



Application of Environmental Accounting Principles in Boosting Fish Production in Nigeria

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Abstract: The paper is a result of the study of the application of environmental accounting principles in boosting fish production in Nigeria. The neglect of the agricultural sector in the country has been a major set-back to the economic development. Therefore, a focus on boosting fish production will be apart from promoting the standard of living and economic health; through increased protein intake; lead to sustainable economic development. The objective of the paper was to evaluate how relevant environmental accounting principles will be applied in achieving this sustainable economic development. It was a survey of fish farmers from the 31 Local Government Areas of Akwa Ibom State to whom a questionnaire was administered to determine the level of applicability of Environmental Accounting principles. Also, secondary data for the period 2004 and 2013 were analyzed to identify economic potential and macroeconomic effects on increased fish production. It was discovered that there was a huge potential of investment and growth in the fisheries sub-sector as only 34% of annual demand was met by production. It was also discovered that the level of awareness and relevance of Environmental Accounting Principles was very low. It was recommended that government should focus on the fisheries sub- sector by providing the infrastructure and adequate training on fish farming and environmental matters to the farmers. Also, regulatory activities should focus on recycling of water, waste water treatment and proper drainage and soak- away pits to reduce the discharge of farm water into the environment. These done will boost fish production and ultimately reduce the strain on the foreign exchange reserve of the country.

Keywords: Environmental Accounting Principles, Fish Production, Sustainable Economic Development, Foreign Exchange Reserve

1. Introduction

Fish is like a staple food consumed by a larger population of the country. This has resulted in high demand for fish both for local consumption and for export purpose. Unfortunately, the level of production has not matched the level of consumption. There is the need therefore to meet this shortfall in supply.

According to [2], the awareness on the potential of aquaculture to contribute to domestic fish production has continued to increase in Nigeria. This stems from the need to meet the much needed fish for domestic consumption and for export.

The increase in the population of the country has resulted in huge increase in the demand for animal protein; which is

higher in quality than plant protein. The average protein intake in Nigeria is about 19.38g/output/day which is below the Food and Agriculture Organization (FAO) benchmark of 65g/output/day. This nutritional requirement is crucial in Nigeria where malnutrition and starvation are major problems faced by most rural dwellers in the country [16].

Fish has been recognized to contribute about 55% to the protein intake in Nigeria. However, local fish production has been below consumption with import accounting for about 48.8 million US Dollars in 2002 (Central Bank of Nigeria, 2004). A focus on this sector of production will not only lead to reduction in the amount spent on imports, but also lead to the development of Small and Medium scale Enterprises (SMEs) in Nigeria; which is capable of generating employment, improve income generation and hence improve the standard of living of the populace.

Nigeria has been basically a mono-product economy with focus on Oil and Gas sector. This has been a major setback to the development of other sectors; especially the Agricultural sector and the economy at large. A focus on boosting the production of fish will lead to sustainable economic development. Economic development generally refers to the sustained, concerted actions of policy makers and communities that promote the standard of living and economic health of a specific area.

Therefore, in the 21st century, there is a consensus for an urgent need of protecting our environment; which is very important for the survival of humans. Consequently, researches on environmental problems are evolving and focus has been on accounting, environmental risk assessments and environmental accounting disclosures to meet urgent response to environmental problems.

Environmental accounting is an important tool for understanding the role played by the natural environment in the economy. Environmental accounts provide data which highlight both the contribution of natural resources to the economic well-beings and the cost imposed by pollution or resource degradation of the environment [8].

The Research Problem

According to the United Nations, Nigeria's population of 170 million people may exceed 200 million by 2020, and the demand for fish protein is expected to grow by about 700,000 metric tons over the same period. Nigeria produces an average of 600,000 metric tons of fish annually from aquaculture and capture fisheries. FAO figures show that Nigeria's current fish consumption is 7.5 kilos/person against global fish consumption at 18.7 kilos/person; implying that the country's current consumption shortfall per person is 11.2 kilos/person; which is very high.

The domestic fish production of an average 600,000 metric tons annually is grossly inadequate to meet the national demand of about 2.1 million metric tons. The deficit of about 1.5 million metric tons is worth more than 2.2 billion US Dollar per year and is met by imports resulting in huge foreign exchange outflows. Hence, in October 2013 government ban fish imports over four years, raise import duty up from 10% to 50%. This policy was reviewed in December 2013 by introducing import quotas with effect from January 2014 in order to cut fish import by 25% annually [24].

However, the capacity of available resources and technologies to satisfy the demand of the growing population for fish and other agricultural commodities remain uncertain. Major adjustments are needed in agricultural, environmental, and microeconomic policy; at both local and national levels in order to create conditions for Sustainable Agricultural and Rural Development (SARD).

The lack of knowledge of environmental costs incurred by the sector is one major threat to sustainability. Therefore, incorporating this issue in the sustainability policies and programmes will be of great benefit. Recently, the global debate on environmental problems particularly the unawareness of the environmental consequences of global warming, pollution of all kinds; such as water, air, marine etc

are current issues of concern to developing countries such as Nigeria. Previous researches have been focused either on fish production or environmental accounting, but this paper attempts to link this two independent fields. It is an applied study with a view to contributing to the economic development of Nigeria. The objectives of this paper therefore are to:

- i. identify the economic potentials in the production of fish
- ii. assess the current sectoral conditions
- iii. analyze the macroeconomic effects of increased production of fish; and
- iv. evaluate environmental accounting principles relevant to fish production

2. Literature Review

2.1. Agricultural Development and Sustainable Growth

Development is by the modernization theorist characterized as a movement from a state of backwardness with subsistence economy to a modern industrial society with higher income and productivity rates [3]. The most significant development in the agricultural sector is the preparation of the World Bank sponsored Agriculture Sector Wide Approach (ASWAP) initially referred to as the Agricultural Development Programme (ADP) [7]. The ASWAP priorities are to: improve food security at household and national level, commercial aquaculture, agro-processing and market agricultural land and water management, climate change and key support services. Thus, aquaculture is the key agriculture subsector where government efforts have been directed to meet the challenge of satisfying the growing population because this is where the nation has huge untapped potential [21]. Aquaculture is a set of practices for the husbandry of aquatic organisms that we rely on for many functions which distinguish it from commercial fishing [19]. Aquaculture production, that is, fish and shell fish farming has grown rapidly to address shortfall in captured fishing although it has come under intense scrutiny and criticism as environmentalists fear that it could cause significant environmental problem and further impact wild species that are already threatened [12]. Furthermore, it is stated that aquaculture has become an important factor for improving on food security, raising nutritional standards and alleviate poverty [21]. Also, aquaculture is uniquely placed to reverse the declines in supplies experienced from capture fishing and has notable potentials for new livelihood opportunities, providing mechanism for lower priced fish Thus, resulting in economic growth.

According to [18], growth is a prerequisite for environmental improvement. Sustainable growth as a concept is described as development that meets the needs of the present generation without compromising the ability of future generation to meet their own need [5]. The potential for sustainable growth of the aquaculture industry is indisputable [19]. Ultimately growth of aquaculture base enterprise is

driven by favourable economic outlooks in market, the pace of technological advances, lower investment risks, greater regulation certainty and reliable access to suitable sites for long-term sustainable growth and competitive development [19]. The sustainability of agriculture system must be quantified to select those that can best meet the challenge of food supply and materials to a growing population in a world with finite environment and energy resources [23]. However, the harm to the ecosystem is either caused by nature or man [17]. If environmental inputs are not properly accounted for, relative to economic inputs, optimum use of resources may not be achieved. Therefore, to achieve sustainable growth besides input-output linkage, commercial aquaculture can also have other linkage impacts on the rest of the economy. These include investments in infrastructure, human resources and foreign exchange [15].

However, [23] in their study on Environmental Accounting of Agricultural sustainability, using energy analysis describes the application of energy analysis to evaluate the sustainability of agricultural system related to food production, biofuel, aquaculture and forestry based on the amount of total input energy needed to produce outputs such as food. They found out that greater sustainability is achieved when a system requires a lesser amount of energy to produce a product or uses a greater amount of renewable resources and lesser amount of non-renewable resources for production, and that production of biofuels required three to five times as much total energy as fossil fuel, signifying that biofuels cannot contribute to increase sustainability and that study of aquaculture system quantified the relative importance of the work of nature and the human economy in producing fish and shrimp.

[1] expressed that for aquaculture to be sustainable, production systems must focus on the interactions between the culture techniques and the environment. These include: proper planning of fish farm, good farm management, good diet formulation, improved feeding strategy, practice of integrated fish farming, poultry farm, and pig farm, recycling aquaculture waste and regular monitoring of fish farm.

[4] examined the technical efficiency of fish farm in Edo state, Nigeria using multistage sampling technique to select 180 respondents. The study used both descriptive statistics and stochastic frontier production function and discovered that Technical Efficiency of farmers range from 0.46 to 0.99 with a mean of 0.95 at which 77% of them were operating and that the serious constraints that affect optimum production include: high cost of feed, limited capital, poor power supply, high cost of pond construction, disposal of effluents, increase fish price created by middlemen, and inadequate water supply and recommended that access to suitable extension services and the implementation of policies aimed at tackling the detected constraints would help to increase the efficiency of fish farm in the State.

[18] carried out a study on the relationship between economic growth and environmental sustainability to address the different characteristics of eco-efficiency measurement of environmental sustainability in comparison with the

common measure of population and discovered that while income appears to have a beneficial effect on population measures, it has a detrimental effect on most eco-efficiency measure of environmental sustainability. This suggested that the environmental Kuznets curve needs to be renamed as the pollution Kuznets curve in order to give correct impression that not all environmental measures but only pollution measures may improve with income and that while conventional policies focus on pollution control, they need to be combined with policy options focusing on eco-efficiency aspects of environmental sustainability in the process of economic development and concluded that for environment to be sustainable, the society need not only to limit the level of pollution but also to improve the eco-efficiency of a society as a whole.

[21] conducted a study on socio-economic and policy issues determining sustainable fish farming in Nigeria with a view to stimulating private investment in the sector, meet national market demand through domestic production and export excess to enhance the income of farmers. The study used regression and budgetary analysis to analyse data obtained from 100 fish farmers in ten local government areas of Osun state. The result showed that the average net income in the study area was N318, 640.75 while the gross margin was N457, 327.95. The benefit cost ratio was 1.5:1 indicating that for every N100 invested, the enterprise yields additional N50 and that experience of farmers in fish farming, quantity of feed used, access to credit and size of pond were significant determinants of fish farm production in Nigeria. However, the potential for further growth of aquaculture in the region is promising. Such growth could be realized through improvements in technology and resource use intensification, integration of aquaculture with other farming activities, and development of additional areas for aquaculture.

2.2. Development of Small and Medium Enterprises (SMES) in the Fisheries Sector

A strategic sectoral SME development plan with pilot and demonstration studies focusing on job – creation informs the guided approach to SME development in the fisheries sector [25]. Small and medium – size enterprises are certainly of even greater relevance but many of them are again closely linked with agriculture in both upstream and downstream process [20]. In promoting the SMEs within the fisheries sector through collaboration with concerned government entities, comprehensive database on feasible sectoral SMEs is established and promoted for investment opportunities; but the lack of feasibility studies on SMEs, drive for SMEs as development potential, awareness among private sector on new business opportunities, limited technical capacities at all the levels to foster SMEs development and lack of credit for small and medium enterprise hinder the SME's development and promotion [25]. However, the institutional, organization and managerial support to communities provided through awareness among communities on new business opportunities for SMEs in fisheries sector; community-based

management intervention for development is promoted and advocated; for with training and awareness programmes together with the provision of credit facilities, women participation is promoted, advocacy and guidance on SME initiative and alternative livelihood opportunities; together with technical, operation and financial support mechanism are enhanced.

2.3. Overview of Environmental Challenges in Fish Production in Nigeria

In assessing future challenges for the fisheries sector, [13] identified a number of key issues that span the entire sector which are of primary importance. These challenges include:

- i. Maintaining the contribution made by fisheries and aquaculture and recreation. Depending on geography, access to market and affordable technology, the contribution of fish to food security comes not only from fish produced for direct local food consumption but also from aquatic products of all types which can be sold domestically or exported for funds as well as those which generate income through recreation, tourism and employment.
- ii. Strengthening the base of fisheries management and aquaculture development through improved data collection and scientific assessment so that decision concerning management and development option could be more rationally based and informed.
- iii. Facilitating greater transparency in fisheries sector decision making at all levels through greater stakeholder participation in national and regional processes.
- iv. Improving access to and the dissemination of good quality and timely information in the most appropriate formats in support of responsible fisheries and aquaculture and trade.
- v. (v) Reducing by-catch and discard through the use of more selective gear and fishing operation and innovative and value-added processing and market development for species currently discarded, expanding and promoting uniform quality criteria for internationally traded fish and fish products.
- vi. Promoting cooperation in fish trade with a view to avoiding disputes and imposition of sanctions, minimizing the impact of international fish trade on those group most vulnerable to food insecurity and
- vii. Integrating coastal area planning and management more effectively, thus a major challenge for aquaculture and Inland fisheries is where sustainable enhance the contributions made to regional fish supplies.

However, [22] in their study challenges in managing Inland fisheries – using the ecosystem approach discovered that implementation of the approach to Inland fisheries presents special challenges that arise from lack of data and information, environmental pressures, overexploitation and unsustainable used stock enhancement species introduction. Others are lack of sufficient infrastructure, inadequate governance system and rising demand for fish and fresh

water.

[14] found out that fisheries and aquaculture in Bangladesh is confronted with challenges posed by numerous natural and anthropogenic causes such as climate change, natural disasters, unbalanced urbanization and industrialization, overfishing and environmental pollution. Furthermore, vulnerability of fishery-based livelihoods may substantially increase in the coming decades due to climate change, and in the absence of adaptation, increased frequency and intensity of cyclones and floods would result in greater damage to fishing materials and loss of fish.

[12] examined the trend in fish production in Nigeria, the problem of excessive mismanagement and lack of attention by relevant agencies and discovered that challenges posed by the fishing method as well as the effect of different gears and mechanization of fishing crafts on fish production are well planned strategy of restocking the existing reservoirs after careful scientific study, training of stakeholders on the code of practice for responsible fisheries (PRF), extension of subsidies to fish conservation and utilization strategies.

Also, [25] observed that over-exploration of fishery resources, negative medication of ecosystems and economic losses arising from possible international conflicts threaten the long-term sustainability of fisheries and its contribution to the national food security.

2.4. Environmental Accounting Principles and Rural Development

The need for consistent decisive environmental accounting principles has been argued in professional circles for sometime but never better illustrated than right now as thick black oil continues to gush out of a broken British petroleum pipe a mile beneath the pristine waters of the Gulf of Mexico. The environment effect has obviously been calamitous. However, environmental accounting which entails a subset of GAAP presents additional valuable information about non – monetary transactions to provide a more holistic picture of both financial activity and associated risks. According to [10], the principles are similar and include:

- i. Environmental accounting entails the entity principle – that is defining the complete scope of activity.
- ii. Conservatives (taking into account the worst case scenario)
- iii. The matching principle (matching all revenues and expenses in the appropriate reporting period. This environmental accounting requires additional disclosure to cover environmental contingencies thus creating better awareness of firms overall financial position and better educating management, the board and shareholders about the potential consequences associated with an ecological catastrophe.

However, environmental concerns are also considered and integrated during the planning phase of programmes of measure to support rural areas. The migration of rural working age population led to economic and social decline. These adverse developments triggered the change in the perception of rural areas. However, rural development is

much more than developing agriculture, though agriculture continues to play an important role in rural areas and contributes to economic growth, small and medium – size companies are certainly of even greater relevance but many of them are again closely linked with agriculture in both upstream and downstream processes [20]. A major constraint to the development of the country's fishing sector is lack of direct support to the fish communities. Thus, the weak structural arrangement of fisheries communities together with limited access to social service like health, sanitation, education and social deprivation, lack of limited service and facilities at landing centres (pre, during and post harvesting operation), limited awareness among fishing communities, lack of security and safety service for fishermen, piracy at the sea, increase fishing cost, conflicts among industries further limit rural development. Therefore, the environmental accounting entries can make it more likely that prompt preventive action is taken before a catastrophe event take place, also as a prudent landlord would expect a damage deposit for a valuable rental property, a damage deposit to cover and ecological disaster such as oil well rupture and over-fishing of shrimp stocks could be recorded in each company's books, this increasing transparency [10].

2.5. Applicability of Environmental Accounting in Fish Production

Towards the attainment of sustainability goals of agricultural development, environmental accounting should be applied in fish production process/product design. Numerous observers have recognized the complexity, consequences and necessity of rationalizing accounting system to ensure proper allocation of costs to the source within the firms that are responsible for such costs [9]. Through the application of environmental accounting, management and other concern stakeholder could identify toxic dump in Delta State in 1988 which gave rise to the following Act.

According to [9], the main environmental laws in Nigeria include:

- i. The national Effluent Limitation Regulation S. 1. 8 of 1991 which makes it mandatory for industrial facilities to install anti-pollution equipment.
- ii. The pollution abatement in industries and facilities generating wastes regulation S. 19. Of 1999 which among other things improve restriction on the release of toxic substances and stipulates requirements for monitoring of pollution, to ensure that permissible limits are not exceeded as well as spelling out generator's liability.
- iii. The solid and Hazardous waste Management Regulation S. 1. 15 of 1991, which regulates the collection, treatment and disposal of solid and hazardous waste from municipal and industrial sources. The regulation also provides a list of over 1000 hazardous chemicals to be controlled by FEPA by toxicity category.
- iv. The harmful wastes (criminal provision) Act 42 of 1988 which sentences individuals who trade, dispose or

transport toxic waste in Nigeria or it Exclusive Economic zone to life imprisonment. Koko toxic dump in Delta State in 1988 gave rise to this Act.

- v. The Environmental Impact Assessment (EIA) Act 86 of 1992 which provides the procedure for conducting an EIA of any major development. The sectoral guidelines for the EIA Act have now been development for oil and gas, mining, agricultural, manufacturing and infrastructure sectors.
- vi. (vi) Federal Environmental protection Agency (FEPA) Act. No. 58 of 1988: The Act specifies establishments, membership functions and powers of the federal Environmental Protection Agency and national Environmental Standards. In 2007, the Nation Environmental Standards and Regulations Enforcement Agency (NESREA) Act repealed the FEPA Act. However, NESREA has amongst other functions the power to enforce compliances with laws, guidelines, policies and standards on environmental matters. Thus, an improved environmental regulation resulting from appropriate political institutions is likely to improve environmental sustainability.

Moreover, environmental accounts are also used to assess ways of addressing problems arising from other kinds of pollution, energy, and material use, toxic, emission trade schemes, vehicle emission standards, etc. It may be easier to include environmental cost in capital budgeting, if existing processes system and products are already being assigned environmental costs. Therefore, integrating environmental accounting into capital budgeting involves: Quantifying environmental costs, allocating and projecting environmental costs and benefits, using appropriate financial indicators and setting reasonable time horizon that captures environmental benefits [9].

However, there are several reasons why Environmental Accounting system adoption may be considered in fish production. As stated by [9], these include:

- i. Significant reduction or elimination of environmental costs.
- ii. Environmental costs and benefits may be over looked or hidden in overhead accounts.
- iii. Improved environmental performance which may have a positive impact on human health and business success.
- iv. May result in more accurate costing or pricing of products and more environmentally desired processes.
- v. Possible competitive advantage as customers may prefer environmentally friendly product and services.

2.6. Benefits of Increased Fish Production

The wealth from fish production and changes in the availability of fish has translated into developmental benefits. These are enumerated as follows:

Fish farming has the potential to help expand the resources base for food production and reducing the pressure on conventional sources of fish which are harvested faster than they can be regenerated [21]. With degrading agricultural environment, widespread poverty and insecurity in Africa,

fish farming even at a low cost and readily available strategy to increase food production use less land per capital and less water without further damage to the environment.

Commercial fishermen rely on catches to provide for their families just as farmer on crops.

In developing countries like Nigeria, where the economy is largely agrarian, fish farming can significantly generate employment; enhance the socio-economic status of the farmer as well as generation of foreign exchange [21]. The involvement of small scale aquaculture project in the towns and village will creates employment and merely alleviate poverty among youth. However, it is stated in [11] that over 36 million people are employed directly through fishing and aquaculture.

Fish farming has enormous potentials of improving the nutritional standard of people in Nigeria [21].

3. Methodology

This is an empirical investigation of the application of environmental accounting principles in boosting fish production in Nigeria. The survey technique was employed to cover fish farmers drawn from the 31 Local Government Area of Akwa Ibom State. A total of 100 copies of questionnaire were administered to the farmers which were randomly selected with the aid of fisheries staff of the Ministry of Agriculture in the State. The questionnaire was on bipolar scale of 5. Eighty four (84) copies of the questionnaire were returned giving a response rate of 84%. Also, secondary data were drawn from CBN Statistical bulletin for the period 2004 to 2013 and published journal

articles. The data drawn were; GDP, contribution of Agriculture to GDP, contribution of fish to Agriculture, Production of fish and consumption of fish. Data collected were analysed using descriptive statistics and chi-square. The descriptive statistics include: percentages, mean and variance.

4. Data Presentation and Result of Analysis

The result of the analysis shows that Agriculture contributes between 30 to 37 percent to the national GDP for the period under study while fish sector contributes less than 5% to Agriculture. The performance is further confirmed by the adverse variance between the level of production and consumption of fish. Also, the result shows a shortfall ranging between 1063566.90 tons in 2004 to 1404066.90 tons in 2013,(see Appendix – Table 1). Thus, huge and significant shortfall accounts for the huge amount invested in the import that is contributing to the strain in our foreign exchange reserves of the country. However, the mean production and consumption of fish for the period covered in this study was 614,540.10 tons and 1,815,630 tons respectively. An analysis of the responses to questionnaire shows that environmental accounting principles are not applied in fish production in Nigeria since the X^2 cal (454.83) > X^2 tab (26.3), (see Appendix – Table 2). The fish farmers showed little or no knowledge of environmental accounting principles.

Table 1. GDP, agriculture, fish, fish production and fish consumption data presentation and analysis.

Year	GDP N(Billion)	Proportion of Agric in GDP N(Billion)	% of Agric in GDP	Proportion of fish in Agric N(Billion)	% of Fish in Agric	Production of fish (tones)	Consumption of Fish(tones)	Variance of fish production and consumption
2004	11,411.07	3,903.76	34.21	130.12	3.33	536,433.10	1,600,000	(1,063,566.90)
2005	14,610.88	4,752.98	32.53	162.61	3.42	552,433.10	1,643,750	(1,091,316.90)
2006	18,564.59	5,940.24	31.99	196.45	3.30	567,948.60	1,691,250	(1,123,301.40)
2008	20,657.30	6,757.87	32.71	215.52	3.18	583,872.40	1,732,750	(1,148,877.60)
2008	24,296.33	7,981.40	32.85	254.64	3.19	600,612.80	1,782,300	(1,181,687.20)
2009	24,794.24	9,186.31	37.05	290.69	3.16	617,353.20	1,838,750	(1,221,396.80)
2010	33,984.75	10,310.66	30.33	328.18	3.18	634,500.20	1,810,000	(1,175,499.80)
2011	37,409.86	11,593.43	30.99	373.57	3.22	652,606.60	1,943,750	(1,291,143.40)
2012	40,544.40	13,413.84	33.08	428.23	3.19	689,958.00	2,000,000	(1,310,042.00)
2013	42,396.77	14,709.10	34.69	486.73	3.30	709,683.10	2,113,750	(2,175,000.00)

SOURCE: CBN Statistical Bulletin (2014) and Akinrotumi, Abu & Aranyo (2011)

Table 2. Analysis of questionnaire result.

No. of o	o	e	o-e	(o-e)	(o-e) ² /e
1	300	420	-120	14400	34.29
2	356	420	-64	4096	9.75
3	368	420	-52	2704	6.44
4	322	420	-94	9604	22.87
5	324	420	-96	9616	22.90
6	302	420	-118	13924	33.15
7	290	420	-130	16900	40.24
8	308	420	-112	12544	29.87
9	388	420	-32	1024	2.44
10	314	420	-106	11236	26.75
11	320	420	-100	10000	23.81

No. of o	o	e	o-e	(o-e)	(o-e) ² /e
12	300	420	-114	12996	30.94
13	326	420	-94	8836	21.04
14	306	420	-114	12996	30.94
15	24	84	-60	3600	42.86
16	280	420	-140	19600	46.67
17	308	420	-112	12544	29.87
					$\Sigma = 454.83$

Source: Field Survey, 2016

5. Discussion of the Findings

Based on the results of data analysis, it was found out that:

Agriculture makes direct contribution of its own production to economic performance. This contribution is measured by its proportion in GDP. This range between 30 to 37 percent indicate the neglect of Agriculture by the country with the major focus on the petroleum sector. On the hand, the contribution of fisheries sub-sector to the Agriculture was less than 5% from 2004 to 2013. This was abysmally.

Nigeria mean production of fish was 614,540.10 tons as against a demand of 1,815,630 tons from 2004 to 2013. This indicates that only 34% of demand was met every year for the period from fish production while 66% of the demand was met through fish importation. Thus, there is high potential for fish production in Nigeria.

Environmental Accounting principles that would reduce or eliminate environmental cost are not applied in fish production in Akwa Ibom State

6. Conclusion and Recommendations

This study concludes that:

Fisheries in Nigeria contribute insignificantly to Agriculture and invariably the Gross Domestic Product. The adverse variance between production and consumption implies high growth potential in fish production.

Environmental Accounting principles that would enhance improved environmental sustainability are neglected in fish production in Akwa Ibom State.

The demand for fish in Nigeria is yet to be met through domestic fish production.

However, based on the conclusion of the study, the following recommendations are made:

- i. To realize growth in fish production, there should be improvement in technology and resource use intensification, and development of additional area for aquaculture.
- ii. Fish farmers should increase effort in local fish production to bridge the gap between fish production and fish consumption in Nigeria. Thus, the gap is likely to be bridged if there is proper management of fish farming. They should also ensure that there are regulatory activities that conform to national policy like that of (NESREA). Such activity should include: recycling of water, waste water treatment, soil erosion control, pollution control, no chemical usage, proper drainage and

soak- away pits to reduce the discharge of farm water into the environment.

- iii. Government should support the farmer by providing infrastructure and adequate training in fish farming and environmental matter that will enhance growth in fish production and lead to environmental sustainability.
- iv. The Nigerian Government should focus on taking full advantage of the huge potential in the fisheries sub – sector thus contributing to GDP and improving the standard of living of the people. Ultimately, the strain on the foreign exchange reserve will be reduced through the reduction of imports.

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