Review of Fisheries and Aquaculture Policies in Ghana

Technical Report

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TABLE OF CONTENTS

Tables

Figures

LIST OF ABBREVIATIONS

Abbreviation	In Full
AqFI	CGIAR Initiative on Aquatic Foods
CSIR	Council for Scientific and Industrial Research
EPA	Environmental Protection Agency
FAO	Food and Agriculture Organization of the United Nations
FC	Fisheries Commission, Ghana
IFPRI	International Food Policy Research Institute
IWMI	International Water Management Institute
KNUST	Kwame Nkrumah National University of Science and Technology
MOFAD	Ministry of Fisheries and Aquaculture Development
NDA	Northern Development Authority
UG	University of Ghana

EXECUTIVE SUMMARY

This review report provides an overview of Ghana's fisheries and aquaculture sectors. The report summarizes and highlights the formal policies and governance structures related to aquaculture, inland fisheries, and marine fisheries in Ghana. The report identifies the legal frameworks and strategies governing these sectors and the plans and regulations in place. The aquaculture sector is an expanding subsector that has greater potential to increase and meet the increased demand for fish in Ghana, which is currently being met through imports.

The report emphasizes that fisheries resources in Ghana are derived from marine, inland, and aquaculture sources. It notes a decline in marine fish production but a steady increase in inland and aquaculture fisheries production. The National Aquaculture Development Plan aims to further increase the market share of commercially farmed fish.

Furthermore, the report underlines the significant contribution of fisheries and aquaculture to Ghana's Gross Domestic Product (GDP), accounting for 4.5% of the National GDP and 12% of the Agriculture GDP. It also highlights the importance of fish as the main source of protein for many households in Ghana, which is higher than most countries within the Sub-Saharan region.

The report also highlights some of the Government of Ghana's programs and interventions to increase aquaculture production. Such interventions include the Aquaculture for Food and Jobs initiative, which is linked to the broader Agriculture for Food and Jobs initiative. This intervention increases aquaculture production by supporting women and youths in pursuing fish production by providing initial capital support, which is complemented by capacity development, quality fingerling provision and inculcating the view of aquaculture production as a serious business and employment creation venture.

The report concludes by highlighting some of the points below as key considerations for sustainable aquaculture production.

- The importance of linking policy and practice.
- The key role of applied research.
- Policy harmonization.
- Importance of innovative financing models.
- Ensuring that women and youths are included in aquaculture investments.
- One Health perspective to deal with the threat of fish diseases.

1.0. INTRODUCTION

This review report aims to provide a broader introduction to Ghana before moving to look at the fisheries formal policy context in Ghana with a focus towards aquaculture which can be traced back to the 1950s (Abban et al. 2009). This brief review focuses on inland fisheries policy. Whilst this report focuses on the inland fisheries, the policy architecture tends to bring both the marine and inland fisheries under the same broader legislative frameworks. This review will not focus on indigenous/local level policy practices which are important for inclusive fisheries governance according to the illuminating hidden harvest study (FAO 2023). Formal policies entail the governance arrangements including laws, policies, plans and regulations. Informal policies are based and accepted by local traditional authorities and customs. Such local practices may or may not be accepted by formal authorities or the state (FAO 2023).

The fisheries resources in Ghana are derived from the marine, inland and aquaculture (MOFA 2019). Marine fisheries are based on capture fisheries within the sea. Inland fisheries are based on capture fisheries within the riverine systems and lakes such as the Volta Lake. Aquaculture, on the other hand, is based on fish farming which may be conducted in the sea, rivers, ponds, cages, tanks, dams or dugouts. Marine fish production has been declining from 420,000 tonnes in 1999 to 393,970 tons in 2021 (FAO 2016; Fisheries Commission 2022). Inland and Aquaculture fisheries production has been on the increase. Aquaculture production, for instance has seen a steady growth since 2008 with significant increases in recent times. Ghana's new National Aquaculture Development Plan (2022-2026) targets an increase in the market share of commercially farmed fish from 14 percent in 2021 to 25 percent in 2027.

Fish is the main source of protein for most of the households in Ghana (FAO 2016). Fisheries and aquaculture contribute 4.5% of the National Gross Domestic Product (GDP) which is about 12% of the Agriculture GDP (Alhassan and Akongyuure 2020; World Bank 2019). Aquaculture production in Ghana largely focuses on the Nile Tilapia and catfish producing 43% of the freshwater fish production in Ghana (World Bank 2019). Aquaculture production offers an opportunity to increase fish production especially in the context of the declining fish catches from the marine sector. Ghana has a 26 kg per capita fish consumption which is 6 kg above the global average of 20 kg/ per capita (World Bank 2019). Fish is very central to Ghana as it provides employment, nutrition and financial security (Akongyuure et al. 2017; Bene et al. 2015).

Ghana has a long history of fishing which stretches back for centuries with records of marine fisheries going back to as far as 1700s (Alabi-Doku et al 2020). The fisheries sector in Ghana is gendered with men mainly engaged in the actual fishing and women dominating the post-harvest activities (Appiah et al. 2021). Aquaculture in Ghana, which is synonymous with fish culture, was reported to have been taking place in the 1950s in the northern regions of Ghana (Abban et al. 2009). The aquaculture sector is dominated by men comprising 89%, with females comprising about 3 % and the remaining 8% comprising for collective action aquaculture production through groups (Abban et al. 2009).

This review report is within the context of the CGIAR Initiative on Aquatic Foods (AqFI). This initiative aims to strengthen the resilience of aquatic food systems to realize their full potential for nature, people and climate by tackling systemic challenges such as data gaps, gendered power asymmetries, water resource mismanagement, limited research investment and missed opportunities for scaling through agricultural innovation systems and address food insecurity by piloting the co-designing and scaling of aquaculture interventions in small water reservoirs for multiple-use purposes (irrigation, aquaculture, livestock, and domestic uses) in Ghana.

This review report is based on literature review which looked at the legal framework governing fisheries and specifically aquaculture in Ghana. This entailed looking at the laws and policies governing fisheries from the historical and current perspectives. Aquaculture has largely been governed by the fisheries legislations. The fisheries and aquaculture management plans and other frameworks which governed aquaculture management were also reviewed.

The objective of this policy review is to provide an understanding of the fisheries and aquaculture policy landscape over time. The policy context will enable the CGIAR Initiative on Aquatic Foods to better locate the aquaculture pilot schemes within the broader policy and economic setting of Ghana. The ongoing pilot aquaculture projects will also be scaled to more regions within Ghana. It is therefore important that the broader underlying policy is summarized.

The first section will provide an overview of fisheries and aquaculture in Ghana. This is then followed by an overview of Ghana's Macroeconomic context to provide some background on the economic situation in which fisheries and aquaculture are situated. The macroeconomic section will cover the GDP, labour force and the agricultural food systems whilst relating them to the fisheries and aquaculture context. The main programmes which have relevance to the fisheries and aquaculture sector were also looked at in another section. The programmes include the focus on the youth, the One Village One Dam (1V1D) initiative, fisheries and aqua businesses and Aquaculture for Food and Jobs (AFJ). The review then moved on to examine the Ghana Fisheries legislations and key policies such as the 2008 National Fisheries and Aquaculture Policy. The final section then draws out lessons of experience and their implication for the future aquaculture trajectories in Ghana. The review then ends with a brief conclusion.

2.0. FISHERIES AND AQUACULTURE IN THE CONTEXT OF GHANA

Ghana is a country in West Africa with a total population of 30.8 million with females comprising 50.7% and males 49.3% (Ghana Statistical Services 2021). Aquatic food accounts for 60% of Ghana’s national dietary intake of animal protein (Rurangwa et al. 2015; Chan et al. 2019), about four times higher than the global average (Hishamunda et al. 2009). Ghana is an exception in the continent as it has a high per capita fish intake of 26 kg. The current gap between aquatic food demand and supply, which is filled by imports, is about 640,182.47 metric tons (mt) (50.10%) of the total fish production, according to the 2021 Annual Performance Report from Fisheries Commission. The map of Ghana, indicating its location and the constituent regions, is shown in Figure 1.

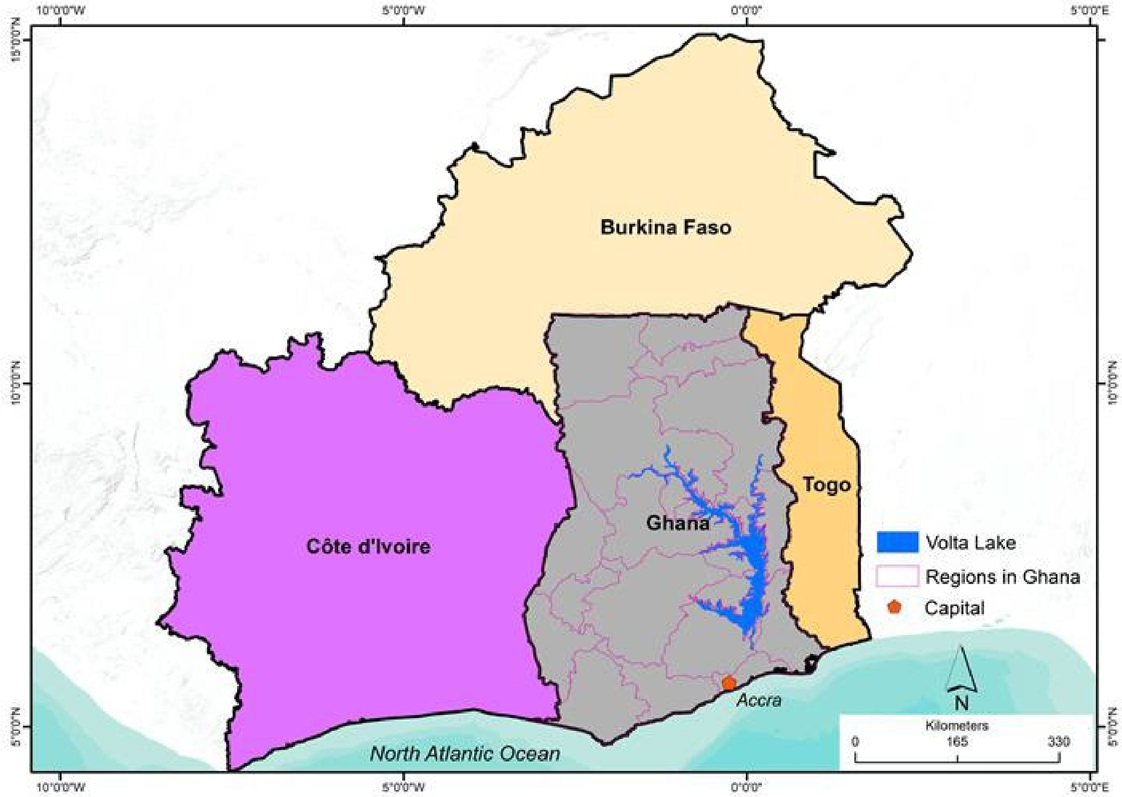

Figure 1. Map of Ghana showing the neighbouring countries and the administrative regions. *(*Map drawn by Komlavi Akpoti, International Water Management Institute, Ghana.)

Aquaculture production in Ghana has grown from 5,590 tonnes in 2008 to 76,630 tonnes in 2018. Due to the incidence of infectious spleen and kidney necrosis virus (ISKNV) which attacked most cage fish farms on the Volta Lake, aquaculture production dropped to 52.36 tons in 2019. In 2020 aquaculture production increased to 64,010 tonnes which could be due to government intervention to the sector by providing free vaccines to fish farms that were affected. The aquaculture production further rose to 89,375.48 tonnes in 2021 (Fisheries Commission 2022). Unlike the capture fisheries, aquaculture has been expanding and still has a lot of opportunity to increase (Statista 2023). The growth in aquaculture was largely driven by large-scale cage aquaculture (Ragasa et al. 2022; Ragasa et al. 2018). In Ghana, tilapia remains the most popular cultured fish, with cage culture accounting for the largest share of fish production. Catfish output has significantly increased recently, with a high production of 20,660.95 mt in 2021 compared to 16,321.96 mt in 2020 and 13,063.41 mt in 2019 (Ghana Statistical Service (GSS), 2023)

The small-scale pond aquaculture has great promise for the smallholder farmers to be engaged and derive livelihoods as they were having a profit margin of about 27% (Ragasa et al. 2022). The farmers who were adapting good aquaculture practices were deriving even greater returns. One of the major challenges experienced by aquaculture farmers was the high input costs especially on the fish feeds and fingerlings. For instance, the production cost figures for 1 kg of tilapia in Ghana was USD1.51 which was higher than major tilapia producers such as Bangladesh, Egypt and China where the production cost per kg averages from USD0.78 to USD1.29 (Ragasa et al. 2022). This was compounded by the fact that 54% of the aquaculture farmers had difficulties accessing inputs and 56% and challenges accessing markets for their fish. The Government of Ghana sees aquaculture as offering opportunities for increasing fish production whilst creating employment and wealth creation opportunities (Fisheries Commission 2022).

Figure 2 shows the aquaculture production figures in Ghana.

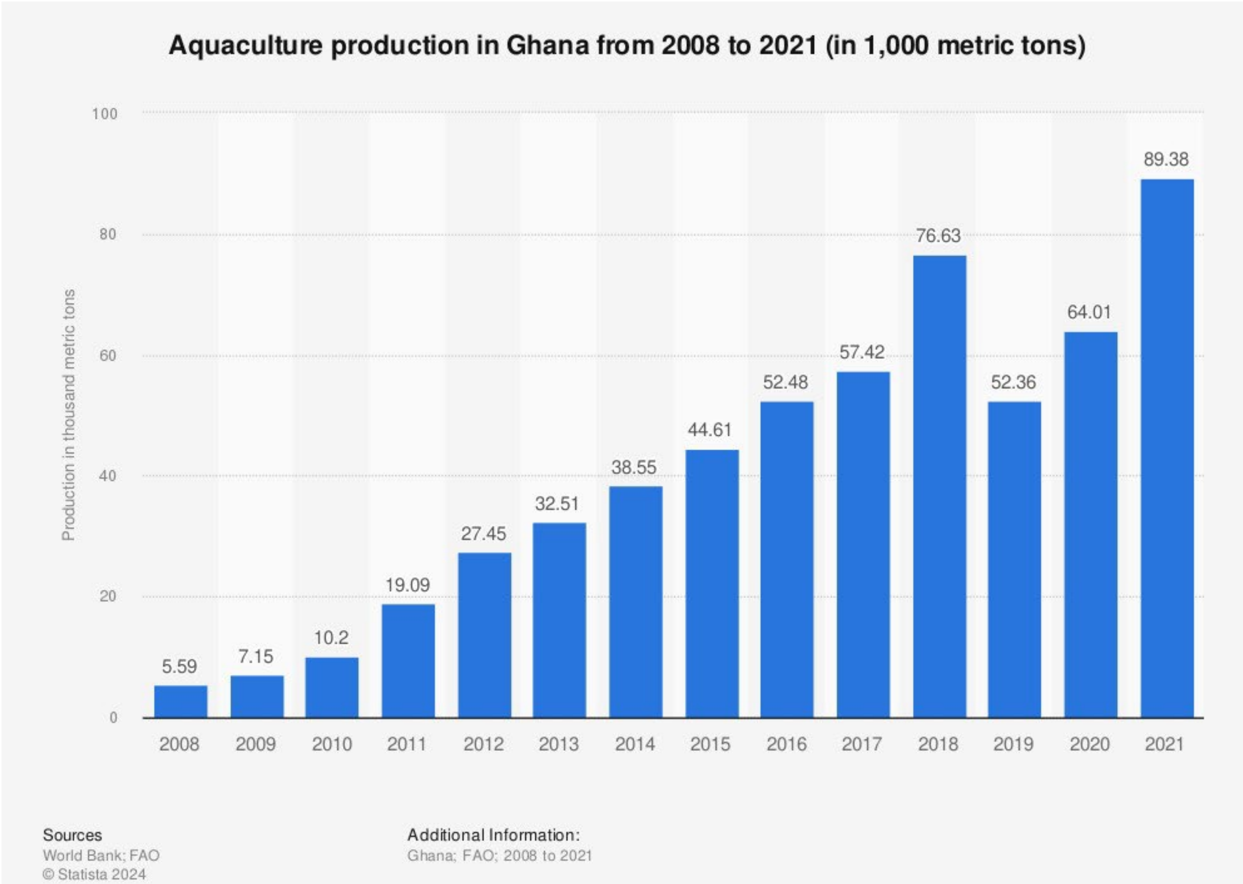

Figure 2. Aquaculture Production from 2008 to 2021 (Sources: https://www.statista.com/statistics/1118781/aquaculture-production-in-ghana/ and Fisheries Commission 2022.)

The expansion of aquaculture, according to Ragasa et al. 2022 and Fisheries Commission 2022, is attributed to the following reasons.

1. The availability of an improved local tilapia, the Akosombo strain since 2005;
2. Pro aquaculture government policy support initiatives - pro-aquaculture policies successfully supported the growth in the aquaculture sector witnessed from early 2010s;
3. Improved hatcheries and grow-out production systems;
4. Presence of high-quality feeds in the local market (Ragasa et al. 2018); and
5. Market availability due to demand exceeding supply (Fisheries Commission 2022).

3.0. OVERVIEW OF GHANA'S MACROECONOMIC CONTEXT

This section highlights the key macroeconomic indicators that have shaped the country' economic architecture for decades. The indicators include the GDP growth rate, poverty rates, and labour force participation. The different indicators, where data is available, are also linked to the fisheries and aquaculture sector.

3.1 Gross Domestic Product (GDP) and Poverty rates

According to the World Bank, Ghana's GDP in 2022 was 72.8 billion United States (US) dollars, which represents 0.06% of the world economy, and GDP per capita of $ 2,175.9 (World Bank 2023). In 2023, the World Back estimated that 25.1% of the Ghanaian population was below the International Poverty Line of USD 2.15 per day.

The African Development Bank (AfDB 2020), notes that the Ghanaian economy, between 2017 and 2020 outperformed the world economy, attaining GDP growth rates of 6.3% and 6.5% in 2018 and 2019, respectively (AfDB 2020). Because of COVID-19 pandemic, GDP growth for 2020 was low (0.5%) but then bounced back to 5.1% in 2021, but soon entered a macro-economic crisis in 2022, caused by existing imbalances and external economic shocks. Because of this crisis, GDP growth rate declined to 3.1% in 2022 and is estimated to have further declined to 1.8% in 2023 (World Bank 2023). Moreover, the instability of the international financial markets generated put pressure on the exchange rate, which combined with a general increase in food and input prices globally, and resulted in exceptionally high inflation in Ghana: 31.2% in 2022 and 45.4% in 2023, most of which is driven by increased food prices inflation and low economic growth are also expected to increase poverty in the country, with 27% of population estimated to be poor in 2023 (World Bank 2023). In the aquaculture sector, high inflation rates resulted in significant increases in fish feed prices. Studies in Ghana have also noted that feed prices in Ghana were twice as expensive as in other aquaculture-producing countries (Ragasa et al. 2018; Macfadyen et al. 2012). The Fisheries sector contributed 1.7% of the GDP in 2022 (Ghana Statistical Services 2022). The major contributor is marine fisheries with inland and aquaculture contributing a smaller proportion. The sectors contribution to Agriculture GDP for the period 2015-2020 is estimated at 5.4% (Fisheries Commission 2022). The sector also provides raw materials to the fish canneries and other fisheries-related industries in the country (GSS 2023)

Ghana has valuable fisheries that could generate in the order of US$ 1 billion in revenue each year. The fisheries support 135,000 fishers in the marine sub-sector alone and indirectly support the livelihoods of about 10% of all people in Ghana (https://faolex.fao.org/docs/pdf/gha178892.pdf). The contribution of fisheries to the GDP has been declining from 1.49 % in 2013 to 1.04% in 2021 (Fisheries Commission 2022). Table 1 summarizes the contribution of aquaculture to the GDP.

Table 1. Fisheries and Aquaculture contribution to Ghana's Gross Domestic Product

Subsector	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Marine	1.04	0.92	0.99	0.92	0.77	0.62	0.60	0.67	0.68
Inland	0.37	0.34	0.36	0.32	0.21	0.21	0.20	0.19	0.26
Aquaculture	0.08	0.09	0.11	0.11	0.13	0.12	0.08	0.08	0.10
Total	1.49	1.35	1.46	1.35	1.11	0.95	0.88	0.94	1.04

Source: Fisheries Commission 2022

3.2. Labour Force

In Ghana, the accessible data for labour force participation rate from 1990 to 2020 shows that, during that period the country recorded an average value of 71.78%, with a minimum of 66.2% in 2020 and a maximum of 74.92% in 1992 (ILO 2020). In a similar vein, data for female labour force participation from 1990 to 2019 reveal that the average figure for the country was 47.8% with a minimum of 46.31% in 2015 and a maximum of 48.67% in 2000. Currently, the figure for 2019 was 46. 66% (Ibid). The International Labour Organization, however, posits that for the same period, the average value for male labour participation was 74.86% with a minimum of 71.69% in 2019 and a maximum of 77.68% in 1990. The latest value recorded in 2019 is 71.69% (ILO 2020). The marine fisheries sector is gendered with men engaged in the actual fishing and women engaged in the post-harvest fisheries value chains and marketing (Appiah et al. 2021). Aquaculture was observed to also offer employment opportunities to youth and women in Ghana (Ragasa et al 2022). The total number of people employed in fisheries is 140,000 with aquaculture directly employing 4,474 people (Fisheries Commission 2022). Women and youths are largely involved in the informal sectors with the figures on their labour contribution being estimates as compared with other sectors of the economy.

3.3. Agriculture and Food Systems

Agriculture continues to play an important role in Ghana's economy. It contributes nearly 20 per cent of GDP and also employs about 42 percent of the workforce (Government of Ghana 2020;

GSS 2020; World Bank 2019 and MOFA 2019). The agricultural sector also accounts for more than 30 percent of export revenue and serves as the main raw material base for the manufacturing industries (MOFA 2020). Ghana's agriculture is predominantly smallholder, traditional and rain-fed. According to the Food and Agriculture Organization (2018), about 60 % of all farms in the country are less than 1.2 hectares in size, 25% are between 1.2 to 2.0 hectares, with about 15% above 2.0 hectares. The sector also accounts for about 80% of total agricultural production in the country (MOFA 2016; World Bank 2019; GSS 2020).

Although Ghana's farming systems take different forms across agro-ecological zones (see Figure 2), there are, however, some common characteristics that manifest across farmlands throughout the country (GSS 2020). The forest zone, which lies in the middle belt of the country is where tree crops such as cocoa, oil palm, coffee and rubber flourish. The zone also helps in the cultivation of food crops such as maize, plantain, cocoyam and cassava. Maize, millet, cowpeas, groundnuts, yam and rice are some of the main crops that are cultivated in the northern parts of Ghana (GSS 2020).

Aquaculture has developed from using earthen fishponds to the use of tarpaulin tanks, concrete tanks, cages and so on as holding facilities. Therefore, aquaculture development in any of the regions in Ghana depends on availability of funds and the interest of entrepreneurs to invest in the sector.

With the introduction of cage culture, the Eastern Region is leading in terms of aquaculture production in Ghana. This position used to be enjoyed by Ashanti Region which has a lot of earthen fishponds due to the suitability of their soils for fishpond construction.

3.4. Regional Aquaculture Production in Ghana

Aquaculture production in Ghana is concentrated in the Eastern region, Greater Accra and the Volta which account for 82% of the total aquaculture production as shown in Table 2.

Table 2. Aquaculture Production by region

Region	Tilapia	Catfish	Total Production (2021)	Contribution by Regions (%)
Eastern Region	36,783.05	3,151.91	39,934.96	44.68
Greater Accra	20,013.01	4,100.00	24,113.01	26.98
Volta	7,437.81	2,480.55	9,918.36	11.10
Ashanti	687.02	2,559.21	3,246.23	3.63
Bono	985	2,074.00	3,059.00	3.42
Western North	860.46	1,531.98	2,392.44	2.68
Western	445.14	1,444.80	1,889.94	2.11
Ahafo	82.1	1,303.56	1,385.66	1.55
Northern	823.64	226.9	1,050.54	1.18
Central	258	655.65	913.65	1.02
Bono East	78.48	501.1	579.58	0.65
Upper West	45.21	240.95	286.16	0.32
Upper East	21.09	212.04	233.13	0.26
North East	25.21	15.11	40.32	0.05
Oti	105	112	217.00	0.24
Savanna	112.5	3	115.50	0.13
TOTAL	36,783.05	3,151.91	39,934.96	44.68

Source: Fisheries Commission 2022

4.0. MAIN PROGRAMMES RELEVANT TO THE FISHERIES AND AQUACULTURE SECTOR

This section highlights some of the programmes which are relevant for the fisheries and aquaculture sector.

4.1. Youth in Agriculture Programme

One of the recent policy interventions of the current government in the agriculture sector is the Youth in Agriculture Programme (YIAP). The aim of this initiative is to mobilize and encourage the youth to actively engage and acknowledge farming or food production as a commercial venture, thereby taking on the phenomenon as a lifetime vocation. The initiative seeks to change the negative perception the youth have of the engagement in agriculture, which views (farmers) as uneducated, unskilled, physical labourers with extremely low economic returns. Modern agriculture is more than tilling the soil and rearing animals. The sector today offers career opportunities in research, environment, financial management, value addition, engineering and other technical areas for the youth to explore.

The benefits of youth involvement in agriculture in the country cannot be underestimated. To start with, the programme intended to ensure the sustainability of the sector's labour force, considering that, the current average age of a farmer in Ghana is 55 years and life expectancy averages between 55-60 years. More so, efforts to boost Ghana's food production will not yield positive results until the youth are strategically positioned in the sector. This will help reduce Ghana's dependence on imported goods, as the continuous reliance on this makes the country more vulnerable. Through the programme, it was intended that rural employment would be increased thereby leading to a decline in the rate of youth unemployment. This programme serves as productive alternative for youth who might otherwise engage in crime due to unemployment. The programme provides farmers with tractor services, as well as subsidized, interest-free agricultural inputs (MOFA 2020).

There are four components of the YIAP (MOFA 2020). These are:

i. Crops and Block Farm,

ii. Livestock and Poultry,

iii. Fisheries/Aqua-business – this aims at promoting fisheries and aquaculture as viable business enterprise.

iv. Agribusiness

4.2. One-District-One-Factory

The One-District-One Factory (1D1F) is an initiative of the current government to transform the nature of the country's economy from the type which is reliant on an import and export of raw material to one that is focused on manufacturing, value addition and export of processed goods. According to available data, 76 factories have been built comprising of 28 new and 48 expansions of existing factories (https://1d1f.gov.gh/#).

The initiative which was launched on the 25th of August, 2017 at Ekumfi in the Central Region hopes to achieve the following objectives; "to add value to the natural resources of each district and exploit the economic potential of each district based on its comparative advantage, ensure even and spatial spread of industries that would stimulate economic activity in different parts of the country, create employment particularly for the youth in rural and peri-urban communities, and thereby improve income levels and standards of living, as well as reduce rural-urban migration, promote exports and increase foreign exchange earnings and enhance the production of local substitutes for imported goods thereby conserving scarce foreign exchange" (MOFA 2020).

The one District One Factory may potentially enhance fisheries and aquaculture production through the value addition of fish from the aquaculture farms whilst also creating employment opportunities. One of the main challenges for aquaculture is sourcing fish feeds and engaging in the fish value chains. Some of the factories could also be producing quality feeds nearer the aquaculture production areas and help farmers engage in the fish value chain.

4.3 One Village One Dam

In 2017, the Government of Ghana launched its 1V1D initiative, which seeks to make irrigation accessible to small-scale farmers in Northern Ghana. This initiative is implemented in five regions of northern Ghana that have consistently been ranked by the Ghana Living Standards Survey as the poorest in the country. The programme is envisaged to develop 570 small dams. The 1V1D initiative aims to build dams for irrigation purposes and to promote dry season farming in the northern parts of Ghana. As of March 2024, about 300 dams were constructed.

To give further description of the dams, the MOFA reveals that, it is expected that each dam will be identified by certain features including, "land area ranging between 2 and 3 hectares, earth embankment wall ranging between 150 to 250 meters with a maximum height of 5 metres depending on the topography of the location, a maximum depth of about 5 metres (2.5 m below and 2.5 m above ground level), water holding capacity of about 30,000 cubic meters, inlet-outlet Structure to supply water downstream (to irrigation farms) from the small dam and Spillway to control the level of water in the small dams" (MOFA 2020). The dams are anticipated as providing water for irrigation, domestic and livestock watering uses. Even though the goal of the initiative is applauded the success of the phase one of 1V1D initiative, however, remains debatable in the national policy discussions due to the technical and implementation challenges encountered. In order to incorporate aquaculture production, the depth of dams under the 1V1D needs to be increased. In the second phase of the program, aquaculture should be considered part of the planned use for the water infrastructure. The 1V1D initiative needs to be more intentional towards aquaculture and also ensuring that there is post-construction institutional support and coordination for sustainability of the dams and aquaculture production.

4.4. Aquaculture for Food and Jobs

This programme is an expansion of the Planting for Food and Jobs which focused on crop farming. In the fisheries sector, AFJ was introduced as a mechanism to increase local fish production and creation of jobs for the youth and women in the aquaculture value chain. This programme is expected to increase fish production from the aquaculture sector by 91, 000 tonnes while creating about 86,000 jobs especially targeting women and youth from 2018 to 2020 (Ragasa et al. 2022; MOFAD 2018). The focal areas for this programme are:

- Private sector engagement
- Involvement of small-scale fish farmers
- Providing Institutional support – schools, prisons and other institutions
- Providing Input support for new and existing farmers especially youths
- Improving aquaculture extension services
- Market linkages

  The main objectives of AFJ include:

  1. Job creation
  2. Increasing fish production
  3. Food and nutrition security

4. Poverty reduction and wealth creation

4.4.1. AFJ Procedure for Selection of Youth Groups

1. Advertise through churches and community leaders to reach out to the youth and organise them together.
2. Chiefs, community leaders, churches and benevolent individuals are engaged to assist the youth in land acquisition, leasing or renting for at least 20 years.
3. The staff of Fisheries Commission will inspect and assess all proposed lands to ascertain their suitability for the project (i.e. the topography, soil type, source of water - its availability, accessibility and quality).
4. Each group should have at least 20 members.
5. At least 40% of the members should be females.
6. Each group will be inaugurated by the parties (Development Partners, MOFAD and FC officials) and taken through all the rules and regulations of the project.
7. Each member of the group should be willing to work without expecting any remunerations until the first fish harvest.
8. Each group will elect its leaders – Leader, Assistant Leader, Secretary, Organizer, Treasurer, Financial Secretary and other members.
9. Each group will be registered as a business entity with equal shares among the members.
10. Open a current account for each group/company.
11. Each group should formulate bye-laws to govern their group/company.
12. Sign a Memorandum of Understanding with the Project Partners.

4.4.2. AFJ Package for Youth Groups

a. Each group is given ten (300 m^2) earthen ponds or its equivalent in cages.
b. They are supplied with a total of 20,000 tilapia or catfish fingerlings.
c. They are supplied with 750 bags of feed.
d. They are trained in fish farming techniques and management.
e. Other accessories (water pumping machine, mechanized borehole, etc) under case-by-case basis.

4.4.3. The Group's responsibility

1. Provision of suitable site/land for the construction of the pond.
2. Take care of the day-day running of the project.
3. Provide security for the facility until harvesting.
4. Harvest and sale of the fish.
5. Reinvest the proceeds from the harvest into the project to ensure sustainability of the project.

4.4.4. AFJ Package for Off-takers (Fish Processors)

In the case of Off-takers (Fish Processing and marketing) who are about 15 members per group, the following package is provided:

i. A fish processing centre containing 'Ahoto' oven is constructed for them.
ii. They are given training in fish handling, processing and marketing.
iii. They are given a start-up capital in the farm of cartons of fish or cash.

4.4.5. The Off-Takers Responsibility

a. Provide site for the construction of the fish processing centre in the community.
b. Operate as a business with equal shares.
c. Buy fish from the fish producers (youth groups or fishermen) add value through processing and sell for profit.
d. Reinvest proceeds into the business to ensure sustainability.

4.4.6. AFJ Package for Distressed Fish Farmers

Under the AFJ fish farmers who are facing financial challenges for one reason, or another were supported with fingerlings, feed and training. This support is to ensure the farmers bounces back to business stronger to be able to employ one or two individuals to assist in his farm. The package for the distressed farmers includes:

i. Rehabilitation of one pond (where necessary).
ii. Provision of 2,000 tilapia or catfish fingerlings.
iii. Provision of 75 bags of fish feed.
iv. Provision free technical extension services.

4.4.7. The Responsibilities of the Distressed Farmer

a) Provide a pond that can hold 2,000 tilapia of catfish fingerlings.
b) Attend refresher trainings in fish farming techniques and management.
c) Take care of day-to-day running of the pond.
d) Provide adequate security the farm.
e) Enrol more farms hands for efficient running of the farm.

4.4.8. Job Creation

A total of 1,600 direct and indirect jobs were created for the youth and women during the piloting phase of AFJ from 2018 – 2022. These include youth groups in fish processing, off-takers in fish processing and trade, institutions, fingerling producers, fish feed manufacturers and many more along the aquaculture value chain. It worth noting that during this period, which was the piloting phase, funding was a major challenge which affected the achievement targets set for the project. However, the significant achievement chalked during the pilot phase gives the confidence that with adequate funding to the project, the aquaculture sub-sector would be a solid means of bridging the wide gap between fish demand and supply in Ghana.

5.0. GHANA FISHERIES AND AQUACULTURE POLICY

Policies aimed at improving the fisheries and aquaculture sector have been implemented over time. These include the National Fisheries and Aquaculture Policy (2008 and 2022), Ghana National Aquatic Animal Health Policy, Fisheries Co Management Policy (2020), Marine Fisheries Management Plan (2015-2019 and 2022-2026), Fisheries and Aquaculture Sector Development Plan (2011-2016), and Ghana National Aquaculture Development Plan (2012-2016 and 2022-2026). The policy documents cover topics such as aquaculture input availability, public and private sector roles, education and training, research and innovation, partnerships, production systems, environment and climate change, aquatic animal health, post-harvest management, and trade of fish and fish products (GSS 2023).

The sector incorporates various actors both within and outside its divisions to formulate, implement, influence and fund fisheries and aquaculture policies in Ghana. Figure 3 shows the different actors and their roles.

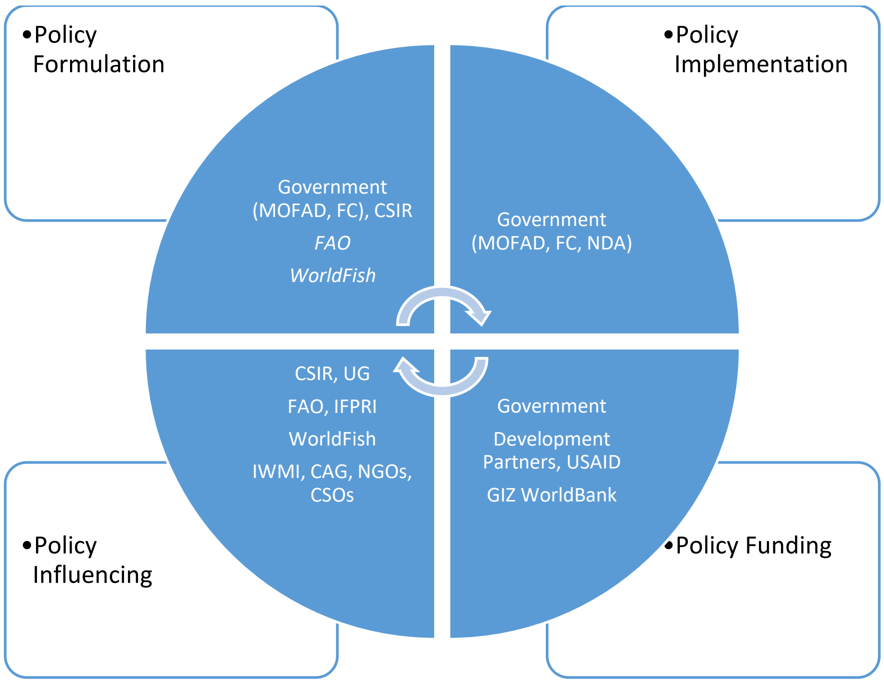

Figure 3. Roles of Stakeholders in Policy Formulation and Implementation (*Source:* Authors' creation)

The main actors within the Aquaculture sector are the Ministry of Fisheries and Aquaculture Development (MOFAD), Council for Scientific and Industrial Research (CSIR)'s Water Research Institute, The Department of Marine and Fisheries Sciences - University of Ghana, Department of Fisheries and Watershed Management - Kwame Nkrumah University of Science and Technology (KNUST), Department of Aquatic Sciences – University of Cape Coast, The Food and Agricultural Organization of the United Nations (FAO), WorldFish, International Food Policy Research Institute (IFPRI), International Water Management Institute (IWMI), Ghana Aquaculture Association, the private sector, fish farmers, fish farmer associations, Non-governmental organizations, Civil Society Organizations, and development partners. There has been a general increasing trend on aquaculture fish farms since the 1950s. Asmah (2008) showed that the annual aquaculture development rate was about 16%.

5.1. Fisheries Legal Architecture

The evolution of the key Fisheries Legal Framework in Ghana and its implication on aquaculture is summarized in Table 3.

Table 3. Key legislation governing the fisheries sector in Ghana.

Legislation	Main Objective	Aquaculture Implication
Fisheries Act, 2002 (Act No. 625 of 2002 (*Appealed the Fisheries Law 1991 other than Part I, and the Fisheries Commission Act, 199*3)	Establishment of the Fisheries Commission, its roles, powers and functions. Development of Fisheries Management and Development Fishery Plans Establishment of the Fisheries Development Fund	Licensing Fisheries Fund – "36 (c) to provide assistance to small scale fishery co-operative enterprises"
Fisheries (Amendment) Act, 2014 (Act No. 880)	Introduces international conservation and management areas. Introduces the Illegal, Unreported and Unregulated fishing and establishes fines for such activities.	Main focus is Marine and international fishing
Wholesale Fish Marketing Act, 1963 (Act No. 156)	Designated fish markets largely for marine fisheries.	
Fisheries Regulations, 2010 (L.I. 1968).	These regulations sought to operationalize the Act 625	Establishes Permit Requirements before Aquaculture activity establishment. Gives guidance on aquaculture production and circumstances which result in the cancellation of permit. Regulates importation of fish species.
Fisheries (Amendment) Regulations (L.I. 2217 of 2015)	Further tighten licensing and international cooperation in controlling illegal and unreported fishing.	Main focus is on international fishing and cooperation.
Guidelines for the registration & licensing of fishing vessels (industrial and semi-industrial) in Ghana	Stipulated detailed guidelines for fishing vessel construction, acquisition, registration and fishing permits	Largely not applicable for aquaculture.
Fisheries Regulations, 1979	Addressed fishing methods, regulations and also stipulates the requirements for importing live fish into Ghana, as well as sea worthiness of boats.	Importation of live fish has implications on aquaculture.
Fishing Boats (Certificate of Competency First Class and Second Class Engineers) Regulations, 1974	Provides for the qualifications and certification for fishing vessel engineers.	Largely for marine fisheries

Fishing Boats (Certificate of Competency as Skippers and Second Hands) Regulations, 1972.	Qualifications and certification of skippers and second in hand.	
Ministerial Directive Regarding the Implementation of Closed Seasons for Industrial Trawlers under The Fisheries Management Plan of Ghana (2015 -2019)	This was meant to enforce the closed season for fishing by the industrial trawlers in line with the 2015-2019 fisheries management plan.	Not applicable
Draft Aquaculture Development Plan (GNADP) 2022-2026	Enhance aquaculture production which is responsive to the current political, social and economic context.	Increase aquaculture investment and production. Make it easier to register for an aquaculture project

Source: Compiled from Acts, FAO Database and Fisheries Commission 2022.

5.2. Fisheries Law, Act 625 of 2002

This Act established the Fisheries Commission, its powers, functions and organizational structure. One important element is also that it sets up the Fisheries Development Fund and how it is to be used. This Act also regulates the management and conservation of fisheries resources.

5.3. National Fisheries and Aquaculture Policy (2008)

This policy realized the need for complementing the declining fisheries catch, with the expansion of aquaculture in order to meet the increasing demand for fish in Ghana. This policy also notes the important need for going beyond capture fisheries which is also facing challenges of illegal/unreported fishing especially within the context of marine fisheries. The industrial marine fishing declined from 207,070 tonnes in 2002 to 198,660 tonnes in 2014. Artisanal fisheries also declined in the same period from 209,770 tonnes to 169,930 tonnes. Illegal marine fishing is said to cost USD$ 2.3 billion every year to the coastal countries in West Africa (Alabi-Doku et al 2020). The focus areas for the policy on the aquaculture part are:

- The sustainable development of aquaculture.
- Increase annual aquaculture production from 9.000 tonnes to 100,000 metric tonnes by 2015.
- Proposes the establishment of a regional aquaculture facility at Asamasa to supply fingerlings and aquaculture feedstuffs to local fish farmers.
- Support local farmers, small scale and commercial aquaculture production.

A critique of this policy by (Abban et al. 2009) highlights 4 points below:

(i) Does not provide for tailored aquaculture zoning.

(ii) Silent on the establishment of aquaculture development.

(ii) Lacks innovative financing solutions for aquaculture.

(iv) No research funding solutions.

5.4. Ghana National Aquaculture Development Plan (GNADP) 2012-2016

This was launched in 2012 and was scheduled to cover the period 2012 to 2016. The Ghana National Aquaculture Development Plan (GNADP – 2012 - 2016) was designed to enable Ghana take advantage of its biophysical and socio-economic environment; strong research capacity; and rising fish prices locally and globally, to significantly bridge the huge gap between national fish demand and supply in the medium term. This medium-term plan was one of the bold initiatives by the Government of Ghana to arrest the decline in the nation's annual fish output and revitalize the fisheries sector, by establishing a strong basis for the sustained and accelerated growth of the aquaculture subsector.

According to FAO, the plan was ambitious with a vision of the Plan being "a strong basis for the accelerated development of a private sector-led aquaculture that enables this subsector to contribute significantly to fish food and nutritional security, employment generation, increased incomes, economic growth and poverty reduction, on a sustained basis" (FAO online accessed 12 April 2023). The plan was building upon National Aquaculture Strategic Framework (2006), meant to facilitate the promotion of aquaculture as a business under the principle that:

- The best investments come from matching the appropriate aquaculture system and the prerequisite bio-physical and socio-economic requirements (i.e., high priority zones); and
- Support mechanisms or services for these aquaculture businesses should be private sector-led thereby requiring a shift in Government's roles and responsibilities more to one of facilitation, monitoring and control.

5.5. Draft Aquaculture Development Plan (GNADP) 2022-2026

As result of the realization that that the GNADP has since been overtaken by changing political priorities, social and economic events including the impact of COVID-19, a draft national aquaculture development plan is being used to engage stakeholders for their input. This draft emerged as a planned output for the Norwegian supported Fish for Development (FFD) Project.

6.0. LEARNINGS FROM FISHERIES AND AQUACULTURE POLICIES AND GOVERNANCE LANDSCAPE

The brief review of the fisheries and aquaculture policy terrain in Ghana as well as the current ongoing piloting of the four aquaculture interventions in the small water infrastructure help to bring to fore the following thematic discussion points.

6.1. Sound Policies – link with practice

Ghana has very good policies and legal frameworks which govern the fisheries and aquaculture sectors. The policies, however, need to be enforced and implemented for better development outcomes. For instance, the policies recognize the importance of science and innovation within the fisheries sector in order to further enhance aquaculture productivity, for instance. However, the MOFAD does not seem to get adequate resources to ensure that the increased productivity materializes. Whilst MOFAD tends to have one of the lowest budgets in Ghana, sometimes it does not receive its full allocation from the Ministry of Finance. This tends to undermine the implementation of activities in all sub-sectors including aquaculture.

6.2. Importance of Innovative and Applied Research

Breeding of fish is key to ensure that aquaculture productivity is high.

The Fisheries Commission does not seem to receive the adequate financial support despite the setting up of the Fisheries Fund. This further undermines the effectiveness of the aquaculture interventions given the potential contribution of this sector. The Akosombo tilapia Strain, which has been a success in Ghana, now needs to be upgraded. There is the need for continuous research into fish breeding to ensure the sector has quality fish seed with good growth performance, disease resistant and tolerant to a wide range of temperature fluctuations. New culturable species are also needed to increase variety and keep the industry vibrant.

6.3. Policy Harmonization

Cross sectoral policy harmonization is a major concern to ensure that, for instance, the aquaculture policies are aligned with the customs and import regulations to ensure that feeds cost are affordable as feed accounts for over two-thirds of the input cost for the aquaculture farmers. Smart subsidies to enhance local quality fish feeds production in partnership with the Fisheries Commission and CSIR might be one of the potential long-term solutions given the priority that the government of Ghana is placing on aquaculture production. The small-scale fisheries benefit through discounted fuel costs under the National Premix Fuel Committee Regulations (L.I. 2233). Special targeted subsidies could be planned within the aquaculture sector. Such a subsidy needs to be critically evaluated to ensure that it does not cause further distortions within the broader market and negatively impact on the resource base.

6.4. Multiple Use Systems

Multiple Use Systems which are holistic need to be incorporated for more efficient and productive aquaculture sector. Existing policies tend to be largely sector specific. It is interesting to note that under the 1V1D initiative, the main thrust was on domestic water supply, livestock watering and crop irrigation. With over 300 small water reservoirs provided in the northern regions of Ghana, it is an opportunity to ensure that where the infrastructure is suitable, aquaculture production must be promoted. This will increase the basket of benefits coming from the small water infrastructure and will also contribute towards further improvements in nutrition and financial income streams.

6.5. Innovative Financing Models for Aquaculture

The Government of Ghana developed a number of programmes including the AFJ. The success of the programmes hinges on the availability of financing by the private sector, especially taking into account the limited state resources. It is, therefore, important to also ensure that programmes developed also map out the funding sources from the private sector. This should entail stakeholder engagements in the plan to explore different explore funding mechanisms for the proposed programmes.

6.6. One Health Perspective

Diseases are a major setback for the aquaculture and fisheries sector more broadly. However, it is important to understand such diseases within the broader horizon of fish and human disease interactions in order to come up with holistic solutions for addressing fish diseases.

6.7. Gender Equality and Social Inclusion

Aquaculture should offer an opportunity for increasing opportunities for women, youths and other marginalized communities in line with Sustainable Development Goal 5. The Government of Ghana, as part of AFJ has identified this gap. However, for more informed gender inclusion, evidence needs to be provided for the gender barriers for women, youths and other vulnerable communities to benefit from the technical aquaculture innovations. The unlocking of the identified barriers will ensure that the technical solutions are grounded within the society under which the innovations are being introduced. Such an approach will avail more sustainable aquatic investment solutions.

6.8. Disconnect Between Policy and Implementation

One of the confounding challenges in Ghana and in Sub-Saharan Africa at large is that there are a number of policy instruments which have been developed but which are not being implemented. This fact raises the point that policies are important but not adequate to see transformation of the men, women and youths on the ground. A number of reasons have been offered. Some of the reasons include lack of financial resources to implement the mandate that the law provides. One example within the broader fisheries sector in Ghana is the enforcement of marine fisheries permit system. This has not been very effective due to limited capacity and resources to patrol the Ghanaian waters. Some of the other reasons provided at the sub-Saharan Africa level are that policy initiatives are sometimes inspired from the international level which might not reflect on the capability to enforce them at national level.

6.9. Quality Fingerling Production and High Feed Cost

Productivity of aquaculture is impacted by the quality of the fingerlings that the farmers are able to access and the high cost of fish feed. In the case of Ghana, fingerling production will not be able to cater for the projected increase in aquaculture production. It is therefore important that plans are put in place to increase both the public and private quality fingerling production strategically located across the different parts of the country. The role of the private sector needs to be promoted as the share for fingerling production by the private sector which was about 1% has since risen to 90% (Asmah 2009). Similarly, the private sector and farmers should be trained and assisted in quality local feed production to reduce the high input cost. Whilst this increased fingerling production and local feed production are welcome, it is also important that the regulatory role of the state is further enhanced to ensure compliance with standards and good practices which might end up being compromised in pursuit of profits. The recently held aquaculture conference from 26 to 27 April 2023, clearly showed that some vaccination activities for fish were ongoing with limited engagement of the state.

7. CONCLUSION

This brief review report has outlined some of the broader issues on fisheries and more specifically on aquaculture in Ghana. Aquaculture does have a role to play to make up for the declining marine and inland capture fisheries. Beyond good policies, practical implementation strategies and resources are necessary for the effectiveness of fisheries and aquaculture policies in Ghana. This calls for a strategic policy and practice reflection to ensure that individuals and collective action is promoted to enhance aquaculture production. Encouraging multiple use systems under the 1V1D programme and the AFJ programme will offer nutrition, employment and income opportunities for women, youths and other vulnerable members of the community. Policy harmonization and sustainable financing mechanism will also ensure sustainability of the project.

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