of the subsidised fuel. Transparency through accountability will reduce corruption in the sales of the fuel.

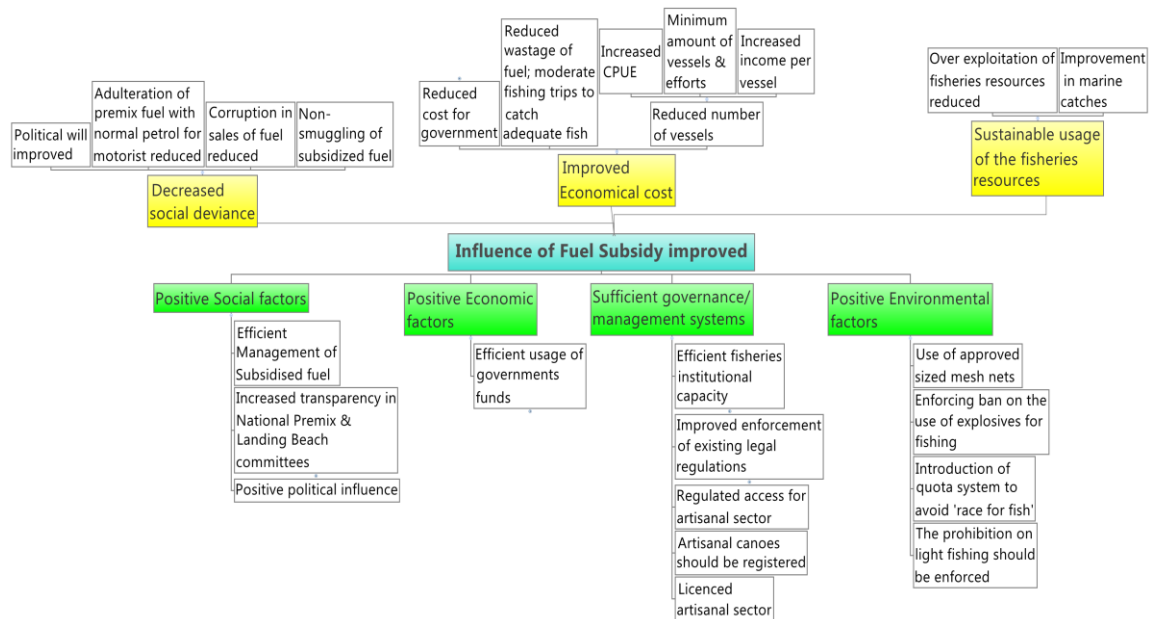


Figure 16: The analysis of objectives showing the means to an end by improved influence of subsidy.

The tragedy of the commons which is regarded as a major issue in the artisanal sector can be avoided by introducing a fishing quota system. This is possible in the presence of an efficient fisheries institutional capacity and active collaboration between fishers, managers and decision makers.

This project takes into consideration, that not all the objectives are immediately/easily achievable. However, due to the relatedness of the objectives, it was important to choose an objective which will contribute to institutional capacity building with a positive environmental impact and most importantly technically feasible.

7.4 Analysis of Strategies

In selecting a strategy to achieve the relevant and feasible desired objectives from the objective tree, the criteria proposed by European Commission (2004) was followed. These include:

- Expected contribution to key policy objectives, such as poverty reduction
- Benefits to target groups – including women and men, young and old, disabled and able, etc.
- Complementarity with other on-going or planned programmes or projects
- Financial and economic cost-benefit
- Contribution to institutional capacity building
- Technical feasibility
- Environmental impact

The sector objectives and policy framework which address some of the criteria was considered. A draft on Fisheries and Aquaculture Policy 2008 describes the vision for Ghana's fisheries sector as:

“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”.

This policy follows national development priorities and aims at reducing poverty through actions undertaken in this sector. Additionally, priority is given to gender equity, in this case, the fishers (men), the processors (women) and their dependents, including all other indirect stakeholders. The policy seeks to avoid over exploitation of fisheries and detrimental environmental impacts thereby promoting sustainability. Current challenges in the sector show that these priorities are in the opposite direction. The on-going West African Regional Fisheries Program (WARFP), which aims at improving the sustainable management of Ghana's fish and aquatic resources, was taken as a major criterion. This is due to the fact that the project addresses the issue of institutional capacity building, improved environmental impacts and poverty reduction to the benefit of stakeholders. Above all, it is technically feasible.

Guided by these, it was identified that sufficient governance/management system was the most relevant and feasible objective. This will subsequently result in positive environmental factors. Governance/management system in Ghana's fisheries can be sufficient in basically two ways; making the FC more efficient and improving the enforcement of legal regulations.

Although the WARFP project does not directly tackle fuel subsidies, by efficiently achieving some of the objectives identified, the influence of Ghana's fuel subsidy will be highly improved.

Two major components highlighted in the WARFP project, which will result in the desirable situation (sufficient governance/management systems and positive environmental factors), will be incorporated into this work. These are Good Governance and Sustainable Management of the Fisheries and reduction of illegal fishing (World Bank 2011).

Good Governance and Sustainable Management of the Fisheries will be achieved by strengthening fisheries management, which includes introducing fishing rights and ensuring sustainable exploitation through research activities. Additionally, fishing capacity and efforts will be aligned to sustainable catch levels.

Fisheries management will be strengthened through effective registration operation. To check the overcapacity problem all operation artisanal canoes will be registered and embossed with registration numbers. After this exercise, registry of new entrants will

not be allowed and this will be followed with issuance of fishing licences according to the Fisheries Act. This will control access, which will reduce the number of vessels and increase CPUE. The MFRD will adequately be equipped to carry out stock surveys which will aid in explaining factors associated with trends in fish catch and effort.

The second component, which is reduction of illegal fishing, will be done by strengthening monitoring, control and surveillance (MCS) of fisheries licensing and the existing fisheries regulations. According to the WARFP project, MCS activities will include the combination of vessel monitoring system (VMS), aerial surveillance and Inland and at-sea fisheries enforcement. The establishment of an effective MCS will contribute immensely to positive environmental factors, which will result in sustainable usage of the fisheries resources and subsequently increase catch and income. Effective deterrence will be put in place to ensure adequate compliance.

The WARFP project identified risks that could impact its objective; one is directly related to the artisanal fishers. That canoe fishers will not participate in registration and licensing efforts, nor recognize the benefits of controlled access to the fisheries from the perception that they will be taxed. However, this will be mitigated by design of the licenses, to act as transferable rights that would serve as capital assets for the fishers and also through communication.

Additionally, knowing the importance of the subsidized fuel to the canoe fishers, a 'conditional factor' could be introduced to registered canoes. This means ensuring that the fuel is only made available to fishers who have registered and licenced their canoes.

8 CONCLUSION AND RECOMMENDATIONS

This study identified and analysed the effects of fuel subsidy in Ghana's marine artisanal fisheries sector.

Subsidies given directly to Ghana's marine artisanal sector were identified as capacity enhancing subsidies. These include Fishing port construction and renovation programs, tax exemption programs and the fuel subsidy program, which was the main area of study.

Ghana's premix fuel subsidy, which was introduced in the early 1990's as GoG social and economic intervention to help artisanal fishers continue to exist long after the reason for its existence has passed. Existing negative factors/situation in areas of social, economic, environmental and insufficient governance and management systems has rooted/caused the 'bad' influence of the fuel subsidy. These influences have resulted in the fuel subsidy being inefficient and making the subsidy to support bad behaviour.

Although it is considered politically impracticable to eliminate this bad or capacity-enhancing subsidy, its influence can be improved. These negative situations when improved will result in decrease social deviance, improved economical cost and sustainable usage of the fisheries resources.

Through strategic considerations, sufficient governance and management systems was identified as the most relevant, easy and feasible objective to achieve. This improvement will result in positive environmental factors and subsequently reduce over exploitation of the marine fisheries resources and improve catches.

The on-going WARFP project which aims at improving the sustainable management of Ghana's fish and aquatic resources, adequately provides solution to this objective in two of its project components. These are Good Governance and Sustainable Management of the Fisheries and Reduction of illegal fishing.

By investing significantly into building the capacity of Ghana's Fisheries Commission and reducing illegal fishing, not only will the fisheries resources be sustainably managed but also the influence of the fuel subsidy be improved. Thus, confirming that fishing subsidies can also contribute to the achievement of sustainable fisheries if rightly designed and effective precautions are put in place. Most important is the fact that this investment contributes directly towards good or beneficial subsidies.

9 RECOMMENDATION

The WARFP project which adequately tackles the objective sufficient governance / management system; it does not address the issue of quota system. Although the fishing rights will be given to the artisanal fishers, in the absence of quotas the ‘race for fish’ is likely to continue. As such consideration must be taken in this respect.

It is recommended that overtime adequate measures must be put in place to eliminate the fuel subsidy since it will become unsustainable in terms of economical and resource.

Suggestions for further research:

- To examine the impact of the fuel subsidy on the profits of Ghana’s artisanal fisheries.
- To investigate the impact of subsidies on livelihoods in artisanal fisheries and Ghana’s food sufficiency/security.

ACKNOWLEDGEMENT

I would like to express my gratitude to my supervisors Dr. Ögmundur Knútsson and Mr. Helgi Gestsson, with the assistance of Mr. Bjarni Eiriksson from the University of Akureyri for their technical and professional guidance, criticism and comments during this project.

The Director of the United Nations University – Dr. Tumi Tomasson, Mr. Thor Asgeirsson, Mary Frances – Davidson and Sigríður Ingvarsdóttir for their support and guidance while developing the work. I would like to thank the board of UNU-FTP for offering me the opportunity to participate in this course and funding my studies. I would also like to thank the fellows of UNU-FTP 2012/13 for their support and making our time here in Iceland memorable.

My gratitude goes to the Director of the Fisheries Commission for nominating me for this program. Also, my appreciation goes to Mr. Paul Bannerman and Richner of the Fisheries Commission for providing me with all the crucial information which I need to finish this work. Thanks to Dr. Amadou Tall, for his professional guidance and critics while reading my work. Finally, I would like to thank my family for their never-ending love and moral support.

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APPENDIX

Appendix 1: CANOE FRAME SURVEY REGIONAL /
DISTRICT SUMMARIES.

Source (Armador *et al.* 2006)

DISTRICT	FISHING VILLAGE	LANDING BEACH	PURSING NETS	BEACH SEINE	LINE	LOBSTER NETS	OTHER SET NETS	ALI NET	DRIFTING NET	ONE MAN CANOE	CANOES	TOTAL MOTORS	FISHERMEN
KETU	13	21	49	152	0	0	28	2	0	0	231	145	8894
KETA	16	42	50	232	0	0	202	18	3	0	505	178	8488
SUB-TOTAL V/R	29	63	99	384	0	0	230	20	3	0	736	323	17382
DANGBE EAST	19	22	384	91	3	11	9	23	27	0	548	436	12463
DANGBE WEST	12	16	132	4	193	112	59	7	11	14	532	579	6151
TEMA	3	7	113	5	219	7	27	86	35	7	499	206	2419
ACCRA METRO ASSEMBLY	10	18	502	45	110	0	98	240	8	0	1003	852	12460
GA	4	5	54	13	61	38	25	8	0	0	199	71	1675
SUB-TOTAL G/R	48	68	1185	158	586	168	218	364	81	21	2781	2144	35168
EFUTU-EWUTU-SENYA	2	7	229	40	71	0	65	37	0	0	442	260	9427
GOMOA	7	19	112	15	103	15	315	156	29	30	775	349	7287
MFANTSEMAN	21	35	320	76	25	200	657	110	31	151	1570	541	14347
CAPE COAST	2	14	55	49	30	38	255	40	0	0	467	226	3673
ABURA-ASEBU-KWAMANKESE	1	8	11	4	0	0	103	166	1	0	285	191	1420
KOMENDA-EDINA-EGUAFO-ABREW	10	20	204	14	51	43	393	201	2	3	7	530	8149
SUB-TOTAL C/R	43	103	931	198	280	296	1788	710	63	184	3546	2097	44303
SHAMA-AHANTA EAST	10	16	239	32	42	173	371	283	255	29	1424	891	11109
AHANTA WEST	20	24	33	16	1	210	230	163	88	187	928	361	4393
NZEMA EAST	19	33	86	62	24	11	121	178	28	109	619	425	7669
JOMORO	26	27	24	53	0	13	46	137	2	0	275	164	4195
SUB-TOTAL W/R	75	100	382	163	67	407	768	761	373	325	3246	1841	27366
GRAND TOTAL	195	334	2597	903	933	871	3004	1855	520	530	10309	6405	124219

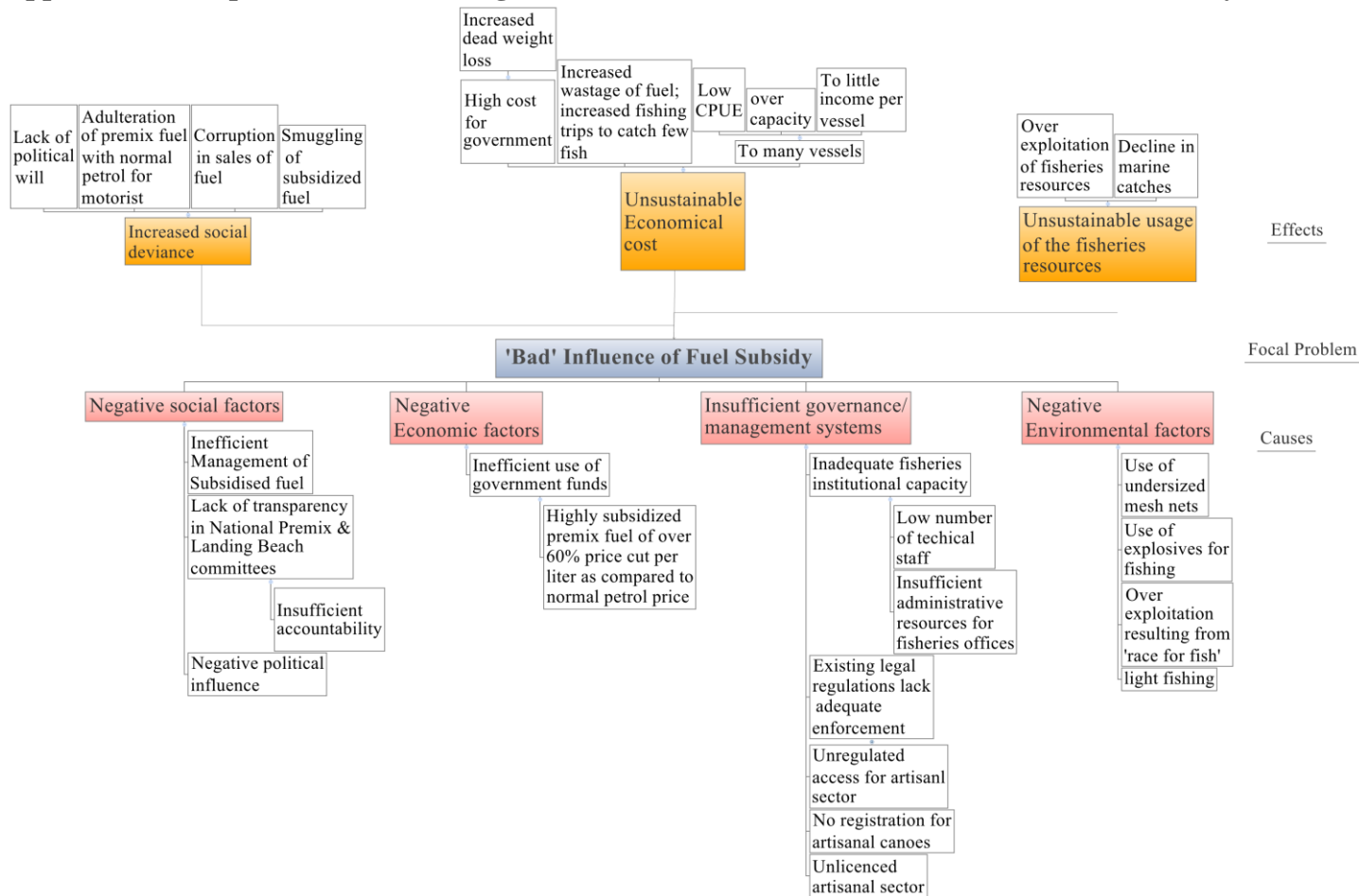
Appendix 2: Subsidy Classification According to (UNEP 2004).

Type of Subsidy	Examples
1. Subsidies to fishing infrastructure	<ul style="list-style-type: none"> -Harbour facilities and moorage – provided free or at low rates of moorage for fishing fleets - Fishing port infrastructure enhancement, such as dredging - Support to producer organizations – institution infrastructure
2. Management services and research	<ul style="list-style-type: none"> - Stock enhancement programmes, including fish habitat improvements, release of juveniles - Fisheries Management Programmes, including monitoring and surveillance - Fisheries Enforcement Programmes, including prosecuting of offences - Programmes to assess fish stocks - Programmes to identify and develop new fisheries - R&D to develop new fisheries technologies - Protection of Marine areas - Aid for fish re-stocking - Artificial reefs.
3. Payments for access to other countries' waters	Payments of part of the costs of access to foreign fishing waters in conjunction with international fishing access agreements.
4. Subsidies for decommissioning of vessels and licence retirement	<ul style="list-style-type: none"> - Payments for the permanent withdrawal of fishing vessels - Payments for the permanent withdrawal of fishing permits or licenses.
5. Subsidies to capital costs	<ul style="list-style-type: none"> - Grants and below-market loans for fleet renewal and modernization - Accelerated depreciation that reduces taxation of vessels and fishing gear - Development grants for fisheries enterprises - Aid to shipyards which supports fishing boat construction - Reduction of the financial burden of equipment needed for deep-sea fishing - Loan guarantees - Loan restructuring.
6. Subsidies to variable costs	<ul style="list-style-type: none"> - Fuel tax exemption or rebates for vessels - Income tax deferral for fishers - Vessel insurance and reinsurance programmes - Subsidies to reduce bait prices - Support of baiting stations - Extension services consultant advice for fishers - Compensation for damaged gear - Transport subsidies - Interest deduction for liquidity loans - Support to energy saving devices on board fishing vessels.
7. Subsidies to income	<ul style="list-style-type: none"> - Payments beyond the norm for other sectors to supplement the incomes of fishers and fisheries workers - Payments targeted specifically for unemployed fisheries workers and going beyond social insurance in other sectors - Payments for independent fishermen who are idled by restrictions on fishing - Payments to vessel owners for temporary cessation of fishing.
8. Price support subsidies	<ul style="list-style-type: none"> - Government support to ensure minimum prices or to keep domestic prices above world prices - Withdrawal of fish from the market to maintain minimum prices.

Appendix 3: Three broad classifications of global subsidies (Khan *et al.* 2006, Sumaila *et al.* 2010).

Types of Subsidy	Examples
A. Beneficial or Good Subsidy	
A.1 Fisheries management programs and services;	<ul style="list-style-type: none"> a. monitoring, control and surveillance programs, b. stock assessment and resource surveys, c. fishery habitat enhancement programs, d. implementation and maintenance of MPAs, and e. stock enhancement programs
A.2 Fishery research and development	<ul style="list-style-type: none"> a. fishery frame surveys, b. oceanographic studies, c. fishery socio-economic studies, d. fishery planning and implementation, e. Setting fishery information systems, creating database and statistical bulletin supportive of fishery management plans, f. Setting up marine protected areas (MPA) and reserves.
B. Capacity-Enhancing or Bad Subsidy	
B.1 Boat construction renewal and modernization programs;	Lending programs below market rate and geared toward fishing vessel construction, renewal and modernization such as loan guarantees, restructuring and other lending programs.
B.2 Fishery development projects and support services;	Provision of institutional support and services, such as the provision of baits, and search and rescue programs Tax exemption programs such as; income tax deferral for fishers, crew insurance, duty free imports of fishing inputs, vessel insurance programs, and other economic incentive programs
B.3 Fishing port construction and renovation programs;	<ul style="list-style-type: none"> a. provision of fish landing site infrastructures, b. port improvements for fishing fleets, c. harbour maintenance, jetty and landing facilities and d. low or free moorage for fishing fleets
B.4 Marketing support, processing and storage infrastructure programs;	<ul style="list-style-type: none"> a. export promotion, b. value addition and price support, c. infrastructure investment programs toward processing and storage of fishery products and fish auction facilities
B.5 Fuel Subsidies	Fuel price support program
B.6 Foreign access agreements	<ul style="list-style-type: none"> a. explicit monetary transfer; b. the transfer of fishing technology, and c. the provision of market access in another fishing country
C. Ambiguous or Ugly Subsidy	
C.1 Fisher assistance programs;	<ul style="list-style-type: none"> a. income support programs; b. unemployment insurance; c. worker adjustment programs, and d. fisher retraining, and other direct payments to fishers
C.2 Vessel buyback programs; and	<ul style="list-style-type: none"> a. permit buybacks, and b. license retirements

Appendix 4: The problem tree showing the cause and effects of bad influence of the fuel subsidy.



Appendix 5: The analysis of objectives showing the improved influence of the fuel subsidy.

