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REPOSITIONING NIGERIA ON THE GLOBAL FOOD SECURITY INDEX (GFSI): ESSENCE OF FISHERY

Suleiman, O. Y.
Department of Fisheries and Aquaculture, Faculty of Agriculture, Federal University Gashua, Gashua, Yobe State, Nigeria
E-mail: ysuleiman08@yahoo.com
Mobile: +234(0)8038204449

Abstract

This paper reviews the significant features of fishery as an invaluable entity with respect to food security in Nigeria. Considering the obvious potentials waiting to be exploited alongside the position of Nigeria as 87th out of 109 countries on the Global Food Security Index (GFSI), the need for a wakeup call becomes imminent. These potentials center on agriculture, yet streamlines to the fishery subsector in this paper. Nigeria whose annual fish demand is 2.66 million tonnes has an estimated inland water area of 12,500 Km^2. Her exclusive economic zone of 200 nautical miles within which she has absolute jurisdiction over all living resources with coastline of 853Km, covers an area of about 192,000 km^2. These natural water bodies are capable of producing about 512,000 tonnes of fish annually along with job opportunities. Aquaculture also offers promising opportunities for sustenance - nutritionally and economically with a potential for annual fish production estimated at 2.5 million tonnes, hence it is indispensable. However, the bottom line is that the country is yet to reach an average of 50% exploitation of these potentials towards bettering its situation. This paper aims at importance of fishery subsector in global food security index. The GFSI reveals the extent of progress in this respect.

Keywords: *Fishery, Food Security, Global Food Security Index, Nigeria, Potentials*

Introduction

Nigeria has great potential to become the food basket of the West Africa sub-region given that she is endowed with relevant resources (Imoudu, 2005). Also, it has a young population (high number of youth) among the more than 160 million people, which if encouraged, can sustain a highly productive agriculture. It is pertinent to note that, three out of the four subsectors of agriculture have been performing dismally in the last decades (Table 2). The table showed that with the exception of crop subsector, livestock share of agricultural GDP declined from 24% in 1980 to 6% in 2010; fishery from 11% to 3% and forestry from 4% to 1% (CBN, 2010).

Because, it is an established fact that about 71% of the earth's surface is covered by water, the significant features of fishery becomes worthy of being reckoned with. Nigeria has an inland water area of about 12,500 km^2 made up of rivers, lakes, ponds, streams, flood plains, etc., which are capable of producing 512,000 metric tonnes (mt) of fish annually (Ita et al., 1985). She has a coastline of 853 km and the limits of her territorial waters and exclusive economic zone (EEZ) are 12 Nautical miles (nm) and 200 nm respectively (Ita et al., 1985). But, in spite of the vast water bodies, Nigeria spends hugely on fish importation annually supplying about 0.75 million tonnes (Oota, 2012) in addition to the domestic production of about 0.78 million tonnes (Nwiro, 2012). Yet, the demand-supply gap stands at over 1 million tonnes.

The Global Food Security Index (GFSI) is an annual measure of the state of global food security by an economist intelligence

unit (EIU) comprising economists, researchers, food specialists and country analysts. The GFSI uses the following definition of food security: "When people at all times have physical, social and economic access to sufficient and nutritious food that meets their dietary needs for a healthy and active life (adapted from world food summit, 1996)". The Global Food Security Index is based on three internationally recognized dimensions, namely: Affordability, Availability and Quality & Safety of food in a given country.

In 2014, the GFSI showed that Nigeria ranked 87th of 109 countries and 10th of 28 sub-Saharan African countries. Since 2012, Nigeria recorded weak scores in areas including food safety and access to finance by farmers. But, the scores were slightly favourable in areas including protein quality and GDP per capita.

This paper therefore signifies the inherent value of fishery in stepping up Nigeria's place on the global hierarchy (GFSI) provided the given potentials are exploited in relation to other agricultural subsectors.

Fishery in Context

A fishery is commonly perceived only as an entity where fish are caught, processed and/or marketed. However, it is rather interesting to note that the concept within its actual definition transcends the above perception.

The definition of a fishery generally can be in terms of the 'people involved, species or type of fish, area of water, or sea bed, method of fishing, class of boats, purpose of the activities or combination of two or more of the foregoing features' (Garcia *et al*., 2008). It involves but seldom refer to a place where fish or other aquatic resources are raised as well as fishing company.

Semantically, fisheries can be seen as two or more fishery entities (Plural), though it is better represented as an inflected form of fishery. Fisheries comprise marine (Coastal), lagoons and off-shore activities as well as Inland (freshwater) activities on lakes, rivers, reservoirs, floodplains, permanent or seasonal water bodies. One can distinguish commercial, subsistence or recreational fisheries.

As an economic activity, a fishery is characterized by its operational scale, ranging from small-scale to large scale activities. What differentiates a small-scale fishery from a large one is not very clear as 'scale' in this sense is often considered contextual. This is evident in the fact that, a small-scale fishery in a given place may be considered as a medium-scale fishery in another place. Generally, small-scale fisheries are characterized by 'low capital input' activities, low capital investments and equipment, labour intensive operations (Garcia, *et al.* 2008).

Conventional Food Security Indices and Position of Nigeria

Food security simply describes a condition in which accessibility to adequate food for a healthy life is guaranteed. Justine *et al.* (2011) presented food security in four areas, viz: availability, access, utilization and stability. Families and individuals require a reliable and consistent source of quality food (availability), as well as sufficient resources to purchase it (access), and the knowledge and basic sanitary conditions to choose, prepare and distribute it in a way that results in good nutrition for all family members (utilization). Finally, the ability to access and utilize food must remain stable and sustained overtime (stability).

The Global Food Security Index is based on three internationally recognized dimensions, namely: Affordability, Availability and Quality & Safety of food in a given country. Each of the three categories in the GFSI contains a subset of indicators which evaluate programmes, policies or practices that influence food security. The GFSI in 2014 added two indicators under availability category – food loss and obesity. Meanwhile, the prevalence of obesity is only a background variable for the GFSI. Affordability is measured across six indicators: food

consumption as a share of household expenditure, proportion of population under global poverty line, gross domestic product per capita (at purchasing power parity, exchange rates), agricultural import tariffs, presence of food safety net programmes and access to finance for farmers. Availability is measured across eight indicators: sufficiency of supply, public expenditure on agricultural research and development (R & D), agricultural infrastructure, volatility of agricultural production, political stability risk, corruption, urban absorption capacity, food loss. Food quality and Safety is measured across five indicators: diet diversification, nutritional standards, micronutrient availability, protein quality, food safety. The index builds on existing food security research and frameworks, including the annual *State of Food Insecurity in the World* report of the Food and Agriculture Organization (FAO), the *Global Hunger Index* of the International Food Policy Research Institute (IFPRI), and the *Maplecroft Food Security Risk Index*, among others. As a way of complementing the tools used for measurements, the GFSI analyses the inputs and drivers of food security in a way that fosters discussion of practical solutions and policy reforms. It also include a quarterly food price adjustment factor that updates the index and rankings of respective countries as global food prices and other macroeconomic indicators, including income levels and exchange rates change over time.

In 2014, the index showed that Nigeria scored 36.5/100 (ranked 87th out of 109 countries and 10th of the 28 Sub-Saharan African countries), representing a score change of +3.4 from year 2013 where it scored 33.1/100 (86th of 107 countries) and 34.8/100 (80th of 105 countries) in 2012. Of particular importance among the newly added indicators at the moment in Nigeria is the food loss. It can be inferred from the report that incidence of food loss in Nigeria is high since it occur mainly during the early phases of the food supply chain – at the production, post-harvest and processing stages. According to the index, Nigeria have since 2012 recorded weak scores in areas of food safety, corruption, presence of food safety net and access of financing for farmers. Whereas, it scored slightly favourably in areas of food consumption as a share of household expenditure, sufficiency of supply, protein quality and GDP per capita.

On the other hand, Food insecurity is a complex phenomenon that interacts with many other determinants of wellbeing. Its drivers are often inter-related and its relationship with poverty and malnutrition is nuanced (EIU, 2014).

Potentials of Fisheries in Curtailing Food Insecurity in Nigeria

According to FAO (2013), Food Insecurity is a situation that exists when people lack secured access to sufficient amounts of safe and nutritious food for a healthy life. Huge potentials exist for Nigeria to better its relatively weak stand in terms of food security. The fishery subsector can contribute immensely in this direction.

State of the Fishery Subsector

Fish demand in Nigeria stands at 2.66 million metric tonnes (mt) per year, with production from inland waters estimated as 525,000 mt (FDF, 2008). According to FDF (2008) as cited in Sikoki (2013): 'Despite Nigeria's high potential for fish production (continental shelf area of 37,934 km^2, 853 km coastline, EEZ of 200 Nautical miles, 12,500 km^2 of inland water surface area and an estimated 2.5 million tonnes of aquaculture potential), she produces only 0.62 million mt of fish annually against a yield potential of 3.2 million mt. i.e. only 23% of demand is met from domestic production (Table 1).

As a source of animal protein, fish locally provides nearly 10 kg of protein per capita per annum. This is an equivalent of 40% of all animal protein consumed in the country (Sikoki, 2013).

The contribution of the fishery subsector to the nation's gross domestic product (GDP) is 3-4% (CBN, 2010). However, its contribution to national development cuts across such activities as employment generation, income generation and household food security. The subsector is also a high foreign exchange earner, generating about USD 38.3 million annually through exports. In addition, it provides 8.23 million direct and 18.27 million indirect employment opportunities for Nigerians (FDF, 2008; Sikoki, 2013)

It is alarming that, the fish yields of most Nigerian inland waters are generally on the decline (Jamu and Ayinla, 2003) and these has been attributed to causes ranging from inadequate management of the fisheries resources to environmental degradation of the water bodies (Edward, 2013).Therefore, the need for drastic measures to be taken towards improvement.

Importance of Fishery for Food Security

Let us look at the pathways from fishery to food security along the four areas of food security. The potentials of fishery are thus discussed.

Firstly, fishery provides food inform of fish and other aquatic resources such as frog, shrimp, oyster, bivalve and plants. Fish can be processed and distributed as live, fresh, chilled, frozen, heat-treated, fermented, dried, smoked, salted, pickled, boiled, fried, freeze-dried, minced, powdered or canned, or as a combination of two or more of these forms (FAO, 2013). It is estimated that by 2020, 90% of fish consumed in sub–Saharan Africa would be low–value food fish, mainly small pelagic fish. Furthermore, by this date, increasing fish prices driven by population growth and high demand would reduce per capita fish consumption in Africa from 7.6 to 6.6 (FAO, 2004).

These statistics are highly worrisome because fish provides a good source of high quality protein and several minerals and vitamins. It is classified as either whitefish, oily or shellfish. Whitefish is low in fat (<1%) while oily fish such as sardines contain between 10 and 25% fat. The fatty fish contain a wide range of fat soluble vitamins (A, D, E & K) and essential fatty acids which are needed for healthy functioning of the body. Aquaculture is thus indispensable as capture fisheries cannot meet the increasing demand.

Secondly, access to food is enabled through the fact that fish and all related economic activities in the 'fish-chain' represent an important means to generate jobs, income and wealth with positive effects from household level to broader economic scales (see figure 1).

Thirdly, good nutrition (utilization) is achieved. A healthy diet has to include sufficient protein containing all essential amino acids, lipid with essential fatty acids (EPA/DHA), vitamins and minerals. Provided its rich nutrient content is preserved (essentially through good quality processing or when eaten fresh), fish constitutes a rich source of these nutrients. Fish in human diet can therefore help reduce the risks of both malnutrition and of non-communicable diseases, which may co-occur when too high intake of energy-giving food is combined with a lack of balanced nutrition (Allison *et al*., 2013).

The fourth area (stability) results from the combination of availability and access at macro-level (which is a function of sustainability of the subsector) and of access, availability and utilization at the micro/household level (HLPE, 2014).

Finally, to consider the contribution of capture fisheries and aquaculture to food security, one needs also to take into account losses and waste, including by-catch discarded after fishing prior to landing, post-harvest loss and consumer waste (HLPE, 2014). Figure 1 represents conceptually the link between fishery (capture and aquaculture) and food security.

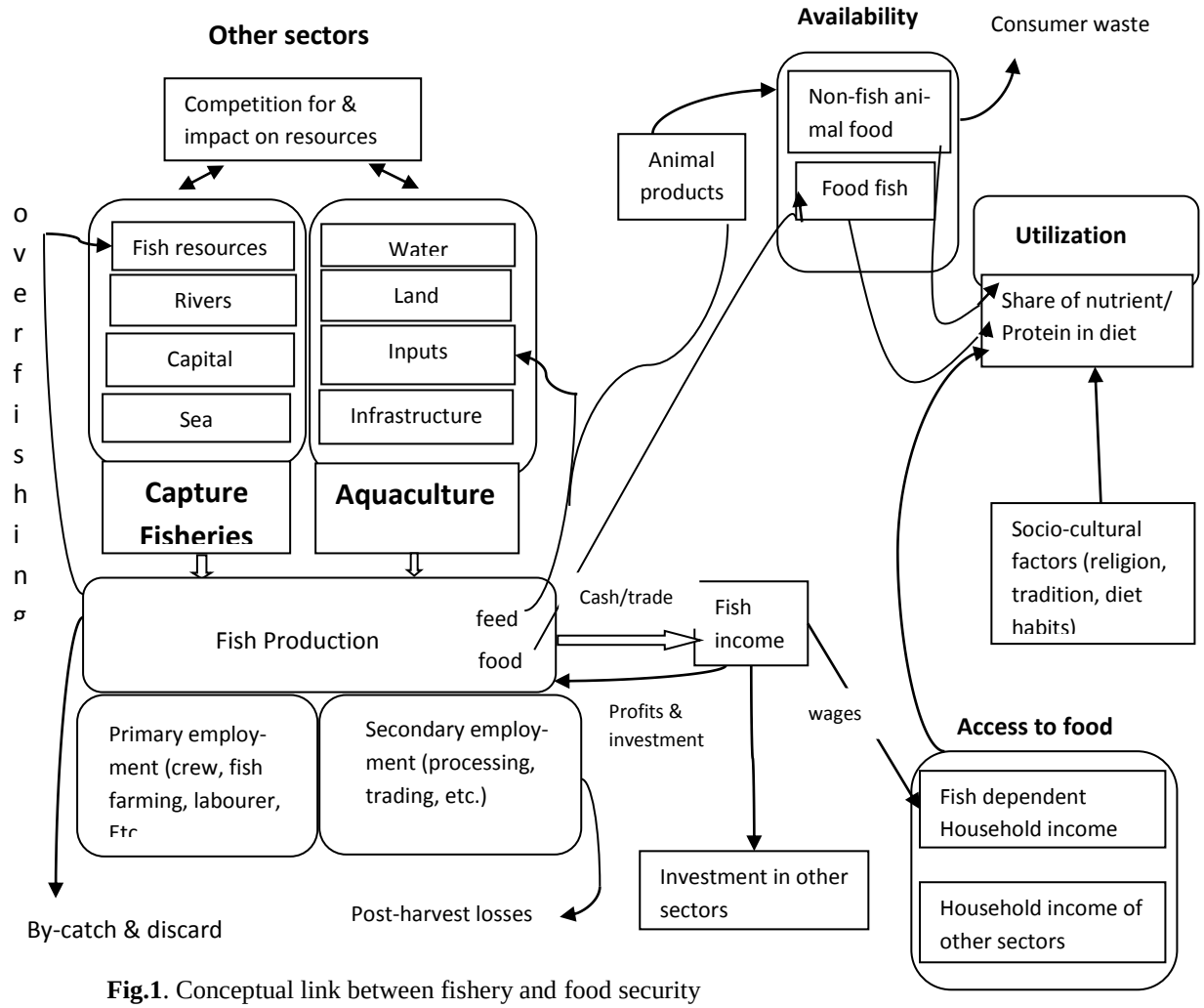

Fig.1. Conceptual link between fishery and food security

Source: HLPE (2014)

A Food Secure Nigeria

To determine how fisheries and aquaculture can best contribute to food security in the long term, it is important to understand the organization of the subsector and review the main challenges and opportunities it faces in terms of its environmental, economic and social sustainability and development. Here, we shall look briefly at the environmental realm.

Checking Competition, Pollution and Climate Change Impact on Fisheries

Even if overfishing is generally considered as the most important pressure on fisheries, they are also confronted by wider threats, from pollution to ecosystem degradation induced by the impact of other human activities, particularly in coastal areas (Cochrane *et al.*, 2009). In other words, part of the problem, and therefore part of the solution to the sustainability of fisheries in Nigeria lies outside the subsector.

Competition

The impacts of activities such as oil drilling, power plant installations, construction of ports and other coastal infrastructures, dams and water flow management (especially for inland fisheries), etc, are tremendous. These have effect on aquatic productivity, on habitats that sustain resources (e.g. through erosion and pollution) and on the livelihoods of fishing communities through denial of

access to fishing grounds or displacement from settlements (Allan *et al.*, 2005).

In regard to food security, HLPE (2014) revealed that management will need to assess current and future resources, taking into account local and regional pressures, including expected population increase and economic activities. This will require careful valorization of resources, while considering innovative approaches in areas such as development of aquaculture.

Fish and food safety

The contribution of fish to good nutrition and health has been counterbalanced by concerns pointing to the risks of toxins/poisoning from harmful algae, bacteria, viruses and chemical pollutants in fish, which are problematic in several parts of the world. A number of hazardous inorganic and organic compounds can be present in fish and other seafood. In terms of exposure by marine organisms, the compounds that represent the most significant health hazards are heavy metals such as methyl mercury, cadmium and organic tin (STAP, 2012).

Impact of Climate Change

Unlike most terrestrial animals, aquatic animal species are poikilothermic (cold-blooded) and changes in habitat temperatures will more rapidly and significantly influence metabolism, growth, reproduction and distribution, with stronger impact on fishing and aquaculture distribution and productivity. The interconnectedness of aquatic systems allows fish species to migrate with shifts in ecosystems conditions (HPLE, 2014). Expected changes in climate patterns and extreme events, sea level rise, glaciers melting, ocean acidification and changes in river flows are expected to result in significant changes across a wide range of aquatic ecosystems with consequences especially for marine fisheries. It is somewhat unclear whether industrial and artisanal fisheries are equipped against the instability that will result in the quantity and quality of catch. However, there is considerable less information on climate change impacts on inland fisheries and aquaculture (IPCC, 2014). But, studies have shown that, climatic effect will be more in the near future and fish availability will depend on governance performance as well as aquaculture performance (Fulton, 2011).

Eventually, environmentally sustainable aquaculture production will depend on the right combination of farming systems (including health management), resource use (e.g. land, water, energy), use of appropriate inputs (feeds, seeds, labour, infrastructure), management of production (e.g. escapes, diseases) and considering options for innovation such as new culture species (Lebel *et al.*, 2010).

Aquaculture is indispensable

Increased market demand has been the key to the emergence of the aquaculture industry. Nigeria's aquaculture production stood at 85,087 metric tonnes against its estimated potential of 2.5 million metric tonnes (FDF, 2008). Oota (2012) opines that, Despite the increase of fish production in Nigeria, production level is still very low and this has been attributed to high cost of input, high interest rate on credit for farmers, lack of skilled manpower and ineffective aquaculture extension service system. Other factors include inadequate facilities for genetic improvement, undeveloped potential for local feeds and environmental degradation of aquaculture sites.

Fish in aquaculture systems are very efficient converters of feed into protein; more efficient than most terrestrial livestock systems. For instance, poultry converts about 18 percent of the food consumed and pigs about 13 percent as compared with 30 percent in the case of fish. In other words, Production of 1 kg of beef protein requires 61.1 kg of grain while 1 kg of pork protein requires 38 kg as compared with 13.5 kg in the case of fish (Hasan and Halwart, 2009).

Similarly, Domestication that allows genetic improvement of stocks in aquaculture is and will be a major driver of efficiency of production and thus an opportunity for lowering the ecological footprint of the sector (Dunham *et al.*, 2001). However, in the absence of effective genetic improvement and breeding programmes, cultured stocks may even be inferior to wild populations due to inbreeding (Acosta and Gupta, 2010).

It is worthy to note that Food security considerations have not always been a key factor in germplasm conservation and genetic improvement programmes. Trade and commercial interests have been the major drivers of breed improvement programmes. But the successful example of the genetically improved farmed tilapia (GIFT) programme, which began as a food security initiative to help small-scale fish farmers in developing countries improve productivity and profitability, showed that a food security approach to breeding programmes can trigger substantial growth in aquaculture development and markets (Acosta and Gupta, 2010).

CONCLUSION AND RECOMMENDATIONS

Indeed, the fishery subsector, if critically directed, can contribute immensely to food security in Nigeria. This is not only in area of food availability and nutrition but resource use efficiency, wealth creation and sustainability. Nigeria deserves to be above its current position in world rankings such as that of the GFSI but impeded by a number of factors including the poor state of fisheries and aquaculture. For food security, the fishery subsector offers hope for improvement as long as policies for transformation take cognizance of these established recommendations:

- Vertical integration approach to subsectors in agriculture is recommended to remove the existing parity among them.
- Enhancement of fish stock through effective restocking programmes is recommended in order to reduce biodiversity loss.
- Fisheries legislation should be redefined for: capture-based aquaculture, prospective and existing investors (fish farmers, fishing companies and feed manufacturers) and recognition of rights over (fish, water and land) resources.
- Government and other stakeholders should sedulously support innovations base on fish genetic improvement, management systems and aquatic ecosystem research to check vulnerability due to environmental degradation.
- Training opportunities should be widened for all stakeholders in the fisheries community.

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***Table 1*: Nigeria's fin and shell fish yield potential (Source: FDF, 2008)**

S/N	Resource category	Potential yield per annum (mt)
1	Coastal/Inshore (finfish)	
	• Coastal resources	142,000
	• Inshore resources	16,620
2	Offshore (finfish)	
	• Demersal resources	6,370
	• Tuna and other pelagic fish	15,000
3	Coastal artisanal (shellfish)	48,000
4	Industrial (shellfish)	3,760
5	Freshwater resource	
	• Rivers and floodplains	226,550
	• Lake chad	160,000
	• Kainji lake	30,000
6	Aquaculture	2,500,000

***Table 2:* Percentage share of agricultural subsectors to the growth of agricultural GDP**

Year	Crop	Livestock	Fishery	Forestry
1960	80	9	3	8
1965	78	9	4	10
1970	76	8	9	7
1975	65	8	18	4
1980	61	24	11	4
1985	80	13	3	4
1990	81	11	5	3
1995	84	10	3	3
2000	83	10	5	2
2005	90	6	3	1
2010	89	6	3	1
Mean	78.82	10.36	6.09	4.27

Source: CBN (2010)