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Residents' Perception of Aquaculture Development: The Case of Buguma Fish Farm in Rivers State, Nigeria

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Abstract: ***Residents' perception has been investigated towards the establishment of the Buguma fish farm as an intervention project to the loss of livelihood in Buguma community because of pipeline vandalism triggered pollution, rape of women fisher folks and criminal activities such as piracy, kidnapping, theft, etc. in the creeks. Specific objectives of ascertaining the residents' perceptions of the aquaculture farm project and its activities in terms of positive and negative impacts and identification of the benefits enjoyed from the Buguma fish farm by the residents have also been assessed. The study was explorative with pragmatic philosophical worldview belonging to the class described as 'Triangulation Mixed-Method Design (Cresswell & Tashakkori, 2007), where qualitative and quantitative data are collected at the same time, and emphasis is placed on both qualitative and quantitative data in establishing result and making recommendation (Cresswell, 2002). The study adopted both random and convenience sampling techniques which are frequently used in mixed-method studies (Cresswell, 2002 & Nueman, 2003). The number of questionnaires administered to residents' households was 384, while the number returned was 376. The number and quality of questionnaires collected allowed a qualitative and quantitative examination of the residents' perception of the Buguma fish farm. In general, the result of the research work affirms that there was livelihood loss due to oil pollution from pipeline vandalism; and high level of criminal activities such as kidnapping and robbery but that the Buguma fish farm as an intervention project reinvigorated the livelihood base and improved the living standard of Buguma residents as it opened window of investment opportunities, serve as a tourism destination and provides jobs/ employment for Buguma residents.***

Keywords: Aquaculture, Residents' Perception, Buguma Fish Farm

1. Introduction

Globally, rapid population explosion has statistical figure standing at about 7.3 billion in 2016 (UNFPA, 2016). This was made possible by advanced maternity and health care. However, the rise presents with it various challenges around global sustainability. One of such challenges is the demand for more food (FAO, 2016). A publication of the Food and Agricultural Organization of the United Nations (FAO, 2014) was able to draw and analyse the direction of the global population. It posits that the population of the world is expected to increase for about 2.3 billion people between now and 2050. Although this suggests that there is a slower rate of growth compared with the experience over the past 40 years, it is still about 30 percent increase in the number of people who will definitely demand food. It is to be noted that the amount of food that will be demanded, produced and processed will increase by about 70 per cent to 100 per cent in the developing countries like Nigeria. Nigeria's population in 2001 was 124,445,829 at 2.55% growth rate. It was 140,431,790 at 2.5% growth rate in 2006 (NPC, 2006). In 1st January 2016, it was projected to 184,635,279 at 2.67% growth rate showing a difference in population of 44,203,489 (Countrymeters information, 2016). This will invariably mean a demand in increased supply of several types of food products to cope with the increasing population and food demand. To this effect, aquaculture is poised to assume its high position as an adaptation strategy with industrial capacity that will tackle reduction in wild fish catches, an aspect of sea foods production that will meet up the increasing request for seafood protein and economic empowerment (Tidwell & Allen 2001). Well beyond producing food, aquaculture has additional possibilities: creating dietary and industrial mixes; boosting quantities of wild fish for recreational fishing; re-establishing threatened and endangered species; reconstructing vital shellfish natural surroundings; and giving ornamental fish, coral and live shake for aquariums and foreign exchange when developed on a substantial scale (Fletcher W. J, Mumme M. D and Webster F. J, 2017). The potentials of aquaculture assert that it is integrated as a major contributor to it's country's GDP. According to Ekunwe and Emokaro (2009), Nigeria is recorded statistically as the largest producer of African aquaculture products, with a production clucking over 15,489 tons every year. The Buguma aquaculture farm which is under the researcher's investigation is one of the major farms in the Rivers State of Nigeria. The Millennium Development Goals were laudable and really impactful against poverty and poor health for millions of people all over the world. The current strategy is the new 2030 Agenda for Sustainable Development. Since the world can no longer be sustained by hunting for fish or catching fish in the open river, the new paradigm- aquaculture seems to be a path to achieving part of the new Sustainable Goals.

Famine and starvation are always waging war mostly among the poor people in the world. The FAO (2003) estimates that 799 million people in 98 developing nations are not getting enough food to live normal, healthy and energetic lives. Food demand, especially the request for fish, has risen continuously, and it is forecasted that more population explosion coupled with change in eating behavior will place more demand on food supplies subsequently for more thirty years (FAO 2016). Farming in the upland area and fishing in the coastal communities of Rivers State had been the backbone of Rivers State economy for many years. However, the focus changed when oil was discovered in Oloibiri community of the then Rivers State in 1956. Today, the primary occupation farming and fishing in Asari-Toru Local Government area of Rivers State, Nigeria is done by

small old aged farmers and fishermen. Majority of the educated young and able men and women are constantly moving to the urban areas for greener pastures because the only available secondary occupation providers in the area are works in the education sector, health sector and the Asari-Toru Local Government Council domiciled in Buguma which all put together has not succeeded in employing more than 5% of the total population. The vast majority are left to take decisions either to migrate to urban centres or to resort to the traditional fishing and farming at a subsistence level leaving the vast local resources untapped. This, therefore, has led to consistent poverty, unemployment and hunger which thus are generating associated problems necessitating breaking down of law and order. Buguma community residents who were primarily into traditional fishing to earn a living can hardly go out for fishing because of pipeline vandalism triggered pollution, rape of women fisherfolks and criminal activities such as piracy, kidnapping, theft, etc. in the creeks. The young men and youths in the face of these challenges are not also willing to take the task of going out into the river and casting net at fishes. Even the high rate of oil pipeline vandalism triggered pollution on the river and creeks has reduced the amount of catch as traditional fishing is no longer as lucrative as it was before. It is apparent that there is a loss of livelihood in Buguma.

The goal of the study is to assess the perception of Buguma community residents of the aquaculture development in Buguma.

The objectives of the study are:

1) Ascertain the residents' perceptions of the aquaculture farm project and its activities in terms of positive and negative impacts.
2) Identify the benefits enjoyed from the Buguma fish farm by the respondents

The study was conducted in Buguma, headquarters of Asari-Toru Local Government Area of Rivers State, Nigeria. Buguma City historically is the foundation of the Kalabari kingdom where the King Amachree dynasty sits. Buguma is an Island that is surrounded by sea and creeks (the Asari-Toru –Buguma Sea leading to the Cawthorne channels and the Amanyanabo Okolo creek connecting to the Girls Secondary School Marywood through to the Buguma fish farm site). Buguma is sharing boundary at East by Bukuma community of Degema Local Government Area. In the south are the tributaries leading to the Atlantic Ocean; her West by Angulama, Omekwetariama, Minama, Krakrama, Sangama communities and in her north by Ido community of the Asari-Toru Local Government Area. Buguma like other settlements in the Niger Delta is engulfed with a predominant mangrove swamp vegetation and tropical rain forest climate. The people are pre-occupied with fishing along the creeks that criss-cross the area and sea fishing traditionally in canoes. Buguma is dominated by one traditional language known as Kalabari; although there are strangers-Hausas, Ibos, Ibibio etc engaged in different kinds of trading which are the paramount activity that makes up the major economic activity of the rural dwellers. Buguma community enjoys rural-urban and urban-rural linkage by the Emuohia-Abonnema-Buguma link road thus making transportation and flow of ideas easy. Fig 1.1 and 1.2 shows map of the study area.

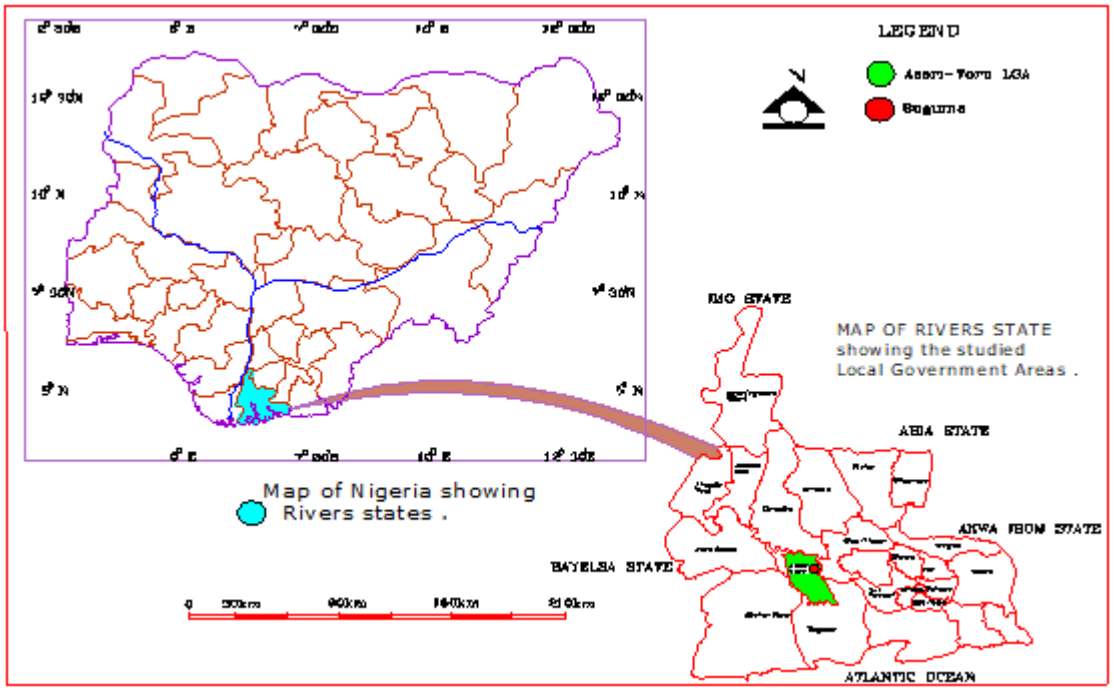

Figure 1.1: Map of Study Area
Source: Adapted and modified from Nigerian Muse, 2018

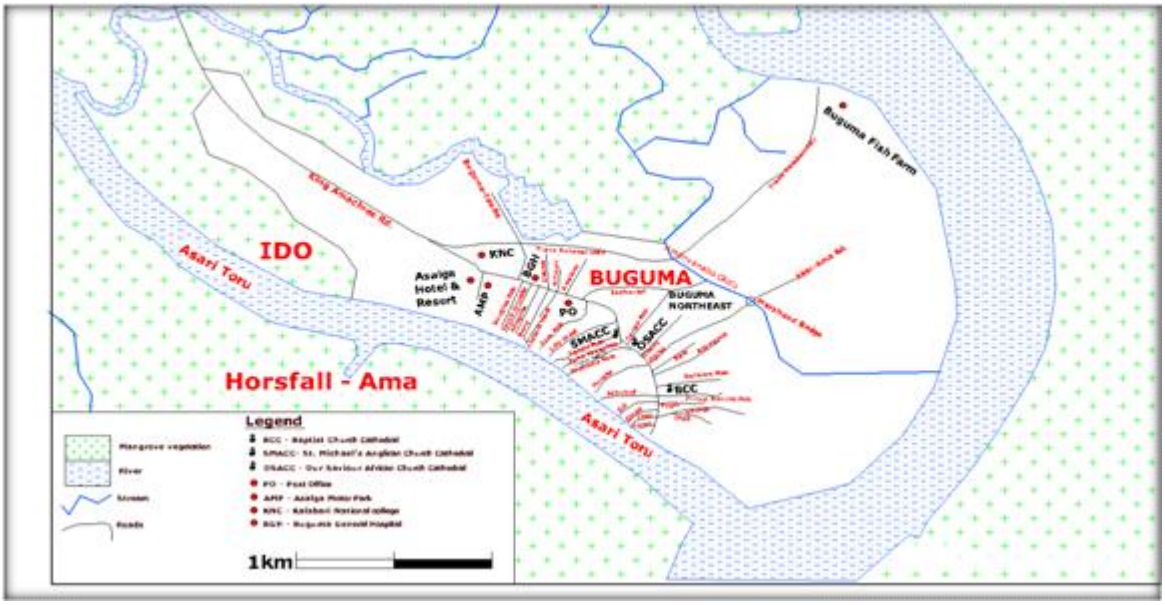

Figure 1.2: Map of Buguma showing Streets
Source: Ikiriko T. D, 2018

2. Perceptions of Aquaculture Development

Aquaculture is the breeding**,** rearing**,** and harvesting of fish, shellfish, plants, algae and other organisms in all types of water environments. Aquaculture has a major advantage over the decreasing capture fisheries as the time of harvest can be synchronised to coincide with market demand (FAO, 2008). Aquaculture is one arm of agriculture that can thrive in any ecological area of Nigeria. According to the Nigerian Fifth National Biodiversity Report, 2015, there are five priority ecological areas of Nigeria which are arid, guinea savannah woodlands, coastal and marine ecosystem, rainforest belt including montane forest and wetlands and river basins. As long as water (whether brackish or fresh) which creates the enabling environment for aquaculture industry to thrive is available or provided, aquaculture will do well in any part of Nigeria.

Looking in a global perspective, several authors and scholars have made remarkable contributions in the way people, the public, locals or residents perceive aquaculture development in their locality or area of interest. D'Anna, L. M., and G. Murray (2015) conducted a research on Perceptions of shellfish aquaculture in British Columbia and implications for well-being in marine social-ecological systems. They measured how the perceived environmental, economic, and experiential effects of shellfish aquaculture have suggestion for the well-being of the social component in a social-ecological system. They conducted a multi-methods study using interviews, participant-employed photography, and a household survey. Their results reveal that aquaculture affects individuals and communities along multiple dimensions that they termed environment, economy, and experience.

Gordon et al, (2003) conducted a study on Aquaculture potential in the Rivers State of Nigeria. Their discoveries or findings demonstrates that Rivers State holds promise for aquaculture advancement and aquaculture can possibly add to both sustenance security and economic security in the state. Ideal components for aquaculture advancement in the Rivers State that they highlighted incorporate abundant water resources, a tropical year-round growing season, a tradition of fishing and fish consumption, an informed and prepared unit of aquaculture researchers and specialists, and a noteworthy populace that is youthful, unemployed and looking for opportunities to accommodate themselves and their families. Whitmarsh and Palmieri (2009) researched on the social acceptability of marine aquaculture. Their review shows that public attitudes towards the eventual fate of aquaculture- the salmon producing industry are a component of the weights individuals connect to the helpful impacts of business extension (i.e. job creation, and so on.) as against the apparent negative impacts related to ecological degradation. Research in Mexico and Greece recognized that the aquaculture industry's social acceptability was enhanced where local concerns about environmental damage from aquaculture were low, perceived socio-economic benefits were high and location and management regimes were considered suited to the region (Hugues-Dit-Ciles 2000; Katranidis 2003).

Katranidis et al. (2003) found that what made the peoples' acknowledgement of aquaculture activities as more noteworthy were financial advantages and there was less worries about ecological contamination from the business. Women, community groups (particularly those with conservation interests), ecotourism industries, some researchers, local governments, some state agency staff and educated individuals from the overall population will probably concentrate on aquaculture's contrary (ecological, monetary and social) dangers and look for upgrades in aquaculture arranging and administration to significantly diminish those dangers (Nicole et al; 2006). Local, regional and national studies have examined opinion of the industry's sustainability, how communities regard the industry and appropriate institutional assistance to the industry's challenges in Australia, Canada, Europe, Mexico and the United States. One review in the United States and two in Australia proposed that parts of society view the business' natural manageability positively, despite the fact that there

was low consciousness of a portion of the ecological issues testing the business (Blackstone 2001; Aslin and Byron 2003; Mazur et al. 2004). Wilson 2001 recommended that aquaculture's social acceptability increases where its socioeconomic benefits (e.g. employment opportunities) can be clearly verified and communities and stakeholders are kept well informed about the industry's environmental impacts and governments' regulatory and management processes. Hugues-Dit-Ciles (2000) established that where the values and needs of local communities in Mexico were integrated into aquaculture planning prior to development, the industry's social, economic and environmental sustainability could more easily be protected. Kaiser and Stead (2002) distinguished a scope of faltering and perspectives influencing European waterfront aquaculture. They have reasoned that expanded utilization of coordinated (marine and seaside) arranging, which highlights more open, straightforward and participatory fora, is required to help the business accomplish its maximum capacity.

Mazur et al. (2005) presented a report on Community Perceptions of Aquaculture. Their report presents answers to questions on the public knowledge and their opinions about aquaculture in Australia in two specific regions. The survey had the aim to investigate the peoples' opinions concerning aquaculture in general, the information and presumptions towards the economic and social estimation of fish farming, their mindfulness about potential ecological effects and their estimation of aquacultures' sustainability. They employed two methods in their work. The first method employed is the stakeholder's identification method. This involves a variety of individuals and groups who have a specific interest in aquaculture (communities of interest) and those who are interested in aquaculture because they live in close proximity to it (place-based communities). The second method engaged was the survey method. This involves the use of questionnaires, focus group discussions and direct observation.

The results of the study indicated that the public actually attaches relatively high importance to minimizing environmental damage from aquaculture, and this has its correspondence in the fact that people are willing to pay a quality price for aquaculture products produced in a more environmentally friendly way.

3. Research Methodology

This study is explorative with pragmatic philosophical worldview belonging to the class described as 'Triangulation Mixed-Method Research Design (Cresswell & Tashakkori, 2007), where qualitative and quantitative data are collected at the same time, and emphasis is placed on both qualitative and quantitative data in establishing result and making recommendation (Cresswell, 2002). Triangulation mixed-method design allows residents perception and expectations to be explored and better understood both qualitatively and quantitatively. Samples were drawn from the relevant population and studied once.

The target population of the study includes Head of Households in the community. Cochran's (1977) correction formula was used to determine the final sample size which became 384. The field research comprised the following operations: a. Reconnaissance survey, b. Structuring of questionnaires, c. Listing of streets, buildings and households in Buguma to provide a sample frame for the household questionnaire administration and d. Probability sampling of streets, buildings, households and respondents. The study adopted both random and convenience sampling techniques which are frequently used in mixed-method studies (Cresswell, 2002 & Nueman, 2003). The total number of persons in Buguma were divided by the population of each street (Family Units) in Buguma and multiplied by the sample size. A stratified random sampling technique was then used to list out the buildings/households in each of the streets and the respondents were interviewed. See Table 1.1 showing population size distribution. The study relied on two sources of information-primary (pre-coded questionnaires, key informants, small group discussions, direct observation) and secondary (government records, maps and published information on hard copies and online journals). Data analysis employed descriptive statistical techniques. Descriptions of findings were made with special reference to the opinion of household heads who patronized the Buguma fish farm.

Table 1.1: Population Size Distributions

S/N	Family Units (Streets) in Buguma	Number of persons	Number of Questionnaire distributed	Number of Questionnaires returned
1	Douglas	670	11	11
2	Jacob Oruadiri	405	7	7
3	Atiegoba	923	15	15
4	Berry	1032	17	15
5	Chetam West	448	7	7
6	Nifeipiri	1094	18	18
7	Tom west	1488	24	24
8	Lilly West	632	10	10
9	Johny West	548	9	9
10	Wokoma	1355	23	23
11	Horsfall	1621	26	24
12	Johnbull (Ikiri)	1022	17	17
13	Braide (Edi)	843	14	14
14	Ombo	762	12	12
15	Ikpo	782	13	13
16	Kama	601	10	10
17	George	1492	24	22
18	Otaji	512	8	8
19	Tyger	556	9	9
20	Ojuka	948	15	15
21	Dateme	667	11	11
22	Abbi	1023	17	15
23	Oboko	836	14	14
24	Atampaka	231	4	4
25	Tariah	1231	20	20
26	Isokariari	688	11	11
27	Amatoru	521	8	8
28	Ibama	626	10	10
	Total	23557	384	376

Source: Ikiriko T. D, 2018.

4. Results and Discussion

This section presents the results of analyses carried out in the course of the study. Three hundred and eighty four (384) questionnaires were administered and three hundred and seventy six (376) were retrieved making a response rate of

ninety eight percent (98%). Analysis was therefore based on the entire 28 streets of Buguma.

Respondents overall Perception of the aquaculture farm in Buguma

Respondents were asked to state their overall views of the aquaculture farm in Buguma. Table 4.29 shows that 23.0% of respondents had a very positive view of the farm, 50.0% had a quite positive view of the farm, 18.8% had neither positive nor negative view of the farm, 4.2% had quite negative view, 1.6% had very negative view of the farm while 2.4% don't know what to say.

Positive Perception about the Buguma aquaculture farm

In the survey, those who viewed the industry quite or very positive centre their reason primarily on the economic benefits of aquaculture to Buguma residents and her neighbours (74.4%), particularly that aquaculture makes fresh sea food/ fishes available (55.5%). Other reasons for viewing the industry positively include that aquaculture is perceived to be a source of employment (54.4%), that it's it increases the community population so boasting commerce and trade (43.1%), products taste good, soft and enjoyable (44.2%), and that it Produces good, quality and healthy sea foods (24.1%).

Residents' Personal view of Impact of the Buguma aquaculture on residents

Without any prompting about the possible positive or negative impacts of aquaculture, all respondents were asked to tell their views of the aquaculture industry as positive or negative on them. Out of 376 respondents, 120 respondents (31.9%) view aquaculture as positively impacted on the residents, 79 respondents (21.0 %) view it as negatively impacted, 19 respondents (5.0%) view it as both negative and positive while 142 of respondents (37.8%) view it as with no impact. 15 respondents (4.3%) says they don't know. Since most of them see it on a positive light, it thus means that it is really of positive impact to the community.

Buguma residents' use of the coast (positively impacted by aquaculture)

From the study, the hallmark reason for the use of the coast as impacted by aquaculture is creation of jobs (35.8%). This was followed by 17.5% of respondents who say that it provides sea food with ease.

Negative Perception of the Buguma aquaculture farm

Although majority saw the aquaculture project as a positive venture, 21% of the people (79 respondents) saw it as negative with the following reasons on 100% basis: that contracts and senior level jobs were done by foreigners and strangers (87.4%). This was followed by those who said that it causes environmental pollution (85.1%), then by the group who says that the aquaculture industry is too expensive and not for individuals or community to embark upon (84.0%). Not natural, genetically modified (43.6%); Fear of future health hazard (17.24%), It encroaches on recreational areas (19.5), Disliked farmed sea foods / don't eat it (19.5%) and others who do no comment (23.0%).

Buguma residents' use of the coast has been negatively impacted by aquaculture

Again, among the 79 respondents who say that Buguma resident's use of the coast have been negatively affected by the Buguma fish farm, 23 respondents gave their reasons that it pollutes the river water, 17 respondents are of the opinion that the farm does not take care of the outside environment. Other reasons given were changed natural/ recreational area to aquaculture industry area (9 respondents); Over farming/ depleting resources (6 respondents) and impact our traditional fishing (8 respondents).

Benefits of Buguma fish farm

Most of the residents saw aquaculture as a sustainable way to produce sea food in the area. A total of 202 respondents strongly agreed that aquaculture is a sustainable way to produce sea food. A total of 66 respondents' agreed, 18 respondents remained undecided, 55 disagreed while 35 strongly disagreed.

Buguma aquaculture farm was looked at as a tourism destination and 218 of the respondents (58.0%) strongly agreed that the Buguma aquaculture farm is a tourism destination. A total of 72 respondents' agreed (19.1%), 21 respondents remained undecided (5.6%), 35 respondents making 9.3% disagreed while 30 respondents (6.0%) strongly disagreed.

It was also confirmed whether the Buguma Aquaculture farm has improved the living standard of Buguma residents and 152 of the resident respondents strongly agreed that the Buguma Aquaculture farm has indeed improved the living standard of Buguma residents by opening window of investment opportunities. 72 respondents' agreed, 15 respondents remained undecided, 78 disagreed while 59 strongly disagreed.

To ascertained that one of the benefits of the Buguma Aquaculture farm to residents was that it provides jobs/ Employment for Buguma residents, 222 of the respondents making 59.0% strongly agreed that the Buguma Aquaculture farm provides jobs/ Employment for Buguma residents. 56 respondents' making 15.0% agreed, 6 respondents making 1.6% remained undecided, 44 making 11.7% disagreed while 48 making 12.7% strongly disagreed.

To ascertained that one of the benefits of the Buguma Aquaculture farm was that it contributes positively to Buguma's clean, green image, a total of 84 of the respondents 22.3% strongly agreed that the Buguma Aquaculture farm contributes positively to Buguma's clean, green image, 203 respondents' 54.0% agreed, 16 respondents making 4.3% remained undecided, 45 making it 12.0% disagreed while 48 making 7.4% strongly disagreed.

When asked respondents whether the Buguma Aquaculture farm contributes significantly to local, state and national economy, 82 of the respondents 21.8% strongly agreed that the Buguma Aquaculture farm contributes significantly to local, state and national economy, 148 respondents' 39.4% agreed, 14 respondents making 3.7% remained undecided, 106 making it 28.2% disagreed while 26 making 6.9% strongly disagreed.

The question of Buguma aquaculture farm having negatively impacted on Buguma's natural beauty was answered by respondents that 44 of the respondents 11.7% strongly agreed that the Buguma Aquaculture farm has negatively impacted on Buguma's natural beauty, 23 respondents' 6.1% agreed, 63 respondents making 16.8% remained undecided, 48 making it 12.8% disagreed while 198 making 52.6 strongly disagreed.

Finally, Aquaculture poses a risk to natural sea life was raised as a question and the answer was that 103 of the respondents strongly agreed that the Buguma Aquaculture farm Aquaculture poses a risk to natural sea life, 74 respondents' agreed, 26 respondents remained undecided, 105 respondents disagreed while 68 respondents strongly disagreed.

5. Conclusion

The overall residents' perception of the aquaculture farm in Buguma is positive. A total of 23.0% of the respondents had a very positive view of the farm, 50.0% had a quite positive view of the farm. The few who had negative view about aquaculture are concern about the people and environmental impacts which will be managed by the EIA mitigation plan of the project. The impact of the Buguma aquaculture farm on personal use of the coast was also positive. Their reasons were that it is good for the economy as it brings them revenue, it protect and saves coastal resources, good for recreation and site seeing, relaxation and meditation and has created job/ employment for their people. "MoU was signed with ONIDA of Israel for the advancement of Fish Farms at Buguma, Andoni, Ubima and Opobo. The aggregate production limit of these farms is 5,000 tons for every year and that it has the objective of transfer of technology to our local investors who may wish to replicate this farm in smaller units" (Rotimi Amaechi, 2009 *In Eze Chukwuemeka Eze online publication).* This paper has confirmed that the venture actually has positive impact on the community residents as it creates employment opportunities, generate revenue and boast economic activities in the area.

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