

Climate Change Implications for the Aquaculture Industry in the Rivers State, Niger Delta Area of Nigeria

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Abstract

Rivers State is a coastal community in the Niger Delta Area of Nigeria encompassed by a network of tributaries, inland and the Atlantic Ocean at its Southern tip. The communities of the Rivers State are largely dependent on the coastal wetlands for aquaculture and fisheries activities, which are their main economic activity. Several other economic activities especially oil prospecting and exploration activities by numerous companies, land fills, and reclamation, and human activities such as deforestation of the mangroves of the wetlands among others responsible for global climate change are high in the Rivers State.

Also, certain climate change activities have been observed recently. Thus a review was carried out to determine the likely implications of climate change on the aquaculture industry, and subsequently the livelihood of the fish farmers, and recommendation/suggestion have been made to this effect.

This review is aimed at understanding and creating an awareness as regards the climate change implications for the aquaculture industry for all stakeholders in the Rivers State and proffering a solution to this anomaly.

Keywords: Aquaculture, Economic Activity, Climate Change, .

INTRODUCTION

The behavior of the climate system and the processes that cause global warming are well understood and grounded in basic scientific principles. Scientific uncertainty is inevitable with a system as complex as Earth's climate (Aalbersberg et al 1993). However, advancements in measuring, analyzing, and modeling techniques have helped clarify many uncertainties in recent years.

As the scientific evidence on rising global temperature became indisputable, skeptics focused their argument on whether human activities are in fact the cause of global warming. They argued that the observed warming could be caused by natural processes such as changes in the energy emitted by the Sun. However, the Sun's influence has been found to have contributed only slightly to observed warming, particularly since the mid-20th century. In fact, there is overwhelming evidence that greenhouse gas emissions from human activities are the main cause of the warming.

In its 2007 report the IPCC projected temperature increases for several different scenarios (IPCC, 1996), depending on the magnitude of future greenhouse gas emissions. The IPCC cautioned that even if greenhouse gas concentrations in the atmosphere ceased growing, the climate would continue to warm for an extended period as a result of past emissions, and with more dramatic effects than were observed during the 20th century. If greenhouse gas emissions continue to increase, scientists project severe climate changes. Many elaborate computer models of temperature, precipitation patterns, and atmosphere circulation have been used to study global warming. Based on these models, scientists have made many projections about how global warming will affect weather, glacial ice, sea levels, agriculture, wildlife, and human health. Many changes linked to rising temperatures are already being observed.

A warmer world will be generally more humid as a result of more water evaporating from the oceans. A more humid atmosphere can both contribute to and offset further warming. Storms are expected to be more frequent and more intense in a warmer world. Water will also evaporate more rapidly from soil, causing it to dry out faster between rains. Some regions might actually become drier than before. Overall, higher latitudes are projected to receive more rainfall, and subtropical areas are projected to receive less. Shifting patterns of precipitation will occur. Droughts are projected to become longer and more intense.

IMPLICATION OF CLIMATE CHANGE ON COASTAL AREAS:

“tomorrows crisis, today impacts on fisheries”

Fishing industry is an essential part of Rivers state. It provides much needed protein, and nutrients as well as creates jobs for thousands of people in the state. With the high demand on fishing, their populations are declining. Fish populations are being depleted faster than they are able to restore their number. They are not given enough time for the populations to regenerate and sustain the demand that has been put on them. Over fishing is not the only impact on marine communities, climate change, habitat loss, and pollution are all added pressures to these important ecosystems. The banks of the water systems of Rivers state are desirable and ideal locations for people to settle (Alm, et al 1993). They provide water for drinking, bathing, cleaning,

and fishing for both the dinner table and trading to make a profit. As the people have settled along the shores of the rivers and coasts, marine and terrestrial habitats are being lost and ecosystems are being drastically changed. The marine ecosystem of Rivers state is important in maintaining the temperature of the water because the slightest change in the water temperature could be fatal to certain marine species. Trees and shrubs provide shade and habitat for marine species, while reducing fluctuation in water temperature.

Rivers state has important ecosystem that needs to be protected, for it is home to 36 families and nearly 250 species of fish, of which 20 are endemic meaning they are found no where else on Earth.. With the loss of habitat and the climate getting warmer, ever little temperature degree is necessary to maintain some of the marine environments. Other than restoring habitat, the problem of pollution can also be reduced.

Climate change is having major impacts on biodiversity in Rivers state. Saltwater intrusion puts stress on plants and tree species that are very important to life and culture (Blommestein et al 1996). For example in many areas of Rivers state, trees used for house construction, local medicine, food and traditional clothing - are dying from saltwater intrusion as the seawater slowly seeps into the ground.

Due to the climate change and global warming, changes of weather patterns in some wet areas can become drier. Unexpected drought may lead to the loss of plant species, as well as the fishes. This is a major concern because forests are an important ecosystem that supports birds, plants, humans and other animals. Due to the rising sea level, mangroves in River state will have to retreat inland to survive. Climate change should not be seen as an environmental problem.

Local fishermen may face trouble and see their income decline if more coral bleaching occurs in the future (Brown 1997). Likewise, farmers may find it difficult to have good crops to sell or export if the area is hit with drought or heavy rainfall due to the changing weather patterns (Briguglio, 1993)

Much of the fish ecosystem in Rivers state is at a serious risk from inundation, flooding and physical damage. Also infrastructure including, roads, airports and port facilities (all predominantly found on the coastal areas), are in danger of destruction. Such damages will disrupt food and energy supplies.

The effect of climate change also causes rising ocean acidity, thus making it more difficult for marine organisms such as shrimps, oysters, or corals to form their shells – a process known as calcification. Many important animals, such as zooplankton which forms the base of the marine food chain have calcium shells. Thus the entire marine food web is being altered – there are ‘cracks in the food chain (Costa 1994). As a result, the distribution, productivity, and species composition of fish production in Rivers state is changing, thereby generating complex and inter-related impacts on the marine systems of the area, that provide habitats and nursery areas for fish. The changing rainfall patterns and water scarcity is impacting on rivers and lake fisheries as well as aquaculture production in Rivers state.

Rivers state is a coastal town and has a lot of dependency on fish which are particularly vulnerable to climate change. Rivers state may become a casualty of climate change, for example, fishing communities in Bangladesh are subject not only to sea-level rise, but also flooding and increased typhoons (Aksornkae 1993). Also fishing communities along the Mekong river, produce over 1 million tons of basa fish annually and livelihoods and fish production will suffer from salt water intrusion, resulting from rising sea level and dams.

STRATEGIES FOR MITIGATION OF CLIMATE CHANGE

Responding to the challenge of controlling global warming will require fundamental changes in energy production, transportation, industry, government policies, and development strategies around the world. These changes take time. The challenge today is managing the impacts that cannot be avoided while taking steps to prevent more severe impacts in the future.

Reducing emissions of greenhouse gases, also called greenhouse gas mitigation, is a necessary strategy for controlling global warming (Bakun 1993). There are two major approaches to slowing the buildup of greenhouse gases. One is to reduce the consumption of fossil fuels, thereby reducing greenhouse gas emissions. The other is to keep carbon dioxide out of the atmosphere by storing the gas or its carbon component somewhere else, a strategy known as carbon sequestration or carbon capture.

This process of carbon capture can be done in the following ways:

- (1) Preservation and planting of more trees around the environs of Rivers state: Trees, especially young and fast-growing ones, soak up a great deal of carbon dioxide from the atmosphere and store carbon atoms in new wood.

Forceful injection of carbon dioxide into depleted oil wells, thus forcing the oil out of the ground or sea floor. Thus capturing the carbon directly. In 1998 the United States—the world’s single largest contributor to greenhouse gas emissions—became a signatory to the Kyōto Protocol, for reducing carbon dioxide emissions. The Kyōto Protocol, which expires in 2012, is only a first step in addressing greenhouse gas emissions. To stabilize or reduce emissions in the 21st century, much stronger and broader action is required.

The Niger Delta and Rivers state in particular should invest in sustainable aquaculture, which will help in buffering and diversifying economic activities. Programs should be introduced, such as the -funded Coral Reef

Targeted Research to provide advice on building resilience and conserving our ecosystems.

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