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Climate Change: Mitigation and Adaptation Strategies in Fisheries and Aquaculture in Nigeria

I. Magawata and J.K. Ipinjolu

Department of Forestry and Fisheries, Faculty of Agriculture, Usmanu Danfodiyo University, Sokoto, Nigeria

Corresponding Author: I. Magawata, Department of Forestry and Fisheries, Faculty of Agriculture, Usmanu Danfodiyo University, Sokoto, Nigeria

ABSTRACT

This study examined possible mitigation and adaptation measures in small-scale fisheries, aquaculture and the fishing communities in Nigeria to cope with the impact of climate change. It is recognized that mitigation measures in fisheries are limited but must consider possible options on the inputs, equipments and methods employed in fishing and fish processing activities. Several opportunities for adaptation options in the country's artisanal fisheries and aquaculture and by the fishing communities, to reduce their vulnerability to climate change impacts and protect the livelihoods and food security have been identified. The areas of research on climate change to enhance knowledge on the socio-economic, biological and ecological impacts and to guide decision on mitigation and adaptation measures, in fisheries and aquaculture and the fishing communities, are also outlined. Proper integration of fisheries and aquaculture into the national policy on climate change and the political will for implementation are key to effective climate change mitigation and adaptation to ensure sustainable fisheries and to protect the livelihoods and food security in the country.

Key words: Mitigation, aquaculture, climate change, fisheries

INTRODUCTION

The phenomenon of climate change is, perhaps, one of the most current challenges facing man in various socio-economic endeavours and it is anticipated that this will continue to be so in decades ahead. The issues to the shift in the global weather pattern with respect to understanding the causes, impact, mitigation and adaptive strategies have assumed socio-cultural, economic, political, biological and technological dimensions. The United Nations Framework Convention on Climate Change defines climate change as a change of climate which is attributed, directly or indirectly, to human activities that alter the composition of the global atmosphere and which are in addition to natural climate variability observed over comparable time periods.

There are considerable literatures on the main causes of climate change and the impacts on environmental resources and inhabitants in many regions of the world. Among the several reports relevant to fisheries and aquaculture include those of the IPCC (2007), WorldFish Center (2010), Medugu (2009), Halls (2009) and Williams and Rota (2012). World Fish Center reported that the productivity, distribution and seasonality of fisheries and the quality and availability of the habitats that supports them, are sensitive to climate change effects and that the many

fishery-dependent communities and aquaculture operations in regions are highly exposed to climate change. Therefore, the major challenge is coping with changes in fisheries system brought about by climate change.

Fisheries is a food production system that is composed of habitat or water body, the fish population and the users who are mainly the fishermen. These sub-systems are intricately related and the impact of climate change on any one of them will directly or indirectly impact negatively or positively on the others and on the generality of the communities that depend on them. With focus on the characteristics of the Nigeria fisheries industry, this study examined possible mitigation and adaptation strategies to combat the impact of climate change on fisheries and aquaculture with focus on Nigeria.

MITIGATION MEASURES

A policy brief study by several organizations (Anonymous, 2009) identified three specific adaptation and mitigation measures specifically required for fisheries and aquaculture sector. These are the ability of the measures to improve the management of fisheries and aquaculture and the integrity of aquatic ecosystems, response to the threats and opportunities to food and livelihoods security and help the sector to reduce greenhouse. However, while much opportunities are available for adaptation strategies in fisheries and aquaculture, the mitigation measures seems to be limited and their effectiveness in combating climate change are still subject to thorough scientific investigations.

Halls (2009) noted that in a small-scale unmechanised fisheries, such as the inland or freshwater and coastal artisanal fisheries in Nigeria, the scope for climate change mitigation through reduction in CO₂ emissions or reversing the global warming trend is very limited. The mitigation strategies often suggested that fisheries include promoting the use of fuel-efficient fishing vessels and methods, removing such disincentives to energy efficiency as fuel subsidies and reducing overcapacity in global fishing fleets, as there are too many boats burning too much fuel to chase too few fish (Oyebanjo, 2010).

Conserving fuel wood during fish smoking through efficient use of small quantity of wood to smoke large quantity of fish according to IPCC (2007) could help a great deal in the mitigation of climate change. The same author explained that another strategy is the use of gas smoking kilns or solar powered dryers. These methods have very negligible emission to the atmosphere and hence less damaging to the environment.

ADAPTATION STRATEGIES

Several adaptation measures to the impacts of climate change on fisheries and aquaculture and the fishing communities that depend on the resources for livelihoods have been suggested (WorldFish Center, 2007; Halls, 2009; Williams and Rota, 2012). Adoption of coping strategies to the impacts of climate change is a must for artisanal fisheries system and the rural fishing communities who contributes very little to global warming but inevitably suffer more for the negatives effects. However, the appropriateness and effectiveness of these measures would depend on the characteristics and vulnerability of the fisheries and the fishing communities.

The following sections outlined some possible adaption options in artisanal fisheries and aquaculture in Nigeria is given as follows:

- The country's capture fisheries which have suffered depletion through stress factors such as overfishing and pollution and now being compounded by changes in climate, should be on continuous well planned restocking programme to reduce their vulnerability
- Protecting the resilience of the freshwater and coastal waters, by avoiding habitat destruction and pollution that could further aggravate stress on the systems
- De-silting of the natural water bodies, (rivers, lakes, creeks and reservoirs) to prevent drying up which has already manifested in zones across the country
- Control of fishing effort and limiting the quantity of fish caught to reduce overfishing as ways of protecting the water bodies and the resource poor fishermen
- Integration of fishing or aquaculture with agriculture to diversify the economy and empower the communities to secure their means of livelihoods
- Training opportunities and financial assistance to reduce vulnerability of the fishing communities to the impacts of climate change
- Development, adaptation and adoption of appropriate fish post-harvest technology to reduce huge loss incurred in the rural fishing communities and make-up for reduced fish production arising from the impact of climate change
- Plan of action, through the National Emergency Management Agency, to protect fishing communities from immediate impact of climate change such as floods, displacement and disease outbreak
- Expansion of aquaculture to increase and stabilize fish food supplies and employment to protect livelihoods of communities and to augment wild stocks
- Expansion of fish farming in the expanded flooded plains of rivers, reservoirs and fadama areas
- More attention to mariculture in view of the anticipated impacts of climate change on freshwater aquaculture
- Promotion of fish culture in cages and irrigation canals of the reservoirs to enhance livelihoods of the communities
- Integration of fish culture with crops and/or poultry to ensure efficient utilization of environmental resources, production inputs and infrastructure to enhance livelihoods and food security
- Promote the culture of planktophagous and herbivorous fishes that feed at the lower level of food chain and others such as seaweed and shellfish which, according to FAO (2009) could help to sequester carbon
- Improvement of the microclimatic conditions of fish farms, natural waters and the larger environment through planting of shrubs and vegetables around pond areas, orchards/semi-deep rooting trees around natural water bodies and massive afforestation programme
- Support innovation by research on management systems and aquatic ecosystems
- Political will to implement adaptation strategies
- Integration of fisheries and aquaculture into Nigeria's policy on climate change

RESEARCH NEEDS

There should be reliable and current scientific information to enhance knowledge on the dynamics of climate change, the impacts on capture fisheries, fishing communities and aquaculture, as well as on the mitigation and adaption strategies. Therefore, some issues that could be subjected for immediate, medium and long term research activities of scientists and other stakeholders in fisheries and aquaculture in Nigeria are itemized as follows:

- Indices, trends and dynamics of climate change in the country and the neighbour regions
- Quantitative information on the biological and ecological indices and effects of climate change
- Sources and contributions of fisheries and aquaculture to climate change at the local and regional level
- Impacts of climate change on individual fish species, fish population, other aquatic resources, fish ponds and other fish culture systems in the country's inland and coastal water bodies
- Vulnerability and response of artisanal and industrial fisheries, as well as aquaculture to changing weather pattern
- Evaluation of the effectiveness of feasible mitigation measures in fisheries and aquaculture
- Innovations on adaptive options in fisheries and aquaculture and the fishing communities
- Effect of adaptation measures by other sectors on fisheries and aquaculture
- Forecasting and early warning mechanisms on the immediate impacts of climate change
- Scientific framework for incorporation of fisheries and aquaculture in a national policy on climate change

CONCLUSION

Climate change is inevitably a challenge for fisheries and aquaculture management/production. Rigorous research on impacts, mitigation and adaptation combined with practical actions, locally, nationally, regionally and globally will provide knowledge to the solution of the problem.

Empirical evidences on the effectiveness of mitigation and adaptation measures should be put in place to ensure scientific approach to the problem at hand. To this end, measures of weather monitoring and forecasting need to be intensified.

High quality research that involves resource users, build strong partnerships and harness political will for implementation of the adaptation and the mitigation measures is crucial for making fisheries and aquaculture systems more resilient to the challenge of global climate change and securing a bright future for the people that depend upon them.

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