SALVAGING THE FRESHWATER ECOSYSTEMS IN NIGERIA: GREAT THREAT TO SUSTAINABLE FISHERIES AND AQUACULTURE DEVELOPMENT.

By

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ABSTRACT

Nigeria. the country of many rivers, is also rich in lakes, reservoirs and wetlands. Sustainable and wise use of these inland aquatic ecosystem and water resources has become a matter of widespread and intense concern. Unhealthy freshwater ecosystems and seriously diminishing and unequal availability of quality freshwater call for high quality limnological research and expertise to underpin the enhancement of sustainable fisheries and aquaculture development.

In every regard of national health, agriculture and economics, the continued over exploitation and misuse of finite freshwater resources is directly causal to the progressively deteriorating fish production and general standard of living. The integration of basic understanding of inland ecosystems with applied problems and their solutions should be of fundamental concern to all ,stakeholders in our freshwater resource. This is a basic element in creating an attractive and security ensured economic environment for investment in fisheries development, including aquaculture. This is the focus of this paper.

INTRODUCTION

Nigeria, the country of many rivers, is also rich in lakes, reservoirs and wetlands. Sustainable fisheries production and development depends largely upon good aquatic environment. It is generally accepted that the future well-being of a developing country such as Nigeria, will depend upon a much wiser balance between exploitation and conservation of natural resources in order to achieve sustainable systems that would avoid environmental degradation. The quality of the aquatic medium determines success to a very large extent in fisheries and aquaculture. Paulin (1989) noted that "the aquatic medium is in direct and immediate contact with the metabolic processes of fish". Relevant soil structure and composition and natural environmental factors (e.g. pH, dissolved oxygen concentration, temperature, salinity) all influence the quality of the medium, which is turn determines the health of the fish and their performance.

For quite sometime. Nigerian freshwater ecosystems are being damaged at accelerating rates by toxic contamination from industrial and urban pollution, infectious diseases, dam construction. irrigation, factory farming, forest and wetland destruction. Consequently, there has been a steady increase in the quality and diversity of discharges that reach our freshwater environment. Without question, the lack of available quality freshwater has emerged as the greatest threat to sustainable fisheries and aquaculture.

Freshwater must be a national commons. Most human beings in developing countries like Nigeria. view Freshwater as a universal heritage of society. Our common societal heritage of freshwater demands ecological maturation in the use of these finite resources.

In every regard to national health, agriculture and economics, the continued over exploitation and misuse of finite freshwater resources is directly causal to the progressively deteriorating fish production and general standard of living. We must recognise that fisheries and aquaculture development depends on maintaining satisfactory water quality. The integration of

basic understanding of the freshwater systems with applied problems and their solutions should be of concern to all stakeholders in our freshwater resources.

The paper highlights the importance of freshwater in Nigeria for fisheries including aquaculture and examines the various sources of degradation their impacts and possible control measures. Finally, the paper underscores the role of limnologists and relevant institution/organisations in protecting the freshwater environment from degradation. Decisions are needed now, than before to secure our freshwater resources to sustain this generation and coming generation of Nigerians.

IMPORTANCE OF FRESHWATERS AND THEIR FISHERIES
Freshwater of Nigeria

Nigeria has abundant freshwater resources with a total cover of about 15 hectares (Ita, 1993). These vast freshwater ecosystems are distributed all over the country (though unevenly) from the costal region to the arid zone of the Lake Chad Basin. Freshwater resources constitute an important part of Nigeria natural resources especially as water source of hydroelectric power generation, irrigation, transportation, domestic and industrial water supplies and fisheries. In Nigeria, a large proportion of both urban and rural populations lives beside the lakes, rivers, reservoirs, swamps, floodplains, lagoons, wetlands and estuaries, all of which are important ecosystems for fisheries and aquaculture.

Inland Fisheries

The inland fisheries sub-sector is private sector driven and operates mainly in the remote rural areas, costal and inland fishing areas of Nigeria. It contributes about 86% of the domestic fish production (F.D.F. 2003). It is a source of employment, income and nutrition for millions of rural dwellers that depend on fish for livelihood. It is estimated that not less than 3.0 million Nigerians are engaged in Artisanal fish production. Indirect employment is offered to people who engage in the production of fishing inputs such as canoes/boats, nets, hooks etc. The sub-sector also offers employment to blacksmiths, outboard engine mechanics' and spare-parts dealers, fishing boat builders etc.

Aquaculture

F.D.F. (2003) noted that the national annual aquaculture production is estimated at 25,000 metric tonnes about 6% of domestic fish production. However, the annual potential for aquaculture production is estimated at about 2.5 million metric tonnes. Thus, aquaculture can contribute significantly to domestic fish production and when combined with improved freshwater fisheries management, has the potential to eliminate fish importation which was put at a cost of US $241,066,537 or N27,963,718,292 (at $ - N116) in the year 2000, and even earn foreign exchange (F.D.F, 2003).

The appraisal serves to bring to the fore the magnitude and importance o four freshwater fisheries resources which are already at risk form pollution and other environmental perturbations, if control measures are not promptly taken.

MAJOR TREATS TO NIGERIA FRESHWATER ECOSYSTEMS
Water Pollution: Impact on fish and Fisheries.

Water pollution in Nigeria occurs in both rural and urban areas. In the rural areas freshwater systems such as rivers, streams and lakes are usually polluted by inorganic substances used in agricultural activities usually pollute streams and lakes. Such substances include fertilizers pesticides and herbicides. These substances applied on farmlands are sometimes washed down by rain into stagnant ponds and pools of water on the plain and also into storage reservoirs. Excessive load of fertilizers (nutrients) in the water, generate, excessive growth of phytoplankton, which in turn can lead to high biological oxygen demand, thus resulting

in aquatic pollution as a result of drastic oxygen depletion of the water, causing much stress to the great majority of fish species, which gradually die off.

Ita (1993) reported that fertilizers and effluents from the industrial city of Kano pollute Jakara reservoir in Kano State. High levels of toxic heavy metals have been detected in the reservoir. (Butt, 1985; Adeniji and Mbagwu, 1990). These authors also detected high levels of copper, chromium, zinc, iron in and manganese in fish from the reservoir. Warwade Reservoir, also in Kano, was equally found to be polluted.

Some pesticides used in Nigeria, are known to cause serious environmental problems. Contamination of water by pesticides directly or indirectly can cause fish kills, reduced fish productivity and lethal concentrations of undesirable chemicals in edible fish tissue, which can be harmful to humans eating these fish.

Many factories in Nigeria are located on riverbanks and use the rivers as open sewers for their effluent. Improper disposal of untreated industrial wastes has resulted in coloured, murky, odorous and unwholesome freshwaters, fish kills and a loss of water quality. The major industries responsible for water pollution in Nigeria include petroleum, mining (for gold, tin and coal), wood and pulp, pharmaceuticals, textiles, plastics, iron and steel, brewing, distillery fermentation, paint, beverages and food. Petroleum industry presents the greatest threat to water quality. From time to time, accidental oil spillages occur which endanger freshwater fisheries among other resources. Anko et. al. (2001) reported on the increased pollution levels of the coastal areas of Cross-River State by petroleum product spillage. He noted that the increased pollution in the Cross-River State is a problem of fishery industry. Lagos lagoon was once very productive but now unsuitable for fishing as a result of urban pollution.

Recent World Bank report notes that the problem associated with lack of quality freshwaters in Nigeria threatens to place the healthy of about 40 million people at risk. The study suggests that it would cost in excess of US $9 million a year to correct such problems it freshwater contamination goes on unchecked.

Other sources of threat

Nigerian freshwaters and also being damaged by infectious diseases, dam construction. irrigation. factory farming forest and wetland destruction. The construction of dams for water resources development, for instance, hydroelectric generation result to damage to fisheries owing to changes in ecosystem characteristics. West (1989) noted that the Kainji Dam construction led to an overall reduction through loss of highly productive fisheries in the flood plains downstream as a result of flood regulation. Raji (1992) reports that one of the threats to Lake Chad fisheries is the damming of the inflow rivers both within and outside Nigeria. The construction of dams in Nigeria mainly on the Hadejia-Jamara rivers and the tributaries has reduced the discharge into the lake, thus limiting the extent and duration of the lakes floodplains. Such floodplain areas are essential to many fish species as spawning, nursery and feeding grounds. He further noted that both channelization (for irrigation) and water abstraction (for irrigation, livestock and domestic use) an major activities in the Chad basin area and are likely to be some of the contributing factors to the increasingly dwindling fisheries.

Daddy (1989) reported huge fisheries potentials of Nigerian wetland systems among other resources. They are known also to help maintain water quality, promote rapid growth of plants, absorb toxic metals and chemicals and clean up polluted waters. The author further stressed that inspite of the huge potential of these freshwater systems, wood fuel gathering, industrial developments. overgrazing, extensive irrigation projects, urbanization and hydroelectric dams among-others, are rapidly degrading these ecologically and environmentally important systems. The various impacts of upstream impoundments on downstream wetlands primary resources particularly on Niger River have been documented. (Chude, 1979; Ita and Mohammed 1979).

CURRENT EFFORTS TO PROTECT NIGERIAN FRESHWATER
National Policy on Environment.

The Federal Government of Nigeria by decree 58 of December, 1988 established The Federal Environmental Protection Agency (F.E.P.A., F.G.N. 1988a) The FEPA had the statutory responsibility for overall protection of the environment. The National Policy on environment articulated by FEPA was launched on 27th November 1989 (FEPA, 1989) The goal of the Policy was to achieve sustainable development in Nigeria and in particular to:-

- Secure for all Nigerians a quality environment adequate for their health and well-being
- Conserve and use environment and natural resources for the benefit of present and future generations.
- Restore, maintain and enhance ecosystems and ecological processes essential for the functioning of the biosphere and for the preservation of biological diversity and to adopt the principle of optimum sustainable yield in the use of natural resources and ecosystems.
- Raise public awareness and promote understanding and to encourage individual and community participation in environment efforts
- Cooperate in good faith with other countries, international organisations and agencies to achieve optimal use of Tran boundary natural resources and effective prevention or abatement of transboundary environmental pollution.

Policy consolidation was pursued through the introduction of guidelines and standard for environmental pollution abatement strategy.

However, environmental protection measures are only meaningful if the environment to be protected is adequately understood. Neither over-protection nor under-protection is desirable. Ideally standards should be set based on scientifically generated environmental baseline data Such data are scarce in Nigeria in the present circumstances.

Strategies Under the National Policy on Environment for Water resources Management.

Management approach is based on an integrated holistic and systematic view of environmental issues. The programme activities of the policy aims to establish and strengthen legal, institutional, regulatory, research, monitoring, evaluation, public information and other relevant mechanisms for assuring the attainment of the specific goals and targets of the policy They will also encourage environmental assessment of proposed activities, which may affect the environment, or the use of natural resources prior to commencement.

As part of the strategies for the implementation of the National policy on environment in the water sector, a comprehensive national water resources master plan has been drawn up with the support from the Government of Japan, through the Japan International Cooperation Agency (JICA). For the first time, a decree on water resources protection and management has been promulgated. (FGN, 1993), with the purpose of:-

- Promoting the optimum planning, development and use of the Nigeria's water resources.
- Ensuring the co-ordination of such activities as are likely to influence the quality, quantity, distribution, use and management of water.
- Ensuring the application of appropriate standards and techniques for the investigation, use, control, protection, management and administration of water resources
- Facilitating technical assistance and rehabilitation for water supplies.

ROLE OF NIGERIAN LIMNOLOGISTS

It has earlier been stated that environmental protection measures can only be meaningful, if the environment to be protected is adequately understood. Our common societal heritage of freshwaters demands ecological maturation. It is essential that the leaders of Limnology – the practitioners of freshwater resources – assume leadership roles in demanding

national and international condemnation of malicious and wasteful use of freshwaters. The condemnation demands not simply criticisms but leadership in offering solutions for ecological maturity in wisely using our public trust, the water, as a common property for all. To understand the environmental and ecological complexities of our freshwaters, limnologists must work as a team with other scientists relevant to freshwater environment to be able to safe guard the huge potentials of the vast freshwater resources now under severe threat.

CONCLUSION AND RECOMMENDATIONS

Freshwater is a common trust of humanity. Nigeria is richly endowed with this very important natural resource with huge potentials for thriving fisheries and aquaculture. Since sustainable fisheries production and aquacultural development depends largely upon good aquatic environment, we must understand the complexities of the biological metabolism that influence quality and long-term sustainability of freshwater resources. We must understand the management necessary to maintain acceptable level of water quality. It is also important to understand that the cost of water use must reflect true environmental values. It is only then that we can advance to the ecological maturity essential for sustainability and development of our freshwater fisheries and aquaculture.

The limnological community of Nigeria must move united, assertively and with dispatch if they are to remain professionally active and relevant.

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