Ecological and Livelihood Change in Fishing:

A Study of Artisanal Capture Fisheries and Cage-Aquaculture on the Volta Lake of Ghana.

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List of Acronyms

FAO	Food and Agriculture Organization
MOFA	Ministry of Food and Agriculture
MOFAD	Ministry of Fisheries and Aquaculture Development
WRC	Water Resources Commission
VRA	Volta River Authority
EPA	Environmental Protection Agency
FC	Fisheries Commission
SRLA	Sustainable Rural Livelihoods Approach
GSS	Ghana Statistical Service
GNADP	Ghana National Aquaculture Development Plan

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Abstract

The focus of this research was to find out the effects of cage-aquaculture on indigenous small-scale artisanal fisher people on portions of the Volta Lake in the Eastern Region of Ghana. This objective was structured into three sub-questions. The first question sought to determine the extent to which the enclosure of space for cage-aquaculture activities conflicted with other users of the Volta lake. The second question also sought to establish the relationship between cage-aquaculture and ecological change. The third question sought an explanation as to whether policy changes for aquaculture development contributes to the sustainability of rural fishing livelihoods.

In order to achieve this objective, qualitative interviews were conducted through a research assistant. The primary data was complemented with secondary data from published documents. A political economy and ecology perspective was used together with the Sustainable Rural Livelihood Framework for analytical purposes. The first findings of the study revealed that the effects of cage-aquaculture activities on other users of the lake extended beyond direct restriction of fishing activities to restructuring economic activities thus making rural people in the community vulnerable to external influence and exploitative relations. The second finding revealed that the relationship between cage-aquaculture and ecological change was influenced by political factors that established exploitative interactions with ecological systems. Finally, policies for the development of cage-aquaculture was seen to be worsened the structure of distribution of benefits and thus weakened the sustainability of rural fishing livelihoods.

Relevance to Development Studies

The study investigated the effects of cage-aquaculture on artisanal capture fisher people. The objective of this study helped in revealing the economic and ecological effects of such a top-down intervention on existing rural livelihoods. In so doing, this study reveals the extent to which developmental projects such as cage-aquaculture could impoverish rural fishing livelihoods when they are not properly researched and implemented.

This is relevant to development studies as to emphasizes the need to interact with target populations of aquaculture development for context-specific peculiarities for proper implementation.

Keywords

Livelihood, Ecology, capture fisheries, Cage-Aquaculture

Chapter 1
Introduction

1.1 Background

This research investigates the recent phenomenon of increasing fish farming activities along the Volta Lake in Ghana. Cage-aquaculture is being developed rapidly along the lake as a perceived solution to socio-economic challenges. The objective of which is for overcoming low fishing yields and alleviating rural poverty. Kassam and Dorward (2017) has noted that aquaculture is being promoted in Ghana by the State in collaboration with other development and donor agencies. The aim of which is to eradicate poverty and provide economic development. The State in coordination with other agencies both local and international is promoting cage- aquaculture across the country. Cage-aquaculture having been introduced in the year 2000 in the country, is spreading at an unusual rate as compared to other Sub-Saharan African countries (Kassam & Dorward 2017). The intervention is more widespread on the Volta lake, a water resource that is said to be one of the largest man-made lakes in the world. A lake that stretches from the southern to the northern part of the country and has many of its surrounding communities relying on it for their livelihood needs. In recent times, there appears be an expansion of cage-aquaculture activities on some parts of the lake and this is being done along with indigenous capture fishing activities. However, this changing trend seems to be breeding some form of tension between fish farmers and indigenous fishermen as well as other users of the lake, a tension which appears to be about the enclosure of space for cage-aquaculture activities. My intention is to investigate the assumption that cage-aquaculture is the solution to improving low fishing yields and for improved rural community livelihoods. The assumption appears to be based on a mainstream approach to promoting food security and rural development strategies. A careful analysis of the situation would be vital for the conflict resolution, ecological and rural livelihood protection.

1.2 Statement of the Problem

Fishing is considered to be the main occupation and livelihood activity for communities that live along the coast or other water resources including lakes, lagoons, rivers among others. These communities have long relied on their indigenous ways of capturing fish from water resources mainly for subsistence purposes and sometimes for trade. The local method of fishing involves the use of fishing nets, boats with paddles and more importantly were organized along cultural or communal labour. They generally organize labour into fishing groups with an allocation of boats to fish and share their fishing yield amongst themselves. The men and boys usually go fishing while the women and girls either prepare, preserve or sell the fish to other households. Access to the water resources were open to all members of the community but permission had to be sought from traditional authorities for new groups that do not belong to the community.

The scenario presented above shows a typical organization of fishing activities in Ghana prior to institutional and structural changes within the fisheries sector. It is important to establish that the fishery resources in Ghana are broadly: marine sources of the sea and inland fishery sources including lakes, rivers and lagoons (MOFA 2016). This research will however focus on inland fisheries, specifically; the Volta Lake of the country. The Volta lake is said to be one of the largest man-made lakes in the world. It serves a host of uses to various communities around it and beyond. Primarily, fishing is said to be the predominant livelihood resource for the communities especially in the Volta and Eastern regions of the country. Among its various uses are for hydropower electricity, transportation and for consumption.

However, in recent times, there has been an influx of caged aquaculture on water resources in the country and this can be traced back to interventions of the State as well as other international agents within the sector. Fish farming can be said to have begun in 1956 when the State started developing aquaculture systems out of irrigation systems in some parts of the country especially in the north (FAO 2016). This was coupled with the establishment of the nation's first ministry of fisheries and State Fishing Corporation to support the State's industrialization project (Kwadjosse 2009).

Presently, there appears to be tensions between indigenous fisher people and fish farmers that rely on the lake for their livelihood (Karikari & Asmah 2016). According to Karikari and Asmah, among a host of the constraints faced by fish farmers is the conflict they encounter with indigenous fisher people (2016). The conflict is squared on issues of access, ownership, property rights linked to fishing yields, ecological change and sustainability of rural fishing livelihoods. On one hand, the current trend of fish farming on the lake is said to restrict access to portions of the lake while altering the relations of production as well as the distribution of costs and benefits. On the other hand, aquaculture development is perceived as a solution to low fishing yields and hence food security as well as poverty reduction.

With much being argued by State actors in favour of aquaculture development for food security and poverty eradication purposes, there is the need to investigate the major points of interest on both sides of the spectrum, involving crucial elements of ecological and livelihood interest linked to rural fishing activities.

1.3 Justification and Relevance

This study aims to contribute to theory and policy. This thesis will contribute to the discourse on economic and ecological change in rural livelihoods, a contribution that is meant to redirect the focus of promoting sustainability of resources in isolation from peoples' livelihood needs to understanding the interdependences of peoples' livelihoods and resource control dynamics. This remains relevant to the field of social and development studies.

1.4 Research Questions

Main Question

What are the ecological-economic effects of inland cage-aquaculture on indigenous small-scale fisher people and how do they react towards it?

Specific Questions

- To what extent does enclosure of space on the lake for cage-aquaculture purposes conflict with other users of the lake?
- What is the relationship between cage-aquaculture and ecological change?
- How do political and economic changes in cage-aquaculture development contribute to sustainable rural livelihoods?

1.5 METHODOLOGY

The research is an empirical study that was conducted in the Asuogyaman district of the Eastern Region of Ghana through the services of a field assistant. A qualitative method of data collection was used for the collection of primary data. The need for a qualitative approach with both primary and secondary sources of data was important because the study is about ecological and livelihood change in an area with very little published information. This type of research is done in reference to historical and current information on the structural, institutional and ecological trend as well as interaction with people on their livelihood outcomes. The secondary sources of information include: policy briefs, legislative documents, scholarly articles and journals, books and other relevant published information.

1.5.1 Method

Stratified and non-random sampling techniques were used to determine 'informants' within the target population. According to O'Leary (2004) stratified sampling allows a researcher to break down the study population into various components to include representations of different groups. This is an important technique for the research because it enables for representations of fish farmers, artisanal fisher folk, State and traditional authorities in the data collected. Non-random sampling techniques of hand picking and snowball would also be adopted in the primary data collection process. This is because, as O'Leary (2004) states that, hand-picked sampling allows for selection with particular

characteristics of interest to the researcher such as politically motivated and critical subjects of study. Also, the snowball technique is used for objects of study that cannot be easily determined (2004). This technique was very useful because it enabled the researcher to get access to the defined populations that were not readily available.

This research is a case study and involves interviews and observation of the target population. The target population was fisher people in the Mpakadan community in the Asuogyaman district of the Eastern Region. A sample size of 25 was used in total from the target population but breaking it down, 10 fish farmers, 12 small scale artisanal fisher people and a representative each from the State and traditional authorities were interviewed. The interviews were semi-structured while the observation technique would a non-participant type. This means that some of the questions that were asked were prepared beforehand and others were follow-up questions during the interview and the researcher did not interact directly with sample population during the observation exercise. The interviews and observation data were captured through audio and video calls and recordings respectively with permission from the informants. This approach helped in noting down accurate and complete data.

The primary data were gathered through the help of a professional private researcher whom was recommended to me by a colleague. The researcher hails from the Upper West of Ghana and as such there were no existent biases in the selection of interviewees. The researcher also has experience in the collection of data for the Ghana statistical service, Malaria control agencies and assisting in the collection of data for university lecturers in Ghana. I maintained live contact with the researcher during the interviews using WhatsApp video calls and direct phone calls in order to ensure the reliability of data. The period of data collection lasted for ten days.

Secondary data were gathered by reviewing literature on the topic of economic and ecological change and livelihood strategies, aquaculture, capture or artisanal fisheries and other relevant literature on the subject. Sources of secondary data that were used also include: local and international development reports, journals, credible publications and local policy documents on aquaculture and rural development in Ghana. The analysis of qualitative data was done first of

all by transcribing the interviews, noting down the themes or patterns in responses thereby coding the data. The analysis was completed by synthesizing the theoretical and conceptual framework with empirical data collected.

1.6 Ethical Concerns and Challenges

The research was conducted in accordance with the ethical requirements of social science studies and that of ISS. Anonymity, transparency and confidentiality is being ensured. There was an establishment of mutually respectful relations between the researcher and participants. I tried to coordinate with authorities at ISS during the entire research process.

A major limitation was my inability to collect the primary data personally due to some social and financial constraints. The level of bias or competency which might have affected reliability of data collected through a third party was controlled with the use of technology for audio and visual support remotely. This involved the use of WhatsApp video calls and direct phone calls. I also experienced the challenge of language barrier and sought help from a third party in the field for accurate translation in order to understand and analyse the interviews. Another challenge is the limited content in published information on the topic and getting access to some local factual content. A major challenge was also the difficulty encountered in trying to interview the fish farmers because their managers prohibited them from granting interviews to us. This led to adjusting the sampling techniques in order to visit the homes of some fish farmers for interviews. There were also instances where the target population (both fishermen and fish farmers) were doubtful of our credentials so in such instances I provided proof of my letter of enrolment to the field assistant to present to them before the interviews were conducted. Another challenge was the unreliable nature of technological assistance and which interrupted a few of the interviews resulting in delays. It was also difficult to convince some fishermen and women to give up part of their schedule for interviews but this was overcome with the support of the chief of the area.

1.7 Organization of the Paper

This thesis is organized into five chapters. The first chapter presents the introduction and this includes: a brief background, statement of the problem, justification of the study, research questions and methodology. The second chapter covers the conceptual and analytical framework while the third chapter highlights the context of artisanal and cage-aquaculture in Ghana. The fourth chapter contains the presentation, analysis and interpretation of findings in the study. The fifth chapter serves as the conclusion of the study.

1.8 BRIEF LITERATURE REVIEW

This section reviews some of the relevant studies that have been conducted in the fisheries sector and on aquaculture in Ghana and other parts of the world. The review focuses on social, economic and ecological components of such studies while highlighting the relevance that is attached to political factors in the analysis of change in the sustainability of rural fishing livelihoods.

Brummett and Williams presented the evolution of aquaculture in the rural African context and in so doing suggested that the sector has not been performing well due to a number of traditional constraints (2000). These were phrased as social, economic and political constraints that hampered the performance of the sub-sector and one which is linked to the State to adopt modern economic growth models specifically in the control of water and fishery resources (2000). Similarly, Berg et al (1996), carried out a study on lake Kariba in Zimbabwe, in which they suggested that aquaculture development could be implemented successfully, if such economic decisions on the use of natural capital, were to be supported by local and social factors in order to promote long term instead of short term solution to prevailing ecological challenges. A study was also conducted in 1980 by Emmerson, on developmental challenges in artisanal fisheries in Asia. The findings revealed that artisanal fisher people often prioritized their livelihood needs over formal developmental interventions because they were more concerned about security in distributional outcomes. The author also suggested that the vulnerability of fisher people to new projects should be analyzed contextually (Emmerson 1980).

A number of authors including; Fujita and Bonzon have argued for a right-based fishery management approach in response to the challenges of declining fisheries (2005). They argued that for sustainability purposes, Designated Access Privilege (DAP) systems should be used to allocate access rights and quotas to different fishing communities and groups for sustainability purposes (2005). In their article, the problem of property in water, Campling and Havice

have challenged the notion that the creation of private property rights in fishery resources is the solution to the economic and ecological crises of fisheries and for food security (2014). The authors stress that, mainstream approaches hold the view that in the absence of property rights, open access to resources causes overexploitation of fisheries. They also argued that the creation of private property rights is a site of conflicts in the struggle over surplus value (2014). Veuthey and Gerber also analyzed the socio-ecological conflict between coastal populations and shrimp farmers using a political ecology perspective (2012), by focusing on the role of formal and informal institutions in regulating access and in their analysis of the complex power struggle, the found out that the introduction of capital separated the local producers from their original means of production thereby worsening their livelihoods.

Beveridge, Philips and Macintosh investigated the relationship between aquaculture and the environment in Asia (1997). In analyzing the socio-ecological sustainability of aquaculture, the authors revealed that aquaculture produced more environmental impacts as the market for environmental services expanded (1997). Another research was conducted by Campling, Havice and Howard using a political economy and ecology approach in the study of capture fisheries from 11 case studies (2012). Their findings revealed that, the inclusion of capital in fisheries undermines ecological systems and labour relations while highlighting that access relations influence the ecological and economic aspects of fishing activities because powerful actors seek to control access to fishery resources. They also mention that environmental change also influences the political economy of fisheries (2012). In a similar vein, Bene et al, reviewed various publications on fisheries and aquaculture and from their observation, revealed that, although aquaculture contributes to food security, its contribution towards poverty alleviation remains unclear (2016). This finding is also reflected in Kassam and Dorward's assessment of the contribution of aquaculture to food security and poverty reduction in Ghana (2017). Their findings showed that national targets for food security and revenue generation were being achieved but this did not reflect in the food security and income derived by rural fish farmers (2017).

Further research has been done on cage-aquaculture. One of such studies was done by Hehiglo (2008) who argued that Ghana cannot rely on marine and 'capture fisheries' to meet the increasing demand (population) for fish in the country. In his argument, the author acknowledges that fishing is the main livelihood activity (both directly and indirectly) in some communities. This is an important point because in acknowledging the dependence of fisher people livelihood activities on the 'indigenous' structure of fishing, any change in the model of rural fishing activities could have some effects on these people due to how it would be organized. In a similar vein, Asmah et al, have emphasized on the inefficiencies of 'capture fisheries' in the struggle to overcome hunger and malnutrition and the burden of high fish imports (2016), and similar to Hiheglo's

argument. The authors place their emphasis on increasing population (rising demand) and declining capture fishery stocks. The support for aquaculture development is for the attainment of food security, economic growth and improved livelihoods for local fisher people (Asmah et al 2016); though these authors admit that such an intervention must overcome the challenge of its sustainability. The call for sustainability of aquaculture therefore raises a need to examine the effects of such an intervention on the lives of rural fisher people in both economic and ecological relations. Asmah et al have also highlighted the constraints faced by fish farmers includes a conflict between them and indigenous fisher people together with other users of the lake (2016). This scenario is not peculiar to Ghana only, as Marshall (2001) makes known a conflict involving proponents of aquaculture (government and fish farmers' groups) on one side and the traditional fisher people and environmentalists on the other. She explains that while State agents are focused on macro-economic factors, those against it are concerned with ecological sustainability issues and the livelihoods of traditional fisher people. In the face of sustainability concerns and conflicts with indigenes, attention has not been accorded to important issues of the peoples' livelihood through thorough research. While the conflict may appear to be over property rights, Asmah et al (2016) state that the issue is rather about space. The authors go further to suggest ways to manage these 'spatial conflicts' but in so doing their suggestions have failed to engage in the challenges faced by artisanal fisher people.

Conflicts in aquaculture development are not limited to Ghana alone. Marshall (2001) similarly, investigated a conflict and major concerns in a local Canadian fishing community, a study in which State-supported 'property regimes' of an ever expanding aquaculture sector was examined. The author argued that the State's promotion of aquaculture was shifting control of fishery resources thereby worsening local livelihoods that relied on 'capture fisheries'. According to Marshall, most studies on aquaculture have focused on environmental issues in sustainability unlike her study which sought to examine property regimes and its influence on 'community relations' (2001:336).

The review of literature presented above highlights some significance of aquaculture development and challenges that the sector faces yet little research has been done into the concerns that are being raised by artisanal fisher people on the economic and ecological consequences of the transition in the fisheries sub-sector. These economic and ecological issues include major issues of access rights in the livelihood change.

Chapter 2

Analytical /Conceptual Framework

2.1 Introduction

This study adopts the framework of Sustainable Rural Livelihoods while engaging in a political economy/ecology approach to analysing livelihood and ecological change as against an apolitical and dominant institutional-based, economic approach to poverty alleviation among inland fishers. The analytical framework is aimed at engaging with the underlying principles of the theories and concepts within political economy/ecology including a focus on access and ownership in analysing change in rural fishing livelihoods that are associated to broader political, economic and ecological factors.

As indicated in the previous chapter, cage-aquaculture is being promoted towards achieving food security and for economic growth and also as a remedy to a perceived declining artisanal sub-fishing sector in Ghana. But it is important to assess the ecological dynamics in fishing while analysing the gradual transition to cage-aquaculture along with its ecological-economic effects on artisanal small-scale fishing livelihoods. The need to utilize a political perspective in ecological and economic livelihood change analysis is backed by Scoones (2009), emphasis that, such a scope presents an opportunity to move beyond a descriptive analysis of rural livelihoods that usually focuses on explaining bottom-up diversity and coping strategies used by rural communities. The introduction of a political scope in this case goes beyond a describing how rural livelihoods are organised in reality at the individual and household level to broader communal, national and regional levels (2009). Also key to this framework is an analysis of institutional structures on resource access and their influence in shaping rural livelihood outcomes or changes (Scoones 1998).

A number of studies have been conducted into rural fishing livelihoods, however, only a few of these studies have adopted a sustainable rural livelihoods framework in their analysis of livelihood dependence on fishery resources and which may be due to varying research objectives and context. This study nonetheless adopts an extended framework of Sustainable Rural Livelihoods as revised by Scoones in 2015, while making a few modifications to its conceptual framework to suit the focus of this research. This extended framework, I argue presents a holistic scope within which to operationalize concepts for a detailed analysis of fishing livelihoods, imbibed in a combination of ecological and political-economic influence.

Scoones indicates that the Sustainable Rural Livelihoods Approach (SRLA) was developed in the 1980s as part of a series of consultations organized

by the WCED in preparation of the Brundtland report, aimed at promoting Sustainable Development and has since gained increasing usage in research (2015). A framework that was meant to be both analytical and practical in its study of rural livelihoods and one that initially relied on the premise that rapid rural population increases and their intensive production strategies are the starting point for the sustainable development discourse (Conway and Chambers 1992). The increasing use of this framework in studies that analyse sustainability in rural livelihoods have been vastly applied as a bottom-up approach whereas in some peculiar cases as shown in this study, the transition could be top-down. This makes it more appropriate for the inclusion of a political ecology scope within the SRLA framework building on from Bernstein's (2010) four questions in political economy, highlighting that top-down economic interventions could have implications on resource ownership and access, restructuring of socio-economic relations, wellbeing and capabilities. The ecological component is analysed with questions on how groups interact in relation to fishery resources and how political or ecological changes may be shaped by ecological or political changes respectively (Scoones 2015).

The extended livelihoods framework shown below (in figure 1.1) is an attempt to capture the major concerns in rural livelihoods and make space for the political ecological lens being used in this study. All the same, the focus of this analytical framework remains on analysing rural fishing livelihood outcomes that are dependent on common resources within dynamic ecological-economic contexts and institutional structures.

DIAGRAM OF THE EXTENDED SUSTAINABLE RURAL LIVELIHOODS FRAMEWORK

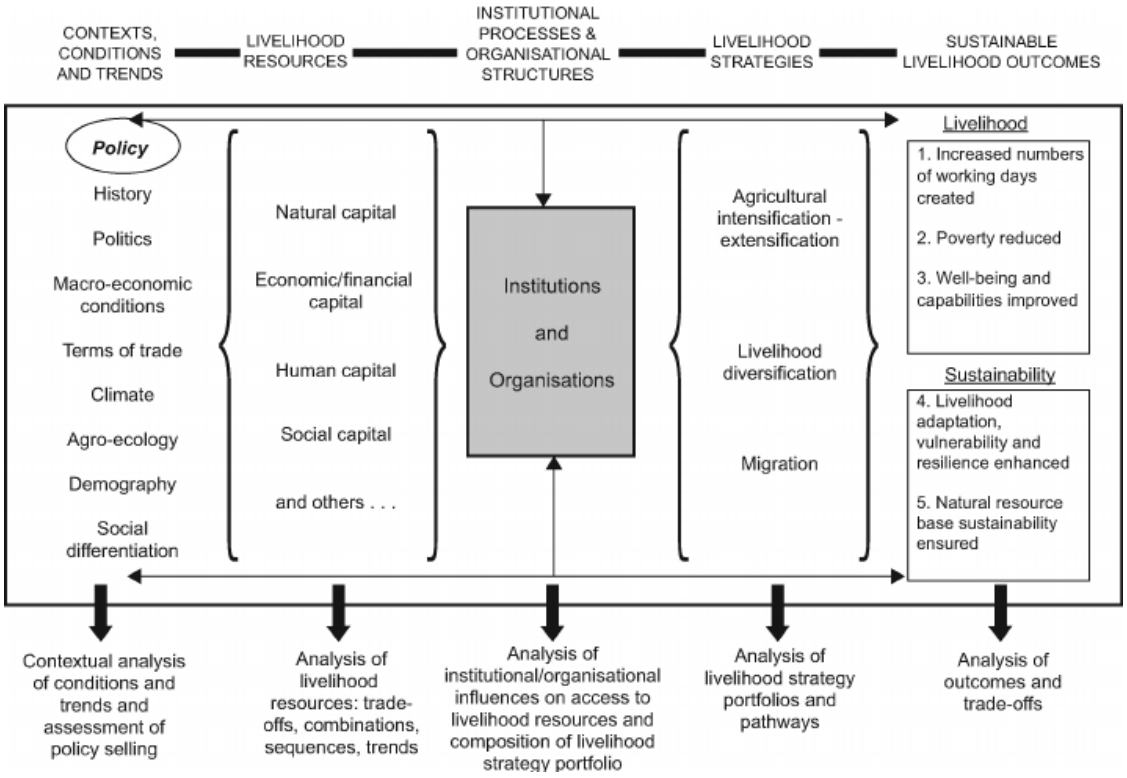

Figure 1.1

Source: Scoones 1998

The context, conditions and trends (shown in the diagram) which in this case is more of a historical and political agro-ecology, will be discussed in chapter three of this study. Livelihood resources and institutional structures will be analysed in a political economy/ ecology frame. Sustainable livelihood outcomes will also be analysed in a way of understanding what constitutes a sustainable livelihood in fishing beginning with a breakdown of the definition of a sustainable livelihood given by Conway and Chambers in 1992.

According to Scoones, studies on livelihood and environmental change tend to focus on coping strategies and livelihood adaptation (2015:4), but I seek to problematize this bottom-up analytical focus as one with an apolitical basis and overly focused on responses to problems that may have political origins. I make modifications to this framework by revisiting four out of five components within

the SRLA framework and these include: livelihood outcomes, livelihood resources, institutional structures and contexts.

To begin with, this study utilizes Conway and Chambers' definition of a livelihood describing it as, people being enshrined with a set of capabilities, and access to material and social resources while being engaged in activities carried out to serve as a means of living (Conway and Chambers 1992; Scoones 2009). Furthermore, a livelihood then becomes sustainable when it "can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base" (Conway and Chambers 1992; as cited in Scoones 2015:6). This definition provided by Chambers and Conway (1992) will be applied thematically in two parts. The first part captures what a livelihood is in socio-economic terms and the second part introduces sustainability which is defined in relation to its economic and ecological components. In accordance with the objective of this research, I show that a political economy/ecology lens in an extended SRLA presents a deeper frame with which to critically analyse livelihood and ecological change in inland artisanal fishing and cage-aquaculture. The significance of the framework is largely influenced by how its concepts and theories are being operationalized.

The first part of the definition describes what a livelihood constitutes by introducing **capabilities**, **access to resources** and **economic activity**. It is important to understand what these concepts contribute to rural fishing livelihoods. Conway and Chambers' explanation of capabilities is an adaptation of Amartya Sen's definition of capabilities as "being able to perform certain basic 'functionings', to what a person is capable of doing and being" (Conway & Chambers 1992:4). This is a view that highlights individual freedom of choice or agency and what Sen argues to be the starting point in analysing social change (1990:43). Nussbaum's (2011) argument builds on that of Amartya Sen with a focus on quality of lives and justice in entitlement using a comparative approach. This approach emphasizes the need for the creation of opportunities that enhance individual freedoms of choice justly as indicators of well-being. In the words of McGregor (2007), it refers to the "psychological and relational qualities as well as the material" (as cited in Scoones 2015:16). A definition that is linked to broader social and political factors, one that takes households and communal

structures into consideration (Scoones 2015). Rather than revolving around neoliberal and utilitarian approaches to assessing well-being of rural livelihoods and 'greening' it with ethical content, a relational application of the question who gets what? by Bernstein (2010) becomes critical in an analysis of capabilities, and what do they do with it? Becomes a more appropriate approach to analysing economic activities other than measuring well-being that implies a utilitarian approach. In this vein, access to resources becomes key in any analysis of who owns what and gets access? (Bernstein 2010; Scoones 2015).

By theorizing the three constituents of a livelihood, it becomes an attempt at uncovering change or trends by analysing livelihood outcomes with questions of who does what? (Bernstein 2010; Scoones 2015). This engages further into the elements of economic activities that are engaged to serve as a means of living and how it changes within the context of inland cage-aquaculture and artisanal fisheries. Interestingly, ownership can be applied to rural livelihood relations of economic activities of labour and access to natural resources. This introduces the debate on entitlements, access and ownership. Instead of stressing on a rights-based approach, a political economy/ecology approach of analysing transition becomes significant when analysing distribution or differentiation conflicts.

The classic definition given by Conway and Chambers (1992) describes livelihoods as being reliant on 'capabilities and assets or resources', terms which have been used synonymously to 'capital' in most applications of SRLA framework. But which are used here to mean what rural people get and in relation to the ownership or their access to resources. This is induced from Bebbington (1999) who argued that peoples' livelihood should be analysed in relation to their access to capital (resources). This approach further distinguished between five different types of capital which will not be delved into. It is important to state that this approach is built on the environmental entitlements approach and the theory of access but is focused on the distinction between resources and access from a social point of view (1999). Capabilities as used within dominant SRLA frameworks implies capabilities as the exertion of agency where as in reality and as Karl Marx emphasizes, agency is usually exercised not exercised within the circumstances of an actors' choosing (Callinicos 2004). Institutions in this in-

stance becomes the context of and object for change (Borras 2009) and distribution conflicts involving natural resources. A suitable clarification of what institutions comprises in this framework is given by Douglass North (1990) as the rules that govern and organizations are the enforcers of the rules (Scoones 2015). These rules include formal and informal rules and authorities as the enforcers of rules in regulating access or ownership of the Volta Lake.

2.2 INSTITUTIONAL PROCESSES AND ACCESS TO FISHERY RESOURCES

Who owns what and gets what access? According to Scoones (2015), institutions hold a major influence in mediating access to natural resources. Resource control and exclusion conflicts is therefore being analysed in relation to institutional structures that may produce winners and losers of in certain economic arrangements. Resource control and exclusion conflicts could be linked to the allocation of property rights and access to natural resources and which may involve power relations. In interpreting what access to resources is, Ribot and Peluso have stated that it is "the ability to derive a benefit from things" (2003:12). The important element of their definition is the emphasis on 'ability' which distinguishes it from the classical definition of the right to benefit from things; as used in defining property. The ability or capability of people and their relations with environmental resources is mediated by institutions (Leach, Mearns & Scoones 1999); that is the rules and patterns of behaviour or social structure (1999).

Ribot and Peluso's theorizing of the concept of access allows for a deeper analysis that moves beyond a focus on organizations, to unravelling economic or livelihood change that could be linked to 'a bundle of powers' (2003:11). This is because organizations or enforcers act in accordance with the institution of governance involving: property rights, ownership and access to (fishery) resources (Ostrom 1990). The influence of social relations (means, relations and processes) also plays a role in either enabling or constraining benefits from the use of a resource (Ribot & Peluso 2003). Access and exclusion conflicts in this case is also analysed in relation to material and immaterial resources vulnerable to the influence of formal and informal institutional structures. These

help in addressing a more important concerns of who actually benefits from the use of the resources and the processes through which they are able to do that (2003).

Apart from institutional and mediating processes, the nature of the resource in question also matters most. Zellmer and Harder have analysed the concept of property in water and classified it as being 'a web of interests' and this they argue is less focused on establishing private assets in water but rather on restructuring the legal, economic and social relations among people (2008). The term benefit is the gain received through access to a resource or from the allocation of rights and whereas rights may signify entitlement, ability is affiliated to power; that is the "capacity of some actors to affect the practices and ideas of others" as in social relationships and institutions (Ribot & Peluso 2003).

The application of these concepts of property rights, ownership and access helps in framing an analysis that studies the interaction between economic activities and access to natural resources. Using Ribot and Peluso's explanation of access, it defines the ability to benefit using all economic means (including natural resources) available for people to make a living. The ability to benefit should be analysed along with institutional structures of property rights and ownership. While property rights and ownership in this case is used only in reference to natural resources, access is used to analyse the extent to which economic and ecological imperatives enhance or constrain the wellbeing of rural fishing communities. Key to analysing the role of access is in analysing the relations of production as well. Livelihood change in this study involves understanding the changing access relations involving power and distribution. This also involves understanding the influence of rules and their enforcers (Scoones 2015) as well as changing relations through credit. As noted by Gerber (2014), credit/debt has social differentiation effects as well as a mechanism with which to lock labour into contractual and debt financing obligations thereby affecting his or her ability to engage in other economic activities other than cage-aquaculture.

Further, these complementary factors may be dependent on how control over natural resource for fishing are organised and enforced. This implies an analysis of water resource control mechanisms with their underlying ecological-

economic assumptions involving power distribution (i.e. the claims or rights of control). Zellmer and Harder have challenged the concept of property that is often used in the analysis of conflicts of access to water resources including fishing activities (2008) and seems to be in line with Gerber and Steppacher's elaboration on the theory of ownership in which they distinguished between possession and property (2016). Their argument is very useful in the analysis of conflicts of access to fishery resources for instance as it emphasis on possession being the availability of clearly defined rights, duties, and privileges whereas property is defined with a focus on the conferment of titles of ownership which empower their holders to benefit exclusively from the use of such resources (Gerber & Steppacher 2016). Therefore, concepts of access and possession, become a worthy determinant of the capabilities of small scale artisanal fisher people to continue engaging in economic activities of fishing on the Volta lake. This is a more appropriate focus for the purpose of the main research question rather than placing emphasis on ownership or property rights in fishery resources.

Moreover, any change in ecological or economic aspects of peoples' livelihoods are mainly influenced by institutional changes in support of State or market-based instruments and which are different from the institutions which have been relied upon by rural communities in the achievement of their past successes (Ostrom 1990). "Diverse institutions, both formal and informal, and often acting in combination, shape the ways in which differentiated actors access, use and derive well-being from environmental resources and services and in so doing, influence the course of ecological change (Leach, Mearns & Scoones 1999: 240).

2.3 SUSTAINABILITY AND LIVELIHOOD OUTCOMES

Ecological change and its effects on artisanal small scale fisher people is being analyzed in this study by using a political ecology approach that is guided by the questions, "How do social classes and groups in society and within the state interact with each other (in an ecological context)? and How do changes in politics get shaped by dynamic ecologies and vice versa?" (Scoones 2015: 84). As stated at the beginning of this chapter in the discussion of the SRLA framework, the second part of Conway and Chambers' definition, which introduces

the concept of sustainability in which sustainable livelihoods have been defined in relation to using and recovering from environmental stresses and shocks without undermining the natural resource base (Conway and Chambers 1992). There is therefore a need for the application of the scope of political ecology in further analysis of the concept of sustainability in artisanal fishing and cage-aquaculture.

Political ecology in this sense has been defined to mean an approach that utilizes political economy and ecological concerns in analysing the "ever-changing dynamic tension between ecological and human change, and between diverse groups within society at scales from the local individual to the earth as a whole" (Peterson 2000:324). This second part of the analytical framework is therefore being operationalized under the premise that, to analyse ecological change, it is important to understand people or societies and to acknowledge that ecological change also affects human behaviour (Dove 1992 as cited in Peterson 2000:323). Following up from the debate on sustainability, Redclift (2007), points out that sustainability could be studied in two ways; that is either in relation to the protection of livelihoods or the protection and conservation of the environment. One of the main objectives in this study is to understand the ecological effects of cage-aquaculture on small scale fisher people and this requires a focus on the protection or sustainability of artisanal fishing livelihoods. Therefore, the distribution of resources and rights to them becomes central to analysing the sustainability of livelihoods (Redclift 2007). This is in line with a political ecology perspective that analyses the methods of access and control of resources and their effects on the environment and for sustainable livelihoods (Watts 2000). Hence they involve the 'politics of distribution' and the 'politics of recognition' (2000). This means the distribution of ecological and economic benefits and the element of cultural or human rights.

Moreover, the concepts of capabilities and sustainability have been stressed upon by Conway and Chambers (1992). They argue that these remain key along with a need for institutions to control the use of natural resources for equity (of access) and for minimal conflict (1992). Although their view is arguable, it is important to apply a political ecology perspective that analyses the effects of changes from the local or global society on rural peoples' livelihoods and their productive resources (Blaikie & Brookfield 1987). This is because dis-

satisfaction and then after resistance could emanate from the losers of institutional changes and this would lead to open conflicts from the artisanal fisher people in this instance. Environmental conflict and exclusion from the standpoint of who wins and who loses from the tragedy of enclosures becomes necessary in analysing the tension between small-scale artisanal fisher people and fish farmers (Martinez-Alier 2001). This involves applying responses from above and responses from below. This is being applied to case whereby the creation of distinct fishing groups using different modes of production creates the possibility of winners and losers of ecological dynamics and expression of power using titles of access to fishery resources.

Conway and Chambers' emphasis on the ability to recover from shocks and stresses is built on agency power, the belief that people do not only react to situations but are dynamic and adapt to opportunities (1992:4). But the ability (capability) of indigenous artisanal fisher people to recover from setbacks, I argue is bonded to the external expression of power in the allocation of access to fishery resources. Sustainability used in relation to livelihoods is no longer limited to protecting existing environmental resources but also about bringing about new ones (Redclift 2007). In this vein, Wolf (1972) had earlier emphasised the significance of communities maintaining constant and uninterrupted access to a combination of shared resources and within a system of clear institutions of shared resource ownership.

CHAPTER 3

Background of Fishing Activities on the Volta Lake / Context of the Study

3.1 Background

Prior to the early 2000s when cage-aquaculture was introduced in Ghana, the fisheries sector was mainly dominated by capture fishing activities (Kwadjosse 2009). A system that was in accordance with the common ownership of fishery resources and the influential of traditional authorities. However, new trends in the fishing sector began to take shape through State intervention of 'modernizing' the sector with the introduction of outboard motors in canoes (Kwadjosse 2009). This was coupled with the establishment of the nation's first State Fishing Corporation in 1964 as well as the Ministry of Fisheries (2009).

The introduction of commercial fish farming activities, can be further be traced to 1953 when the State under colonial supervision began developing ponds in the northern part of Ghana and also in 1957, as an independent State, when policies where crafted to transform irrigation systems into fish ponds all over the country (FAO 2017). These were the initial interventions that affected that structure of fishing activities in the country.

The fisheries sector in Ghana is organized according to two sources; these are the marine and inland fishery sources. The focus of this thesis will be on the inland source of fisheries, which is further comprised of two sources: freshwater (including culture-based) fisheries from the Volta Lake and other coastal lagoons and the second source being aquaculture in cages, ponds and reservoirs (Mofa 2017). This focus of this thesis is further narrowed to cage-aquaculture, specifically on the Volta Lake. Aquaculture is defined as rearing fisheries within stringent and controlled environments for profitable production (Honma 1980 as cited in FAO 2017). Under this study, both systems of fishing are practised on open water (. i.e. Volta Lake), however, the model of production for both systems of fishing differ. The major distinction being the difference in systems of ownership and control and which tend to be problematic when improperly introduced or promoted. Capture fisheries basically involves the use of

canoes and fishing nets with labour from family ties, friendships in flexible agreements whereas cage-aquaculture involves the use of metallic cages and plastic drums, feed, nets for the enclosure of space and formally organized hired labour (FAO 2017; Mofa 2017). The difference in ownership is a crucial point of interest and an object or context for tension or conflict. This study presents its focus on fishing activities on the Volta Lake by tracing its formation and the inception of economic activities on it.

3.2 Formation of the Volta Lake

The Volta Lake located in Ghana, West Africa, is a water resource that is considered to be one of the largest human-made reservoirs in the world by surface area and volume. The lake is believed to be 148 km^3 in volume, with a length of 520 km from the northern part of the country to the Akosombo hydropower dam in the south of Ghana (Nilsson 2009). The lake in its entirety is measured at 8502 km^2 and that is 3.6% of the country's area (2009). The reservoir (Volta lake) was formed between 1961 and 1965 during the construction of the Akosombo hydropower dam but its size exceeded the estimated volume of spillage provided by the contractors (VRA 2017). The lake was formed out of the former Volta basin which occupied a smaller portion of the Volta lake's present geographic area and was enclosed by some communities. According to the VRA Trust Fund (2017), the construction of the hydropower dam and excess spillage of water caused these communities to be displaced and in need of new settlement. Meanwhile small scale crop farming and artisanal fishing had been the main livelihood activity of people living along the then Volta basin, prior to its expansion into what is now known as the Volta Lake (Chambers 1970).

Economic benefits the Volta basin were mainly for artisanal fishing and irrigation sources for neighbouring cash crop (cocoa) and staple crop farms before the construction of the hydroelectric dam. These resources were primarily used by rural communities for their livelihoods (FAO 2017).

The expansion of the water resource into the Volta lake resulting from the construction of the Akosombo dam, had major consequences especially for communities that were flooded and lost their livelihoods in those communities permanently.

> The Volta Lake that was inevitably created as a result of the damming of the Volta River inundated 730 villages with a total population of 80,000 people. This situation required that the affected people be compelled to move from their original ancestral homes and areas of habitation, to other, mostly strange and hostile locations. These displaced people were relocated and resettled in fifty-two (52) townships spread over four (4) regions of the country; namely Volta, Eastern, Brong-Ahafo and Northern Regions and covering seventeen (17) districts of the country...The original policy on resettlement, as promulgated in Act 46 of 1961, gave responsibility for that task to the then Ministry of Social Welfare but due to capacity and financial constraints during the period of project execution, VRA was forced to intervene, thus since 1961, has been responsible for matters concerning the resettlement of the affected people (VraTrustFund 2017).

Displacement and Resettlement of Affected Communities

According to Chambers (1970), 740 social groups with a population of less than 100 per village and 4000 people in the largest community including immigrants from neighboring countries made up the total number of 80,000 displaced people. These displaced communities were considered to be among the poorest in Ghana and they were also largely farmers and fisher people. Chambers (1970), further recounts the resettlement process whereby the State in consultation with the Jackson commission viewed compensation to be a "legal obligation" and sought to acquire "valuable rights" in areas that were flooded (1970:22). The Jackson commission deliberated on "many forms of right, but its most important recommendations were that, in the public sector, roads and public buildings such as schools should be replaced, and, in the private sector, cash compensation should be payable at the current market rates for land, cocoa and other perennial crops, buildings, clay pits and private fishing rights" (Chambers 1970:13). The State had originally set up the Volta River Project (VRP) secretariat with a section focusing on compensation and resettlement but "implicit in the priority of the programme

was an opportunity for legitimate access to resources" (1970:20). The Volta River Authority (VRA) was later set up in 1961 under the Volta River Development Act 1961 (Act 46) to take over control of projects on the Volta basin/lake (1970).

The resettlement programme also presented the agricultural institution and organizations (Ministry of Agriculture) with a chance to meet their own objectives in the 7-year development plan. An opportunity where the "resettling population could...be persuaded to make a radical change from traditional to modern farming methods" (Chambers 1970:22). The affected communities were resettled into new or existing communities around the lake with land for farming activities (VRAtrustfund 2017). However, new farming activities were not viable in isolation especially with new economic opportunities on the lake. Thereby, making a large number of the resettled population to engage in fishing activities due to the increasing fish stock available in the lake and availability of water from the lake for irrigation purposes and transportation (Chambers 1970; Nilsson 2009).

3.3 Institutional and Organizational Context

A number of organizations and institutional mechanisms have been established in recent times and which are linked to the control of fishery resources and aquaculture development. Some of the influential organizations include the Volta River Authority (VRA), Water Resources Commission (WRC), Ministry of Fisheries and Aquaculture Development, Fisheries Commission, Environmental Protection Agency (EPA), and the formal and informal institutions that implement policies and mediate access to resources.

A major organization that has maintained influence over the lake is the Volta River Authority (VRA), which was established in 1961 through an act of parliament to assume oversight responsibilities over the newly constructed hydroelectric dam and all other areas of the Volta lake that are recognised to be a national asset (VRA 2017). The VRA has since its inception maintained control over the lake and is tasked with the responsibility of handling developmental projects along the lake, for the benefit of the resettled communities. Under its auspices, the VRA trust fund also exists independently to supposedly cater for the compensation needs of the resettled townships and to respond to complaints directed at the VRA by these resettled communities (VRA Trust Fund 2017).

The VRA had remained in absolute control over the Volta lake until 1996, when the Water Resources Commission was set up under Act 522 of Ghana's constitution (Agyenim & Gupta 2010). Upon its establishment, representatives from the VRA, EPA and other related State agencies made up its core committee with the task of regulating and managing all water resources and to coordinate the State's policies which appear to be in line with their functions (2010). Act 522 stipulated that, "ownership and control of all water resources are vested in the President on behalf of the people, and clearly defines the defines the Water Resources Commission as the overall body responsible for water resources management in Ghana" (Agyenim & Gupta 2010:7). Prior to this legislation, there was no clear institutional mechanism regarding the control and management of water resources. Hence "Ghana's water resources were treated as a private resource, according to British Common Law" (2010:5).

The Ministry of Fisheries and Aquaculture Development and the Fisheries Commission (a subsidiary of the ministry) are the two most influential organizations in the fisheries sector. The ministry is the main State organization that is charged with the responsibility of implementing strategies to achieve targets that have been set in the National Development Policy Frameworks for the fisheries sector (Mofad 2017). Act 625 established the country's Fisheries Commission to maintain oversight responsibility over fishing activities in Ghana (Fisheries Act 2002). Act 625 further states that it is the commissions duty to 'regulate and manage' the use of fishery resources of the country and to coordinate policies that aim to meet their objectives (2002:6). The Fisheries Commission is the implementation body of the Ministry that enforces policies and regulations that have been formulated (Mofad 2017).

The commission has 5 divisions, one of which is the Inland Fisheries Division, which is responsible for the management of inland fishery activities. The fisheries commission has sub committees that are set up to carry out specific purposes and one of which is the fisheries settlement committee, which was set up to address grievances brought to it by actors within the fishing industry and in respect of the adjudicatory powers of the law courts. Another committee is the fishery license evaluation committee that assesses certain factors before handing over reports to the commission for the award of fishing licenses (Fisheries Act 2002).

The water level in the lake is usually affected by rainfall patterns in the country's two major seasons (the dry and the raining or wet season). The expansion of the lake also resulted in increasing fish stock and variety in the Volta lake and also meant an expansion of the fishing area on the water resource.

According to Ghana's Fisheries Act 2002 (Act 625), the purpose of this Act is to serve as the law on fisheries and which includes to, "provide for the

regulation and management of fisheries; to provide for the development of the fishing industry and the sustainable exploitation of fishery resources and to provide for connected matters" (2002:6).

The commission's activities are funded by the State and from parliamentary approval to use money from the Fishery Development Fund. Among a host of objectives, the fund is targeted at supporting small scale fisheries and for the overall development of the fisheries sector (2002:16). Monetary sources for the fund include; licensing and permit fees, loans and grants, government budget allocation and recovery of damages from legal suits.

A major function of the commission is to develop a fishery plan in consultations with relevant and stakeholders (i.e. persons, authorities and organizations) to be affected by any new interventions or changes. Act 625 (2002:), fishing licenses are issued to mediate access to fishery waters (either for artisanal or aquaculture purposes). All fishing canoes must be owned by Ghanaians or duly registered as an enterprise under Ghanaian laws in order to be licensed to operate in fishery waters. The registration is done by the commission through the various district assemblies around the country. The licenses issued are subject to the payment of a fee and can be renewed. License to operate can also be transferred by the owner (s) but subject to approval by the local district assemblies.

License can also be granted for aquaculture but an application for such a license must include an environmental impact assessment. An application for a license must indicate the aquatic species to be dealt in. The license however is not transferable unless with the prior authorization by the sector minister in consultation with the fisheries commission (Fisheries Act 2002).

3.4 Policy Context (Ecological and Economic considerations)

Fishing yield from marine fishery resources has been declining steadily over the years (MoFA 2017). In 2013, inland fisheries (mainly from the Volta Lake) made up 24% of 298,000 tonnes of fish yield (FAO 2017). Meanwhile marine fishery yield has been declining since 1999 from about 420,000 tonnes to about 202,000 tonnes in 2014 (2017). In response to the declining fish yield, the State has instituted a number of policies, which it believes would help revive the ailing performance of the fisheries sector in Ghana and meet a supposedly growing demand for fish in the local market. One of such policy measures was the introduction of cage-aquaculture into inland fishery resources in 2001 under the National Development Policy framework that paved way for the formulation of the Ghana National Aquaculture Development Plan.

> Fish farming has grown rapidly from 1,200 tonnes in 2005 to 38,500 tonnes in 2014, spurred by high prices of tilapia, the quickly expanding cage farming in the Volta Basin and the high level of government interest and commitment. Tilapias constituted over 90 percent of the total aquaculture harvest. The Government has placed aquaculture as one of the top priorities in the country's development agenda and substantial support is being given to fish farmers in various aspects of the industry. Aquaculture is also being promoted through restocking programs in Lake Volta, reservoirs and other water bodies and the rehabilitation of hatcheries and aquaculture demonstration centers. The Government is actively seeking international cooperation to assist the country in further aquaculture development. The Government's efforts are also targeted at modernizing the fisheries sector (FAO 2017).

It is important to reveal the underlying assumptions held by State and International agencies in their promotion of cage-aquaculture in Ghana. Improving the country's fishing sector using cage-aquaculture, presents a host of opportunities and threats on how feasible or sustainable such an intervention is. Cage-aquaculture development within the country has been backed largely by the State and international development agencies. The objective of these developmental schemes can be found within the fisheries sector policy reports including Ghana's aquaculture development plan, mission statement of the ministry of fisheries and aquaculture development as well as the objectives of the fisheries commission. International sources of such information are traced through development reports and international sponsors of cage-aquaculture projects in Ghana. The Ghana National Aquaculture Development Plan (GNAP) which was published in 2012, a product of the collaboration between the Food and Agriculture Organization (FAO) and Ghana's Ministry of Food and Agriculture revealed the country's strategic objectives and plans towards transforming its fisheries sector. Following up on the initial National Aquaculture Strategic Framework formulated in 2006, the GNAP "seeks to be a guide to improvements in production, marketing, environmental sustainability and social acceptability of Ghana's commercial fish farm enterprises and related aquaculture value chain" (Tall & Failler 2012: 5).

The Ghana National Aquaculture Development Plan stipulates that fisher people in capture fisheries have been losing economically in the sector because their returns on financial input is very low and aims to solve this through the development of cage-aquaculture. These have been integrated into the States' policies in the fisheries sector which seek to "contribute to socio-economic development through food and nutritional security and poverty reduction in a sustainable and economically efficient manner, within the 7 natural limits of capture fisheries resources and environmental protection requirements, and with strongly a

strongly established basis for accelerated growth in aquaculture production" (2012:7). The plan further states its focus area on promoting proper management of capture fisheries, conservation of aquatic resources and protection of the environment to ensure sustainable development. These policies also signal the importance the State attaches to the need for huge foreign investment in the form of monetary and technical expertise (2012). The Aquaculture programme is intended to benefit an estimated over 3,000 Lake Volta fishers and at least 27,000 fish mongers (MoFA 2017).

Map of Ghana and Neighbouring Countries showing the Volta Lake and its Tributaries

Map 1.1

Source: Nations-Online (2017).

The map of Ghana on the previous page illustrates the Volta Lake in Ghana long with its tributaries passing through various parts within and outside the country. The inland water resource (formerly Volta basin and now Volta lake) is shared to the North of the country with Burkina Faso through its tributaries and in the South to its source of the Gulf of Guinea (FAO 2017).

Apart from the generation of hydropower, the lake serves a host of purposes to a large number of local communities that are located around it. The lake hosts a lot of fishing activities and is also used for irrigation of farmlands as well as for transportation (Nilsson 2009; Chambers 1970). Among the various communities that rely on the lake for their livelihood is the Asuogyaman District which…The tension between artisanal fisher people and fish farmers appears to be more prevalent in Mpakadan within the district.

As at 2010, the Asuogyaman district had a total population count of 98,042 and with 71% of this population being rural. It also represented 3.1% of population in the Eastern Region of Ghana. 64% of the population are between 14 and 30 years and form a greater part of the youthful population. There are approximately 23,551 households with 4 persons per household on average. About 69% (aged 15 years and above) of the population are said to be engaged in economic activities. Majority of the population (36.4%) are engaged as agricultural, fishery or forestry workers. Agriculture, forestry and fishery is the main livelihood activity for males and sales is the main activity for females. "About 63.2 percent of the population 15 years and older are self-employed without employees and 24.2 are employees. A higher proportion of females (74.2%) are more likely to be self-employed without workers than their male (50.9%) counterparts. The informal private sector (including artisanal fisheries) is the largest employer of persons in the district (78.3%), followed by the private formal sector (10.8%) and public (government) sector (8.3%)… Less than one percent of agricultural households are engaged in fish farming" (2010:X). According to the Ghana Statistical Services (GSS) report on the 2010 population census;

> There are three traditional councils in the district; Boso, Anum and Akwamus. Basically, the traditional authorities administer stool lands, holding them in trust for the people, and arrange the celebration of traditional festivals. They are also the custodians of traditional beliefs and

> customs, passed on from one generation to another. The traditional authorities also have courts which adjudicate on matters relating to stool lands, lineage and family lands, chieftaincy title disputes, violations of traditions and disputes between localities, lineages, families and individuals (2014:3).

"Fishing in the Volta Lake also constitutes an important segment of the agriculture sector. Fishing is done mainly in some communities along the 141km shoreline including parts of the Kpong headwaters. These communities include Dzidzokope, Atimpoku, Abume, Akosombo, Surveyline, Adomi, Dodi Asantekrom, Asikuma, Mpakadan and Senchi Ferry and old Akrade" (GSS 2014:4). Also there are two large scale cage culture farms located on the Volta lake in the district as well as other small scale cage farms located on the banks of the lake at different points of the lake (MoFA 2017).

Below is a district map of the Asuogyaman District including portions of the Volta Lake.

Map 1.2

Source: Ghana Statistical Service (2014).

CHAPTER 4

Discussion of Findings and Analysis

4.1 Introduction

This chapter presents the data that were gathered from primary and secondary sources. The primary data was mainly gathered through semi-structured interviews and through audio-visual devices and software. The primary data is also backed by data from secondary sources including published news reports and articles.

The data is presented here in accordance with the categorization of the sample population into four (4) distinct groups of interviewees. The artisanal fisher folk category includes interviewees who are engaged in capture fishing activities on the lake like fishing with nets and canoes (whom are usually males) and processing or selling already captured fish (whom are women and also known as fishmongers). The fish farmers' category includes employees (both male and female) of the two large scale fish farms sited on the lake. The traditional authority's category comprises of the Chief and his elders. The final category is the State authority, represented by a representative from the fisheries commission head office in Accra.

4.1.1 Demographic data on both *Artisanal Fisher People* and *Fish Farmers*

Interviews were held with 12 artisanal fisher People. 4 out of whom were females while 8 were males. The age range of the interviewees was between 28 and 65 years. Out of these number of interviews, only 2 were indigenes of the community while the remaining 10 were re-settlers from the neighbouring communities in the Volta and Eastern Regions of the country. While all 8 males were into capture fisheries, the females said they were fishmongers. 7 out of 8 males were married with between 4-5 number of children on average and 3 out of the 4 females were married with children.

Under the cage-aquaculture category, 10 fish farmers were interviewed comprising 7 males and 3 females. 8 out of the 10 fish farmers lived in the community and for a period between 3 months and 45 years. Only 3 out of the 10 were indigenes of the community, the other 7 were re-settlers originally from neighbouring communities in the Volta and Eastern Regions of the country. All 3 females were married whereas 5 out of the 7 males were married with 2-3 number of children on average. The age range was between 25 and 45 years.

4.2 LIVELIHOOD RESOURCES AND ECONOMIC ACTIVITIES

The geographical setting of Mpakadan is endowed with natural resources including land and specifically water (Volta lake). These natural resources serve as the main source of livelihood activities for the rural community; that is, they are used mainly for crop farming and fishing activities for these rural households. As presented in the preceding chapter, the historical formation of the water reservoir or lake as it is called can be easily traced to the early 1960s during the construction of the Akosombo hydropower dam. A few decades after the formation of the lake, it has since served as a major rural livelihood resource and a prevailing local economic activity of artisanal capture fisheries and this is supported by published Ghana Statistical Service data as presented in the previous chapter. That was before the introduction of large-scale cage-aquaculture activities on the lake. And along with its introduction, there has been the emergence of a tension or conflict concerning the use of the lake for artisanal fishing and other domestic purposes.

To begin with, in interviews with artisanal fisher people on one hand, most of the fishermen stated that their spouses' were either fishmongers or crop farmers as well as traders. The fishmongers also had spouses who were either fishermen, school teachers or deceased. This points to a setting where some households are heavily dependent on income from fishing activities for their survival. This is well captured in a quote by a fish monger whom stated that, ***"my husband and I have been fishing since we were resettled here…my husband goes fishing with his friends and give them (the fish yield) to we the women (fishmongers) who sometimes smoke or sell the fresh fish in large quantities to middlemen and women to sell at other places…and sometimes we sell directly to consumers"***. This means that the number of livelihoods that are dependent on artisanal fishing activities extends beyond the actual capture fishing activities on the lake to include local distributors and traders among others. This is further implied from the responses to how artisanal fishing is organized. During the interviews, all fishermen and fishmongers mentioned that trade in capture fisheries is organised in dealings with 'middlemen or women'. According to them, when the fishermen return from artisanal fishing with fish yield, they (the fishermen) share some of the fish yield amongst their fishing crew members and sell the rest, usually in bulk to fishmongers for onward sale to the market. The fishermen referred to the fishmongers as the 'middle women' because they (fishermen) hand over the fish yield to the fishmongers on cash or credit sale for sale. The fish mongers then sell them to consumers. The fishermen in this case do not sell their fish yield directly to consumers. The fishmongers similarly had dealings with retailers in the market and often referred to them as 'middle women'. This means that capture fisheries is organized in such a way that different actors have specific roles to perform and each actor is dependent on incoming fish yield for their livelihood. A fishmonger stated that, ***"we the women do not join the men on the canoes to fish…we do other house and farm work and wait for them to return then we can go and supply the middlemen (or women)"***. The roles and economic transactions per-

formed by the various actors within this category are determined to a larger extent by themselves even though gender considerations also influence the role a person could perform***. "not everyone goes to fish on the lake…some are farmers and some (now) work as fish farmers…but still the lake is very important for all our needs"***, stated another fisherman. According to the interviewees, aside artisanal fishing, water from the lake is used to wash their fishing nets, for irrigation and for domestic purposes like: cooking, bathing among other uses. This means that the benefits or loses that each actor makes is dependent on their roles and negotiation and more importantly their access to the lake. They also indicated that people residing closer to the lake usually engage more in fishing. This is because they tend to depend on the most convenient access to resources to maintain their livelihood. One fisherman mentioned during an interview that, ***"I started fishing because my house is close to the lake…but I also have a small farm…and some of my relatives and friends stay far from the lake but because they cannot depend on only one source (an income source for their needs) they come and fish with me for more income".*** These information portrays a situation where the rural community had established their livelihoods on a number of economic activities to support their livelihood needs. This explains why most of the fishermen and fishmongers have stated below that they are engaged in other economic activities aside fishing.

Furthermore, the responses provided to the number of years in which these households have relied on capture fisheries can be noted from the number of years that they have been engaged in fishing activities. From these interviews, the fishmongers have been engaged in processing and selling fish for between six months to 30 years while the fishermen have been engaged in artisanal fishing for between 15 to 40 years. This means that capture fisheries has been a very influential part of the livelihood activities of people in Mpakadan for a number of years now and probably since the creation of the lake. This point was made by one fisherman who stated that, ***"I have fishing on this lake for 20 years now…I started fishing with my father when I was young and since then I have still been depending on my fishing activities".*** Another important point of note is, artisanal capture fishing activities do not serve as the sole economic activity for most people who are engaged in fishing. Most of the interviewees revealed that they engaged in other economic activities as well to complement fishing activities to meet their survival needs as indicated above. From the responses, 3 out of 4 fishmongers had engaged or were still engaged in trading activities that are not related to fishing. Also, 7 out of 8 fishermen indicated that they had a garden (2 out the 7 additionally had training as craftsmen). This means that capture fishing is not a full-time livelihood activity and therefore those engaged in it find it quite flexible enough to combine with other livelihood activities for their survival. Due to the seasonal nature of fishing, as they described it, they have set up farms on which they cultivate crops themselves during their off fishing period and this helped in taking care of their needs. But a majority of the fishermen and fishmongers stressed that these livelihood arrangements have been changing since the introduction of cage-aquaculture. One fisherman who has been fishing for about 15 years stated that, ***"when I am not fishing and this happens a lot now these days (because of new restrictions from fish farmers) …I work on my backyard farm…I use water from the***

lake to irrigate the farm". From the above, the rural uses of the lake extend beyond artisanal fishing to rural irrigation for crop farms and other domestic uses.

To continue with fish farmers on the other hand, all 10 interviewees considered themselves to be fish farmers but under paid employment. One fish farmer clarified that***, "the fish farmers in this community work as labour for the big (large scale) cage-farms and this farms are owned by people from outside the community"***. 8 out of 10 fish farmers (male) indicated that their spouses were into the provision of personal services (not related to fishing) whereas the remaining 2 females mentioned that their spouses were deceased. The range of experience in fish farming was between 2 months and 11 years. All 10 fish farmers also stated that they were not engaged in any other economic activity aside fish farming. A fish farmer stated that, ***"…we are employed by the company and we throughout the days and the week…we do not have (enough) time to engage in any other economic activity for extra income to support our families".*** This means that unlike in artisanal capture fisheries, fish farmers dedicated their time completely to paid employment for their economic and livelihood needs. ***"as for fish farm work, men and women can work together but they (managers) prefer men to do the difficult work (working directly on the farm and carrying load) while the women are usually told to sort the fish according to their sizes, wash, cut and package them to be taken to Tema"***, stated another fisherman. Information from these interviews revealed that economic activities in fish farming were structured differently from cage-aquaculture. Both men and women work on the farm; engaging in activities such as feeding the fingerlings, harvesting, washing and processing the fish to be sent to the bulk distributors. The fish farmers stated that production and trade in fish farming is organised differently from that of artisanal capture fisheries. According to them, the fish yield is processed at the farm by both men and women and is then transported to the company's storage facility in Tema (in the Greater Accra region).

Furthermore, the presence of 'middlemen and women' was more formally organized and did not allow for the easy entry of external actors into the market for processed fish from fish farms. This means that unlike in the way artisanal fisheries is organized, fish farms is structured in such a way that formal channels have been created whereby specific economic actors (usually formerly registered companies) have the capability to engage in the distribution and sale of fish in bulk, a role that is usually performed by women in artisanal fisheries. According to one fish farmer, ***"the company sells (the fish yield) in bulk in Tema…the women prepare the fish before it goes to the market"***. They stated clearly that, the men are engaged directly on the farms while the women cut, wash and package the stock to be supplied to the market. This also means that there were no specific roles for men and women but certain functions were assigned preferably to only women. The fish farmers were in this case engaged in these activities as hired labour under the control of a managers of the company (fish farm). The structure of fishing activities in fish farming appears to have major implications for the structure of artisanal capture fisheries. These implications are related to the creation of direct fishing and distributary competitors and their effects on the capability of rural artisanal fishing actors.

4.3 STRUCTURAL AND INSTITUTIONAL MEDIATING PROCESSES

Though the resettlement project had some implications in the structure of the affected communities, most of them have maintained their informal institutions and organizations. For instance, the chieftaincy institution remains in existence in Mpakadan. According to the traditional authority (the chief of the village), cage aquaculture has been practiced within the community for close to 20 years. They also revealed that it is being organized in such a way that foreign investors own the cage-farms while people from the community are usually engaged in it as labour.

The chief also discussed the nature of his relationship with actors in the fishing sector including State agencies as well as both artisanal capture fisheries and cage-aquaculture. The informal authorities disclosed that they (traditional authorities) usually expressed their challenges to the State representatives on a regular basis and do collaborate on certain issues and emphasized that ***"we not consulted before cage-farming licenses were issued to these foreign investors to begin cage-aquaculture operations...we were only told that when their activities would begin".*** The chief stressed that they were only informed that such activities would commence but did not have a voice in the decision making process and have never been in direct contact with the owners of the fish farms either. These revelations indicate that informal authorities have been side-lined and made less powerful over the control of natural resources (Volta lake) and economic activities (fishing) within their localities. This can be traced to the creation of institutions in legislations and establishment of formal organizations that have gradually taken over control over resources completely from former traditional institutional and organizational establishments.

The traditional authorities, however, felt that they have maintained good relations among both groups of fisher people and have denied the existence of any open conflicts between the two categories of fisher people. According to the chief, this is because***, "there are clear boundaries that have been set up in the lake to show the cage-farms territories on the lake"***. The traditional authorities therefore believe that such demarcations signal the points of restrictions where artisanal fishermen cannot have to access on the lake. The information above shows that the chieftaincy institution has accepted a subordinate role and seems to be operating within the formal institutional control measures that have been put into effect by the State. The chief also emphasized that they (the community) do not share their fishing territory with other communities without permission. In this case, the traditional and informal authorities have not lost all control over the lake. Even though they do not the power to influence which activities could be performed on the lake, they nonetheless still have the power to protect the informal territorial boundaries of the community. The Chief also indicated that they (traditional authorities) informed people in the community when cage-aquaculture operations were about to commence but stressed that the license for fish farming was issued by the Volta River Authority (VRA) and (other State agencies).

Despite denying the existence of an open conflict, the Chief of the community, indicated that they as traditional authorities encounter challenges in their informal control of capture fisheries on the lake. They mentioned that the challenge was about discouraging the use of harmful chemicals in the lake in capture fishing activities. From the responses given by the traditional authorities, it appears that, the gradual processes of institutional reforms and political transformation over the years are now legitimized. This means that, the traditional authorities seem to accept the superiority of the State in determining political and economic outcomes. The important concerns of ownership, access or control and distribution of benefits or losses appear not to be contested by the traditional authorities. The responses of this authority appears to be accordance with the arguments of the State in favour of its reform of the sector.

4.3.1 State Authorities (Fisheries Commission)

A representative from the State represented by the Fisheries Commission was interviewed. The representative indicated that cage-aquaculture was being introduced to complement artisanal capture fisheries and not to replace it. According to them the fisheries sector remains key to the States economic growth agenda. They also explained the relevance of cage-aquaculture as increasing the total fish supply. In their own words it ***"contributes to the 5% GDP of the fisheries sector"*** and creates employment opportunities.

When probed about the ease of setting up a cage-farm by local communities along the lake, they stated that before setting up a cage-aquaculture farm, a person has to apply for different licenses from the fisheries commission, Environmental Protection Agency, Water commission and Volta River Authority (VRA). The requirements are strict and therefore ***"local people living along lakes and rivers prefer to go into artisanal fishing"***. The agency meanwhile acknowledges that it is very difficult for locals to set up cage-culture because of the huge costs involved and technical knowledge required to maintain the cage-farm ***"unlike in artisanal fishing where they only need a boat and a few other equipment to fish"***. They admitted not setting up any financial or credit schemes for the artisanal capture fisher people to make it easier for rural or indigenous people to set up their own farms. The response and actions of the State agencies as manifested in national policy manuals highlighted in the previous chapter reveals that their intentions in the promotion of large-scale cage-aquaculture, is being targeted at huge capital investments from private and foreign companies. The issue of employment creation is in this vein being presented to the traditional authorities and communities as serving in their best interest.

The agency responded to questions on open conflicts between artisanal capture fisher people and fish farmers. They argued that they were not aware of a conflict in Mpakadan and. They also mentioned that they **"usually consult with traditional authorities because in times of conflict they step in for us".** However, they indicated that the various agencies had specific functions and theirs' (fisheries commission) to be specific is to help prospective investors

set up their cage farms and not to handle conflict resolution issues although they do not ignore conflicts when they arise.

4.4 ACCESS TO FINANCIAL AND FISHERY RESOURCES

Economic and Ecological Challenges

Fishery resources differ in relation to the type of fishing activity being engaged in. For artisanal fisheries, these resources usually include: a fishing site, a canoe, fishing nets and labour (usually from family and friends and sometimes hired labour) whereas in cage- aquaculture, they include: a fishing site on a water resource, huge financial investment in metallic cages, processing, storage and transport facilities as well as hired labour. The main fishery resource, however, is securing access to a fishing site or territory on a water resource, which in this case is the Volta lake. As revealed in the review of related literature, gaining access to a fishery resource is usually a context for the emergence of a struggles or tension (Campling & Havice 2014). This is usually linked to the distribution of gains or losses resulting from the access of the resource, that is the creation of winners and losers. The interviewees, mostly artisanal fisher people emphasized that getting access to fishery resources is the major challenge they encountered.

To begin with, in artisanal capture fisheries, the fishermen stated that they buy wood in the markets and seek the services of a carpenter to build boats for them while stressing that it is very expensive to own a boat. Labour is mainly offered by family and friends for a share of the fish yields and income but also some labour is sometimes hired depending on seasonal and other social factors. Getting access to credit from formal sources was a major challenge for both fishermen and fishmongers. The artisanal fisher people expressed their frustrations at how expensive it is to maintain their fishing activities and at times had to resort to informal sources of credit. One fisherman stated that, ***"most often I borrow money from my relatives and friends to buy some equipment because the banks, and savings and loans companies don't give us loans because of the nature of our work".*** In such instances, they recounted how difficult it was to repay some of the loans they had taken. Some of them stated that formerly, these were due to seasonal factors affecting low fish yields but presently, the siting of cage-farms has worsened their plight. Out of the 14 fishermen and fishmongers, 11 of them stated that they do not have access to credit from formal sources while 1 indicated that he had access to credit but it was not due to his fishing activities. Also 2 fishmongers believed that acquiring fish on credit from fishermen at times could be considered a reasonable source of credit for their activities. A fishmonger mentioned that, ***"we have formed small groups of fishmongers and we select a leader to negotiate with the fishermen on different fishing days…the leader then negotiates with some of the fishermen, the price and the terms of payment…after that we make individual agreements with the leader of the day on how much to pay and if we can pay at once, we give them the money but if we can't, we take the fish on credit and pay to the leader later"***. These responses show that formal financial institutions and organizations do not offer credit services to people in

support of capture fishing activities. Livelihoods that are dependent on capture fisheries then rely on informal sources of credit to support their economic activities. In this case, access to credit resources from formal institutions and organizations for capture fisheries is also a key indicator of which category of actors get which kind of financial support. From the above, the high expenses involved in these artisanal fishing activities makes it difficult to maintain their fishing activities therefore access to credit is a major challenge. This is linked to the low fish yields and low benefits they receive from their activities and having to contest fish farms for access to the lake.

To continue, there was some uncertainty among the fisher people as they believed that the community had a territory in the lake but they could not indicate the limit of their territory. Most of them acknowledged that neighbouring fishers were allowed to fish on the community's fishing territory but with permission and this has now become complicated because of the siting of large-scale cage-aquaculture activities on the lake. All the fishermen and fishmongers indicated that fish farms are sited on the community's territory and they as indigenous people and re-settlers were not consulted before the cage-farms were constructed. They also emphasized that the cage-farms were owned and controlled by foreign investors with some local supervisors that had been employed from the community. Another challenge highlighted by the fishmongers was that, getting direct access to the supply markets of fish farms was indeed a challenge. As stated by one fishmonger, ***"I receive fish supplies from the fishermen sometimes but when there are no supplies I do not get fish from the fish farms."*** Another fishmonger addressed her access to fish and credit by stating that, ***"I (when selected as a leader) usually receive fish in bulk from the fishermen, when I have enough money I pay for it at once and if I don't have I pay for some and take the rest on credit from fishermen and pay back after my sales but I cannot tell if I gain or lose from such arrangements".*** According to them the fish farms do not sell to local fishmongers but rather, they transport their fish yields to the company depot in Tema for onward distribution. This means that livelihoods that are dependent on fish supplies from capture fisheries are deeply affected by any changes in the suppliers of fish.

The fishermen encountered different challenges in their fishing activities, according to a few of them, the high cost of fishing equipment is a major problem. But all eight fishermen that were interviewed, placed emphasis on issues of getting access to the lake as the biggest challenge. The following quotes capture aspects of the responses from the fishermen vividly***. "We go for fishing mostly in the evening and sell our yield to fishmongers but our challenges are about the restrictions imposed by fish farms on us…we are not allowed near the lakeside after 6pm and not allowed to wash in the lake nor dock at lakeside".*** Another fisherman explained that, ***"We have seasons, in the dry season, we get low yields and in the raining season especially we get very high yields but since fish farming started…we are no longer engaged in fishing activities and the challenge is that sometimes we don't get enough for home consumption and for sale".*** Another fisherman explained his ordeal that sometimes he goes out to fish and the challenges includes not getting any harvest and having to be arrested by security personnel of the fish farmers for trespassing on their property (crossing into the boundaries of the fish farms sited on the lake). They also indicated that they do not own fish

farms and the few fish farms sited along the lake side makes it difficult as they now have to go very far to fish on the lake unlike in the past (before the presence of fish farms) when they go fish nearby. This means that the primary actors in capture fisheries also encounter challenges in to the main fishery resource for their economic activities. These challenges are also linked to issues of access to resources (i.e. access to credit and fishery resources). The high cost of producing or buying fishing equipment turns them to focus on obtaining credit. But the issue of having access to fishery resources (i.e. portions of the lake where fish can be harvested) is linked to institutional and political factors. This raises important issues of ownership, rights and access to water resources for fishing and trade activities.

The fisher farmers also spoke about their access to resources. For them unlike those in capture fisheries, the fish farmers had access to formal credit services because of their employment in a fish farm company. But even though they had access to credit, they maintained that the high interest rates attached to the loans were a burden on them. For instance, 9 out of the 10 fish farmers indicated that they had access to loans due to their employment on the farms. One fish farmer stated that, ***"I have access to loans from the bank at a rate of 6-10%"***. Another person stated, ***"I have access to loans because of the farm but with high interest rates which is a burden to me"***. In this case though access to credit is not an issue, the terms of repayment is a challenge. Another challenge that is possibly linked to the need for credit is the level of income received. In relation to income, all fish farmers indicated that the salary was not enough some others, mostly men indicated that the work is very demanding compared to the work they do for the company. A statement from one fish farmer was ***"I work from 4am to 5pm on the farm. The work is very tiring and the supervisors are very demanding on us and sometimes when we try to complain they abuse us verbally".*** Another statement made was, ***"We work hard but the managers do not appreciate our effort".*** This also appears to contradict the assumption that capture fishers have about fish farming been lucrative. The demanding nature of fish farming activities and time commitment also explains why fish farmers are unable to combine this with any other economic activity to make a living. This is because all the fish farmers stated that they do not engage in any other livelihood activity aside their employment.

The responses of most of the fish farmers on what they felt about artisanal fishing was that they are into the similar fishing activities but with the difference being that they are structured differently. One farmer indicated his interest in switching back to artisanal capture fisheries while one expressed dissatisfaction with how artisanal fishermen are being treated in the following quote. ***"I honestly believe that the fish farms are a harm to artisanal fishermen. I feel that we contribute to the worsening situation of artisanal fisher folk".*** Most of the them admitted that there are tensions but the tensions are not open conflicts. ***"there are conflicts especially when fishers cast their nets closer to the boundary of the farms. The fishermen cannot fight back or express their frustration because conflicts are referred to the (law) courts by the managers of the farm".*** They also indicated that they maintained access to the farms for instance in a response from one fish farmer, ***"we construct metallic cages with drums filled with concrete and nets that show***

the boundaries (of the farms) on the lake". They also indicated that regular checks are done to ensure that the nets are remain secure. All the farmers indicated that the form of support they received from their employers were financial benefits. 6 fish farmers revealed that they knew people who had switched back to artisanal fishing while 4 stated that they did not know of any such instances. One stated, ***"I know a lot of people who have switched but I can't determine if they are better (economically) than us"***. Fish farming appears to have been presented as a livelihood activity that is lucrative and more beneficial to rural development but the actual experience of the fish farmers indicates otherwise. The fish farmers indicate a desire to switch to other activities that would be more beneficial to them but appear to have been locked into credit and other contractual relations that make it difficult to switch. There is also the issue of switching to a 'losing side' in capture fisheries when all odds seem to be in support of cage-aquaculture.

The fish farmers did not openly state whether they encountered concerns of ownership or management of cage farms but from their complaints on challenges faced and the welfare of capture fisheries, it can be implied that their concerns are about the ownership or control of cage farms. In the responses, all 10 fish farmers emphasized that all the farms were owned and managed by foreign investors. All of them offered their labour services to the farm under paid employment. All fish farmers acknowledged that the farms had fishing territories (demarcated with metallic cages) but were not sure about whether the community had a limit to their fishing territory. Most of them stated that people are not allowed to fish close to the fish farms but were not certain if permission was sought before their farms were established. 8 of the fish farmers felt that the creation of employment opportunities from fish farming was the most beneficial contribution to the community.

4.5 LIVELIHOOD OUTCOMES AND SUSTAINABILITY

Ecological Change, Tension and Responses

When probed about what they (fishermen and fishmongers) feel about cage-aquaculture, all the fishmongers stated that it was good as it brought about increased the supply of fish for consumption needs. This means that the main factor in the tensions between them and the managers of fish farms were more or less about sustainable access to ecological resources. According to them, the problem about it was that it was not properly organized. A fishmonger stated her interest in offering her labour services if given an opportunity by the owners of the farm. Similarly, all fishermen also stated that cage-aquaculture was good and that they would like to engage in it themselves if given the chance. ***"Aquaculture is the best compared to artisanal fishing because you are assured of yield and its more universal",*** stated one fisherman. The actors view cage-aquaculture as a good livelihood activity because there is some form of security of income sources and they feel that is better compared to the uncertainties in capture fisheries. A majority of the interviewees indicated that they feel fish farmers are economically better off than them. They view paid employment as the most important benefit of cage-aquaculture to their community. These

points clearly show that the tension on having access to the lake is about the protection of livelihoods that are dependent on maintaining access to fishery resources and not one that is against the idea of cage-aquaculture. This means that the rural community prioritize the sustainability of their livelihoods and this includes having access to a secure fishing activity and not limited to the protection against the pollution of the lake.

All the interviewees also acknowledged that the issue of having access to fishery resources on the lake has spurred a conflict between artisanal fisher people and the managers of the fish farms. This is supported by an interview the secretary of the fishermen group granted in which he stated that the fishermen are being restricted access to the lake due to the siting of cage-farms and they would take the struggles with the fish farmers to all avenues to protect their livelihoods since the formal authorities have refused to act on the tension between them (Ghanaweb 2015). The fishermen made the point that fish farming affects them a lot now, in a way that prevented them from casting their nets to harvest fish and dock at the lakeside. Most of the fishermen complained that they now have to travel very far in order to cast their nets for fish (and this influenced them to patronize motorized boats that consume fuel thereby raising their expenses). Sometimes travelling very far to fish also involves breaking into the territories of other communities. They also noted that the emergence of fish farms had broken down former communal fishing groups because some joined the farms and while others have learnt a new trade. One fisherman complained**, *"they (fish farmers) affect our activities…the feed they give to the fish (in the cages) attracts the fish (outside the cages) closer to the farms so when we fish not too far from the lake we don't get anything unless we travel far to fish".*** They explained that even though the cage-farms do not cover the entire area along the lake side, they still could not harvest fish there. This is because of the feed that the farmers use in the cage farms which results in all varieties of fish to swim along the cages and which we are prevented from harvesting even though they are not in the cage-farms and are not the Tilapia breed which the cage-farms rear. Another fisherman stated that there are conflicts***, "Unlike before when we could fetch water for domestic uses, fish and wash…we are no longer allowed access…its only in the raining season and with the support of an NGO that we now have pipe borne water"***. They also complained that they were no longer allowed to wash their nets in the lake as they used to do in the past and even though they are allowed to fetch water for domestic uses, it is polluted and cannot the purposes which they were being used for in the past. It appears that even though the people seem to encounter the problem of water pollution from the fish farming activities, they are using it to support their arguments but such concerns though genuine appear to be secondary to issues of ownership and access to fishery resources or fishing sites on the lake. ***"These are conflicts are on ownership because they claim they have 'bought' the space from the government and the land from private owners…they take it as if the lake is for them"***. These feedback shows that the conflict on getting access to certain portions of the lake is mainly in connection with fishing activities. Other users of the water from the lake only encounter issues of pollution and not access. Aside fishing, they indicated that the water from the lake is used for irrigation and domestic purposes and which includes: drinking, cooking, washing and bathing. From the above, the sustainability of local fishing livelihoods is based on having constant access to fishery resources on the lake. This

has since the introduction of foreign-managed cage-aquaculture activities resulted in struggles or tension in the use of the lake in the community.

4.5.1 Ecological Change and Sustainability

The fishermen also described their capture fishing yield as decreasing but also indicated that, it usually depends on the season, they get more fish yield in the rainy season and less in the dry season. Most the fishermen and fishmongers indicated that they have encountered problems of water pollution (which they blame the fish farming activities for***). "The supply of the feed they put into the water has effects, when you drink it you get 'running stomach' and when you bath it your body itches you".*** They also claim that they (fishermen) dispose of waste properly and not in the lake, usually by burning plastics or burying fish waste on the farms as manure. They also feel that cage-aquaculture has environmental impacts which are worse than artisanal fishing. The responses here indicate that even though the artisanal fisher people acknowledge that ecological changes are usually influenced by certain ecological dynamics and seasonal factors they believe that fish farming activities are increasing the extent to which those effects contribute to their economic hardships. The responses also show that fish farming activities has implications on the capacity of the water to be used for domestic purposes and ecological dynamics such as space and time influences their fish yield.

Addressing issues on environmental concern, the State authorities argued that ***"because cage aquaculture is done in large water bodies the residue of waste will not have any adverse effect on the water. They are easily flushed out"*** But when questioned about difference in pollution impacts they stated that*,* ***"both have environmentally damaging effects. The waste generated from aquaculture pollutes the water while capture fisheries involve degradable acts like the use of smaller net sizes that harvest a lot of fingerlings."*** They also stressed that the Environmental Protection Agency (EPA) was in place to control issues of pollution. The response of the State fishery agencies appears to be prioritizing fish yield over problems of pollution and ignoring the concerns of the rural community. This is because even though the people express their complaints resulting from the use of the water for domestic purposes, the State appears not to be interested in addressing those issues.

The fish farmers responded to concerns raised on the pollution of the lake. The responses about how they disposed of waste on the farms varied. Some fish farmers indicated that, women from the community collected the organic waste from the fresh fish for fat to produce oil. Others also mentioned that there was a dump site where they disposed of the waste from the farm while one interestingly stated that they handed them over to people rearing pigs. In terms of fish yield they stated that it has always been high. In the words of one farmer*,* ***"we feed them four times a day and have huge harvest all the time".*** This means that at all times of the day, artisanal fishermen will not have access to fish if they remain nearby because due to the number of times feed is being dumped into the lake, it is likely that fishes would be located closer to the cage farms. Another fish farmer in describing the type and quantity of feed they use in the

cage-farms stated that, ***"the quantity usually depends on the kind of feed and the quantity of feed we use". "We buy fingerlings from other farms, set them in the farms with different types of feed…either floating or sinking feeds".*** Most of them also indicated that the lake is mostly used for fishing and domestic uses but even they (employed fish farmers) have also been barred from washing in the lake recently. Though this study does not seek to justify all actions of rural artisanal fisher people, it highlights the influence owners and operators of private large scale farms have gained over indigenous people. All but one fish farmer said they did not encounter problems of pollution of the lake. In his words, ***"because of the feed the water is being polluted and we can no longer consume the water for domestic uses".*** The same 9 fish farmers who denied the pollute activities also mentioned that they do not know the impact of their activities on the lake. The response from the fish farmers also indicates that the cage farms do not encounter any ecological or economic challenges in their activities, but they encounter problems of pollution using the water for their domestic activities. This means that the cage-farms (which are owned by foreigners) benefit economically and at the expense of the rural community. Also the cage-farms seem to have earned the right to pollute at the expense of indigenous livelihoods.

4.6 SYNTHESIS OF FINDINGS AND THEORETICAL/ CONCEPTUAL FRAMEWORK

(DISCUSSION / INTERPRETATION OF FINDINGS).

4.6.1 To what extent does Enclosure of Space on the lake for Cage-Aquaculture purposes conflict with other Users of the Lake?

To begin with, the background information (in chapter 3) together with interview responses from both artisanal fisher people and fish farmers, indicates that fishing has been a major livelihood activity in the community and this economic activity is carried out on the community's territory in the Lake. This forms one component of Conway and Chambers definition of a livelihood; that is the economic activity of fishing. To continue, the livelihoods of these people have been influenced since the creation of the lake and is in turn dependent on having continuous access to the lake. This is also supported as a second component of Conway and Chambers' definition of a livelihood which stresses that livelihoods are dependent on having access to material and social resources in order to engage in economic activities for survival (1992). In this case, the people of the

community rely on the lake for fishing and other domestic uses including: cooking, drinking and washing. Moreover, the level of other user's dependence on the lake for livelihood needs extends beyond artisanal capture fisheries to include other domestic uses as well. Then comes an important component of Conway and Chambers' definition of a livelihood; which is the capability of individuals to engage in economic activities. This implies the ability to undertake certain functions but in a just way in relation to other actors engaged in similar activities (Sen 1990; Nussbaum 2011). In this case, this implies having fair access to fishery resources and this draws in the influence of formal and informal institutions and organizations and their role in mediating access to resources (Leach, Mearns & Scoones 1999; Scoones 2015). This also becomes the basis for the distribution of power and the ability to benefit from the use of such resources (Bernstein 2010; Ribot & Peluso 2003).

Furthermore, the organisation of cage-aquaculture is such that is utilizes the enclosure of space (creation of private boundaries) on water resources such as lakes and rivers. In order for this to be achieved, some institutional mechanisms must be put in place to control the allocation of spaces to private individuals and this usually involves the distribution of private property rights. The factors which go into institutional transformation and the allocation of rights of access to specific individuals or groups as well as the motive for sharing benefits of such allocations is what Zellmer and Harder have termed as a 'web of interests' in the allocation of property rights in water (2008:6). This means that any institutional changes that interrupt the economic or ecological structure of capture fisheries activities, lead to changes in the distribution of benefits through the new relations and interests that are represented in such a transformation. Therefore, a change in ownership of a resource or in this study used to mean the possession of a resource (since entitlement cannot be transferred by its holders) is the beginning of alterations in the relations of production. Not only do such ecological and economic transformations affect the informal institutions of ownership or possession but also they also affect people's capabilities to engage in specific fishing activities. This means that interruptions in access to fishery resources affects the actors in the fisheries value chain and the extent of these effects depend on their level of dependency on artisanal fishing. The introduction of cage aquaculture has implications of deep credit and debt relations. In

order to adapt and compete with cage-farms, the artisanal fishers turn to seek credit to protect their livelihoods even though this credit/ debt relation also affects employed fish farmers. Hence these credit and debt relations bind them into contractual obligations and vulnerable to exploitation (Gerber 2014). This also has implications on the economic activities and distribution of benefits along gender lines. Thus fishmongers lose their livelihoods since they cannot buy fish directly from the fish farms to maintain their roles. The enclosure of space for cage-aquaculture purposes also clashes with artisanal fishing activities in what Veuthey and Gerber found to be the effects of the introduction of capitalist interventions in fishing which is further separating local producers from their means of production (2012).

The emergence of struggles and tensions initiated by artisanal fishers and in response to this exploitative intervention is being hampered by powerful actors thereby leaving them to adapt to the situation by seeking alternative livelihood activities.

In effect, the extent of cage-aquaculture activities on other users of the lake extends beyond the denial of direct access to fishery resources for artisanal capture fishing to the various livelihoods that depend on their fish supplies for survival. The extent of these effects are economic as well as ecological and have deeper political connotations. These activities also affect the support of farming activities and domestic uses of water from the lake. But more importantly and in the context of this study, it relinquishes control of access to the lake to State and private actors thereby making rural artisanal fishers and informal authorities vulnerable external influence and tied into situations where they have to seek alternatives in exploitative economic relations.

4.6.2 What is the relationship between Cage-Aquaculture and Ecological Change?

As explained above, the effects of cage-aquaculture have political connotations which are economic and ecological. In an economic sense, this affects the access relations to the resource but ecologically it also affects the sustainability of artisanal fisher livelihoods. The sustainability of these livelihoods are moreover dependent on these access relations as well as ecological dynamics. Using Conway and Chambers' emphasis on what a sustainable livelihood is; this implies the ability of such livelihoods to recover

from stress and shocks and enhance or meet their needs without undermining the resource base (1992). From a political ecology perspective, this could entail how the various actors interact in connection with the resource and how dynamic ecologies are influenced by politics and vice versa (Scoones 2015). The relation between aquaculture and ecological change is therefore implied from the livelihood activities of the people. In this case, cage-aquaculture is being promoted by the State as a solution to a perceived challenge of meeting the increasing demand for fish and the problem of low or decreasing fish stock in water resources. State agencies have defended their interventions to be in the best interest of national and local needs but the implementation of this intervention has resulted in ecological consequences which are reflecting from the economic changes. In this case, even though the interventions are presented as if they are being shaped by ecological dynamics, the clear indication of winners and losers from the distribution of ecological benefits shows otherwise. This is supported by the argument held in environmental entitlements and sustainable livelihood approaches that economic changes in rural fishing livelihoods are influenced by socio-institutional processes (Scoones 2015). Thus, politics is shaping the nature of interaction among people in relation to ecological resources. These relationship changes are also becoming more exploitative upon the introduction of cage-aquaculture. This extends beyond national authorities. Capital involvement in fishery resources is a source of conflict. New institutional forms of ownership and control of natural resources are influenced by international corporations (Campling & Havice 2014). The relationship between cage-aquaculture and ecological change is exploitative and this has deeper consequences in the sustainability of artisanal fishing livelihoods.

4.6.3 How do Political and Economic Changes for the development of Cage-Aquaculture contribute to the Sustainability of Rural Fishing Livelihoods?

In this study, artisanal capture fishing and cage- aquaculture are being analysed as separate economic or livelihood activities. This is mainly because of the different sets of combination of resources that are needed to engage in either of the two fishing activities. The ability to engage in any of the two fishing activities for a livelihood outcome is structured by institutional processes (Scoones 2015). Relating these data to the theoretical framework of the study, the concepts of capabilities, economic activities and access to resources appear to be major themes in the interview data.

In as far as the capability of rural people to engage in either artisanal fishing or cage-aquaculture is being influenced by factors and actors beyond their power, then the sustainability of their livelihoods is deeply affected. This means that such changes in the development of cage-aquaculture contributes to weakening their capability to maintain their livelihoods and makes them more vulnerable to exploitation thus keeping them in poverty.

In sum, these interventions of economic and ecological implications in fishing affect indigenous small scale artisanal fisher people deeply by 'grabbing' their livelihoods.

CHAPTER 5

CONCLUSION

This thesis sought to investigate the ecological and economic effects of inland cage-aquaculture on indigenous small scale fisher people. This main objective was narrowed down into three (3) sub questions:

- To what extent does enclosure of space on the lake for cage-aquaculture purposes conflict with other users of the lake?
- What is the relationship between cage-aquaculture and ecological change?
- How do political and economic changes in cage-aquaculture development contribute to sustainable rural livelihoods?

These questions were approached using the Sustainable Rural Livelihoods framework with a political economy / ecology approach in the analysis. The analytical framework was structured in two parts by separating the economic effects from the ecological effects in the research question. The economic aspect focused on what capture fisheries livelihoods entail and operationalized some concepts from Conway and Chambers' (1992) definition of a livelihood. These concepts included; capabilities, access/ownership and economic activities. While the second part analyzed sustainability using a political ecology perspective. This involved utilizing Conway and Chambers' (1992) definition of sustainable livelihoods. In this sense, the ecological effects of cage-aquaculture on indigenous small scale fisher people was analyzed in relation to sustainability of their fishing livelihoods.

Main Conclusions

Cage-aquaculture is dominated by foreign investors and is being promoted by State and International agencies without the opinions of local communities along the Volta lake. Nonetheless some local people are engaged in it but as labour and traders.

Firstly, there is a tension between the artisanal fisher people and the managers or owners of the cage farms but does not appear to lead into tensions in social relations among the rural people. The tensions are about access to fishery resources with an element of dissatisfaction with newly enforced restrictions by the cage farms. The local do not seem to have an issue with cage-aquaculture itself but with the way it is organized. This includes issues of possession, access and exclusion from fishery resources.

In answering the first sub question, the results of the analysis can be interpreted that there is a tension between cage-aquaculture operators and other users of the lake. The tension extends to the prevention of access to artisanal fisher people from fishery resources. This involves a gradual shift of possession from local to foreign actors indirectly. Also this extends to the encounter of pollutive effects in the use of water from the lake for domestic purposes.

Secondly, there appears to be a relationship between cage-aquaculture and ecological change. State Fishery Commission, Small scale Artisanal fisher people, Fish farmers and other domestic users of the lake have all indicated that the introduction of cage-aquaculture has brought about some ecological effects. These ecological effects are linked to the continuous use of fish feed in the lake as well as the monoculture fish farming activities. More importantly, there are new conflicts over access and possession of environmental resources mainly in resistance to new forms resource exclusion.

Thirdly, the third sub-question revealed that State policies that are targeted at promoting cage-aquaculture in the country appears to be prioritizing macro-economic targets and in the process making rural small scale artisanal fishing livelihoods vulnerable to dispossession, loss of indigenous livelihoods and poverty.

To conclude, the overall effects of inland cage-aquaculture on indigenous small scale artisanal fisher people are ecological and economic. The study also shows that livelihood change is linked to ecological change but went further to prove that ecological change is this case influence by powerful actors with specific interests that subject rural fishing community livelihoods to vulnerability and poverty.

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Appendix A

INTERVIEW GUIDE
CATEGORIES OF TARGET POPULATION

1) INDIGENOUS FISHER PEOPLE

Sample size of 20 fisher people (7 males and 7 females)

Opening questions

1. Do you presently live in Mpakadan?
2. For how many years?
3. What is your village/region of origin?
4. Are you married? Do you have children? How many?
5. What is your age?

Economic activities

6. What work do you do?
7. What work does your spouse do?
8. How long have you been engaged in fishing activities?
9. Have you engaged in other activities aside this one? Wage labor? Do you have a garden?
10. How is trade in fisheries organized? (middlemen or direct sales to markets? Does it include local, regional and national markets? What role do women play? Are there State subsidies for anything? What are the major goods and services that you purchase from the market?).
11. Do you have access to credit? (For what? From whom? With interest? If interest so, at what rate? Are interest payments a serious burden?).
12. Could you tell me a bit more about your fishing activities? What challenges do you encounter?
13. What do you think about fish farming/cage aquaculture?
14. Do fish farming activities affect your (and/or others') fishing activities? If so in what way?
15. Are there open conflicts involving cage aquaculture activities? Do they relate to control/ownership of the lake?
16. Do you know of any former capture fishery workers who are now engaged in cage aquaculture? (If so, do you feel they are better off economically than those in capture fishery?).

Environment

17. What other purposes does the lake serve to the community?
18. How would you describe your fish yield? (in terms of quantity and size of fish on a regular basis).
19. Do you encounter a problem of water pollution?
20. How do you perceive the impact of your activities on fish stock (i.e. the disposal of waste or the demand for mangrove for charcoal affects the availability of fish)?

21. Does fish farming have the same environmental impact as your fishing activities?
22. **Ownership**
23. How do you acquire fishing boats?
24. How is labour organized (Are they employees or family and friends?)
25. Does the village have a fishing territory (common) on the lake? (How do you know about the limits of your territory?)
26. Are neighboring fishers allowed to fish on the village's common (with or without permission)?
27. Any limits on fish captures? (fishing quotas?).
28. Are fish farms sited on the community's territory?
29. Have fish farmers asked villagers before starting their farms? (or who issues them license to operate?).
30. Who is responsible for handling these farms?
31. Have changes in the control/ownership over these resources affected the state of lake and economic activities on it?

Concluding Questions

32. How have you been able to cater for your daily economic needs? Is it improving or deteriorating?
33. what would say are the most important contribution of cage aquaculture to the community?
34. Is Ghana developing toward the right direction? What could be improved?

2) FISH FARMERS

sample size of 10 fish farmers (5 males and 5 females)

Opening questions

1. Do you presently live in Mpakadan?
2. For how many years?
3. What is your village/region of origin?
4. Are you married? Do you have children? How many?
5. What is your age?

Economic activities

6. What work do you do?
7. What work does your spouse do?
8. How long have you been engaged in fishing activities?
9. Have you engaged in other activities other cage aquaculture? (have you engaged in capture fisheries?)
10. How is trade in aquaculture fisheries organized? (middlemen or direct sales to markets? Does it include local, regional and national markets? What role do women play? Are there State subsidies for anything?

What are the major goods and services that you purchase from the market?).

11. What are the financial constraints? Do you have access to credit? (For what? From whom? With interest? If interest so, at what rate? Are interest payments a serious burden?).
12. Could you tell me a bit more about your fishing activities? What challenges do you encounter?
13. Do you feel your activities poses a constraint to other users of the lake?
14. How do you dispose off waste?
15. What do you think about capture fisheries?
16. Do capture fishery activities affect your (and/or others') fishing activities? If so in what way?
17. Are there open conflicts involving capture fishing activities? (Do they relate to control/ownership of the lake? How do you react to them?).
18. How do you maintain access to the cages on the lake?
19. What is the nature of support you receive for your activities?
20. Do you know of any former fish farmers who are now engaged in capture fishery? (If so, do you feel they are better off economically than those in fish farming?).

Environment

21. What other purposes does the lake serve to the community?
22. How would you describe your fish yield? (in terms of quantity and size of fish on a regular basis).
23. Do you encounter a problem of water pollution?
24. How do you perceive the impact of your activities on fish stock (i.e. the disposal of waste)?
25. Does capture fishery have the same environmental impact as your fish farms?

Ownership

26. How do you acquire fish farms? (and is it open to outsiders and foreign investors)
27. How is labour organized? (Are they paid employees or family and friends? Migrant labour?)
28. Does the village and/or fish farms have a fishing territory (common or private) on the lake? (How do you know about the limits of your territory?)
29. Are neighboring fishers allowed to fish on all parts of the village's territory (with or without permission)?
30. Have you as fish farmers asked villagers before starting your farms? (or who issues the license for your operation? Do you know if they consult the local fisher people?).
31. Who is responsible for handling these farms?
32. Have changes in the control/ownership over these resources affected the state of lake and economic activities on it?

Concluding Questions

33. what would say are the most important contribution of cage aquaculture to the community?
34. Is Ghana developing toward the right direction? What could be improved?

3) TRADITIONAL AUTHORITIES

A representative of the traditional authorities

Economic

1. How long has cage aquaculture been practiced in this community?
2. Are local people highly involved in cage aquaculture? (As labour, traders, or fish farm owners?).
3. How do you correspond with the State authorities on the issue?
4. To what extent have the current fishing activities on the lake been influenced by the State's agenda? (How do you protect local community interests in such instances?).
5. What is the nature of your relationship with people in capture fisheries compared to fish farmers?
6. Do you consult local fish workers before granting permission to fish farmers to operate?
7. Why do tensions still exist between the two categories of fish workers?
8. Is there any indication that the tension spreads out into new forms of socio-economic relations within the community?

Ownership

9. How do share in the use of the lake among neighboring communities?
10. What systems do you have in place to regulate the use of the lake among its different uses? (what is the system of ownership or access?).
11. How do you manage conflicts? (How do respond to concerns raised by both categories and other users of the lake?).

Environment

12. Which system of fishing do you think is more environmentally destructive and which measures have been put in place to regulate them?

4) STATE AUTHORITIES

Representatives of state authorities (including: ministry of fisheries and aquaculture development, local gov't rep).

Economic

1. What do think about cage aquaculture and capture fisheries?
2. To what extent is cage aquaculture relevant to the States' reform of the fishery subsector?
3. How are local community interests (including capture fisheries) captured under such reform?
4. How do you correspond with traditional authorities on such issue?
5. What credit (and interest rates) or subsidy schemes are in place to support the local community?
6. How are foreign investments in cage aquaculture managed? (including migrant labour).
7. Are you aware of the tension between capture fishers and fish farmers in Mpakadan community?
8. How do you respond to the conflict/concerns raised?
9. Why has there been a need for a Fishery Conflict Resolution Board? (How effective would they be in resolving these issues? How about potential institutional clashes or conflicts?).
10. What is the situation with investment in fish farming? Where do the indigenes fit into the agenda?

Ownership

11. What is the state of regulation of major economic activities on the Volta lake? (State-centered, community based or private property).
12. How are fishing territories determined and does such an approach take the multiple uses of the lake into consideration when doing such demarcations?
13. Why is the introduction of access barriers influential to the State's fishery project?

Environmental

14. How are environmentally destructive practices in both systems of fishing regulated? How are waste disposal and mangrove destruction controlled?
15. How do perceive the relation between the two systems and the environment?
16. Why is attention been given to promoting aquaculture and not controlling the cause of unstable fish stock?
17. What environmental considerations are taken in consideration when granting permission to private investors? How does this contrast with the regulations for capture fishing?

Concluding Question

18. How do counter the States' logic and objective of achieving economic growth and development in fishing communities when majority of inputs including fish feed and fingerlings are imported and fish farms are highly capital intensive?