The history of environmental policy and pollution of water sources in Nigeria (1960-2004): The way forward

Joseph Akinkugbe Adelegan
Department of Civil Engineering,
University of Ibadan, Ibadan,
Oyo State, Nigeria.
e-mail: gneeder_africa@yahoo.co.uk

ABSTRACT

Water pollution has continued to generate unpleasant implications for health and economic development in Nigeria and the third world in general. However, despite the public and international agencies policy focus on this problem, the situation in Nigeria seems degenerating and therefore demands increased attention.

Right from the inception of British Rule in the 1900s in Nigeria, the colonial economic development policies and plans contain little or no stringent rules to conserve the natural resources or to limit pollution. Thus the formative years of institutional environmental regulation in Nigeria could be said to have been characterized by the absence of clear scientific criteria and standards on toxic wastes and on pollution levels.

Hence, in December 1988, as part of the emerging coordinated approach to environmental issues, the Federal Environment Protection Agency (FEPA) was established due to discovery of an Italian ship in May 1988 of some imported toxic chemical wastes.

So far, there are no clear formulated policies in Nigeria aimed at coordinating and monitoring the relationship between environmental management and sustainable development. Presently, the environmental protection legislation in Nigeria is poorly enforced. Hence, policy makers need to understand the extent to which resource and environmental conditions impinge upon macroeconomic performance.

1.0 Introduction

Progress towards bringing about a cleaner environment has relied on a philosophy of pollution control. This has involved sometimes costly measures and controversial political decisions. As a result, developing countries, poor communities and financially constrained enterprises have often argued that the environment is an expensive luxury that diverts resources from more productive uses. This perspective is giving way to a new paradigm stating that neglecting the environment can impose high economic and even financial costs, while many environmental benefits can in fact be achieved at low cost (World Bank, 1998).

However, most developing countries have long established laws and formal governmental structures to address their serious environmental problems, but few have been successful in alleviating those problems (Bell, 2002).

Regulations are the most common approach to environmental problems. *Standards, bans, permits* and *quotas* are often favoured by policymakers because they promise certainty of outcome – without costly monitoring and enforcement, however, this promise may not be realized. However, experience from Nigerian environmental policies and implementation has shown that the traditional command-and-control system to pollution abatement had not produced the desired result both economic and environmental wise. There is hence the need to examine the potential of mixed environmental policies involving the use of market-based instruments to complement the traditional command-and-control system in achieving economic efficiency in the use of the resource.

The target of this paper is for policy makers to be better informed on everything they need to do to make the market-based instrument work otherwise they would little to show for their efforts in terms of a cleaner environment. Hence, policy makers need to understand the extent to which resource and environmental conditions impinge upon macroeconomic performance. Bad resource policies can actually hurt long-run economic growth by dissipating the wealth inherent in natural resource stocks. Excessive pollution levels damage not only economic assets but human health as well. Excessive levels of pollution-linked illness result in loss productivity, and excess levels of mortality imply substantial welfare loss.

2.0 The History of Environmental Policy and Pollution Control Measures in Nigeria: (1900-2003)

From the onset of British Rule in the 1900s, Nigeria's environmental protection effort had been through the colonial bye-laws. The colonial economic development policies and plans contain little or no stringent rules to conserve the natural resources or to limit pollution. The major laws on water pollution include Criminal Code of 1958 with section 246 aimed at controlling burial in houses and the Public Health Act of 1958 which aims to control the spread of diseases, slaughtering of animals and disposal of night soil and refuse. The fines and penalties are liberal and the laws are quite often poorly enforced.

As early as 1964, a committee was formed from various arms of the Federal Ministries to study the problems of water pollution and to formulate a programme leading to the enactment of a Water Pollution Act of the federation. Over the years there has been an increased awareness of the problems of water pollution with no positive steps taken in the right direction.
The Expert Committee on environmental health of the National Council of Health in 1970 review many proposals received on this subject with a view to recommending the establishment of a sanitary inspectorate in the Federal Ministry of Health. However, the efforts yielded very little results.

Thus the formative years of institutional environmental regulation in Nigeria could be said to have been characterized by the absence of clear scientific criteria and standards on toxic wastes and on pollution levels, while the enforcement of basic environmental and household hygiene depended largely on qualitative legal rules. Oil Pollution has attracted some considerable public interest since the 1970s. A number of communities in the Niger Delta Wetlands of Nigeria have protested the ecological problems of the oil industry and the paucity of government action (Chokor, 1993)

Water pollution remains a major problem in the Nigerian environment. Both urbanization and industrialization have contributed to the scale of pollution. Presently there are no incentives for the adoption of pollution abatement measures and very few disincentives, if any, for polluting the environment. Wastes are disposed of indiscriminately especially for small and medium scale industries but excluding major establishments like the refinery industry which is encouraged to adopt adequate waste disposal and good refining practices under the Petroleum Refining Regulation Act of 1974.

Later, the 1979 Federal Constitution was centered on environmental hygiene, with emphasis on refuse clearance, and the management of liquid and solid wastes in abattoirs, residential homes and streets, all of which came under the supervision of local government councils (Ola, 1984).

It is instructive to note that it required the dumping of toxic and hazardous wastes in Nigeria before the Federal Government woke up to confront the problem of environmental abuse. Hence, the discovery of an Italian ship in May 1988 of some imported toxic chemical wastes, made up principally of polychlorobiphenyls (PCBS) and the hostile media reaction that accompanied the discovery hastened the creation of the then Federal Environment Protection Agency (FEPA) (Now Federal Ministry of Environment) since Nigeria lacked both the institutional and legal framework to tackle the issue. Hence, in December 1988, as part of the emerging coordinated approach to environmental issues, the agency was established by decree. The coming of FEPA represents a milestone in environmental management effort in Nigeria.

The Federal Government of Nigeria in 1988 establish the Federal Environmental Protection Agency (FEPA) (now Federal Ministry of Environment with effect from September, 1999) to protect, restore and preserve the ecosystem of the Federal Republic of Nigeria. The decree 58 of 1988 requires FEPA to establish environmental guidelines and standards for the abatement and control of all forms of pollution.

The major function of FEPA is the establishment of national environmental guidelines, standards and criteria most especially in the area of water quality, effluent discharge, air and atmospheric quality and including the protection of the ozone layer which in the past was absent (Federal Government of Nigeria, 1988). Others are noise control, hazardous substance discharge control and the removal of wastes and ascertaining spillers' liability. The agency also has power to initiate policy in relation to environmental research and technology and in formulating and implementing policies related to environmental management. In addition, FEPA is given some enforcement powers including the right to inspect facilities and premises, search locations, seize items and arrest people contravening any laws on environmental standards and prosecuting them.

The agency is also empowered to initiate specific specific programmes of environmental protection and may establish monitoring stations or networks to locate sources of and dangers associated with pollution. Furthermore, it has powers to conduct public investigations or enquiries into aspects of pollution (Federal Government of Nigeria, 1988). FEPA is thus the supreme reference authority in environmental matters in Nigeria although state and local government authorities and institutions including their environmental departments are still expected to play their traditional role of monitoring and enforcing standards as well as fixing penalties charges, taxes and incentives to achieve certain environmental goals.

Once the decision was taken to confront the problem of environmental abuse, Nigeria led the fight against hazardous wastes dumping until the signing of the Basal Convention against transboundary transportation of hazardous, toxic and radioactive wastes in 1989.

With the setting up of the Federal Environmental Protection Agency, the States Environmental Protection Agencies (SEPAS) were set up. These were complemented by the Local Governments (LGAs) Environmental Protection Agencies.

However, industrial pollution was regarded by FEPA as a priority environmental problem and hence the first ever and only "National Guidelines and Standards for Environmental Pollution Control" was more of an industrial pollution control guidelines and standards with few notes as guidelines for surface impoundments, land treatments, waste piles, land fills, incineration and hazardous/toxic wastes. Moreover, even the available industrial pollution control guidelines and standards are not sound enough and far from been enforced in the country as it were presently. The main legislation for the protection of water resources is scanty.

Hence, the Nigeria's industrial pollution laws and policies are largely outdated and thus very inadequate. There are no specific regulations and penalties on the level of chemical and industrial pollution on water in Nigeria.

To date, Only Lagos State with over 40% of Nigeria's manufacturing activities charges pollution levies. Although the measure is expected to serve as some disincentive to pollution generation and also for the alleviation of pollution problems in the state, it is better seen as a revenue generation effort on the part of the government.

The Lagos State pollution levy remains essentially a revenue yielding effort and it is difficult to say whether the revenue so realized is actually reinvested into pollution abatement. Further, the policy provides no real incentives for industries to adopt pollution monitoring and reduction measures or clean technologies.
So far, there are no clear formulated policies in Nigeria aimed at coordinating and monitoring the relationship between environmental management and sustainable development. This is in spite of all the efforts of the Federal Environmental Protection Agency (FEPA). Presently, the environmental protection legislation in Nigeria is poorly enforced. There are no incentives for the adoption of pollution abatement measures and very few disincentives for polluting the environment. Wastes are disposed indiscriminately especially for small and medium scale industries but excluding major establishments like the refinery industry which is encouraged to adopt adequate waste disposal and good refining practices under the Petroleum Refining Regulation of 1974.

Moreover, in the inventory of Nigeria environmental problems by FEPA (1999) in the context of socio-economic, cultural and ecological imperations, environmental pollution of water (industrial effluent, chemical fertilizers, human waste, eutrophication, deposits by run offs, oil spillage, etc) and issues of health (water borne diseases such as cholera, typhoid, dysentery brought about by the use of contaminated water) have been deemed critical and therefore deserves a place in any master plan for environment and natural resource conservation.

It must be stated that the Federal Environmental Protection Agency (FEPA) is handicapped by the limited environmental information available, the range, nature and diversity of information required as well as the scope of the work itself.

At a time when environmental health damage is worsening in many cities, careful quantification of that damage will help policymakers combine environmental and health decisions with sound economics. Quantification would help set priorities, mobilize public awareness, and encourage communication across different constituencies and interest groups, including environmentalists, health professionals and anti-poverty non-governmental organisations.

Moreover, the need for environmental control arises from the fact it brings improved health and better living conditions. Moreover, experiences from advanced industrialised countries have shown that in the short term, the net effect of pollution control activities is almost certain to have some macroeconomic impacts.

3.0 The History of Pollution of Water Sources in Nigeria: (1960-2003)

Water pollution have continued to generate unpleasant implications for health and economic development in Nigeria and the third world in general, the consequences of which include 4.6 million deaths from diarrhea disease and a sizeable number of casualties from ascariasis (Esrey et al, 1991).

In the West African sub-region (with significant contribution from Western Nigeria) there are estimated 4 million cases of guinea worm, while about 500 million cases of trachoma leads to blindness of about 8 million people each year (Hoddinott, 1997). However, despite the public and international agencies' policy focus on this problem, the situation in Nigeria seems degenerating and therefore demands increased attention.

A number of studies (World Bank, 1993; Brockehoff, 1995; Hoddinott, 1997) have at one time or the other examines the impact of water pollution on variables that determines health status of the household members. Most of the studies hypothesized that an improvement in water quality has a direct effect on people's health via reduced exposure to water-associated diseases.

Patronage of hospitals and other health care facilities in Nigeria is on the increase. The rapidly increasing populations coupled with the deteriorating environment are some of the factors responsible for this trend (Sangodoyin, 1995). Hospital records have confirmed high incidence of typhoid, cholera, dysentery, infectious hepatitis and guinea worm in urban settlements of Nigeria.

Of all the costs of urban environmental degradation, damage to human health is by far the highest. There is a direct link between urban environmental degradation and public health in terms of water related diseases such as diarrhea, dysentery, cholera and typhoid. The rapid growth of urban centers in Nigeria, coupled with the development of unstructured infrastructural and social services have created an environmental situation in many parts of the country which is becoming inimical to healthy living.

Recent studies have shown that zoonotic diseases (diseases of animals transmitted to humans) are yet to be eliminated or fully controlled in above 80 percent of the public abattoirs in Nigeria (Olugasa et al, 2000; Cadmus et al, 1999). Thus, they pose serious environmental health risk. Some of these infectious diseases are tuberculosis, colibacillosis, salmonellosis, brucellosis and helminthoses. These are common examples of zoonoses prevalent in slaughtered cattle population in south-western Nigeria.

Kajogbola (1998) revealed the prominence of malaria, dysentery, chicken pox, measles and pneumonia as the greatest causes of morbidity within the Ibadan region in Nigeria. The study also revealed that the leading killer diseases in the region are solid waste management related precipitated by ignorance, poverty and low standard of living as shown in Table 1 below;

The morbidity pattern shown in Table 1 was also found to be applicable to the larger Nigerian urban society since solid waste management problem is not peculiar to a particular region but a common feature in every urban community in Nigeria.

Table 1: Ten top diseases from sampled hospital records in Ibadan, Nigeria

Rank	Type of Disease	Recorded Cases	% of Total
1	Diarrhea	1530	25.0
2	Malaria	1130	18.5
3	Pneumonia	713	11.7
4	Tuberculosis	686	11.2
5	Eye Disease	459	7.5
6	Measles	421	6.9
7	Malnutrition	330	5.4
8	Anaemia	318	5.2
9	Hypertension	314	5.1
10	Hernia	219	3.5
	Total	6120	100

Source: Kajogbola (1998), Nigeria Environmental Study Action Team

Sources close to the National Health Policy in the Federal Ministry of Health gave the morbidity pattern in Nigeria as follows;

Table 2: General morbidity pattern in Nigeria

Rank	Morbidity	Percentage
1	Infectious and Parasitic diseases	38.2
2	Respiratory Diseases	12.7
3	Diseases of Nervous Systems and Organs	9.9
4	Ill-Defined Conditions	9.2
5	Skin Diseases	8.4
6	Digestive System	4.7
7	Accident	3.1
8	Muscle and Skeletal Diseases	2.9
9	Genito-Urinary Diseases	2.9
10	Blood Diseases-Anaemia	2.5
11	Nutritional and Metabolic Diseases	1.8
12	Others	3.7
	Total	100

Source: Federal Ministry of Health (FMH)(1986)

The concern for increases in the level of pollutants in surface and groundwater is justified since a large proportion of rural and recently urban dwellers in Nigeria obtain domestic water, and sometimes drinking water from ponds, streams and shallow wells (Sangodoyin, 1990).
The use of dump as a mode of waste disposal, is seen as a means of reclaiming natural gullies and excavations in Nigeria. However, leachates from such waste dumps may contain organic and inorganic toxic pollutants which may flow laterally or percolate through permeable soil strata and pollute surface or groundwater (Benka-Coker and Bafor, 1999). According to Pickford (1978), leachates from domestic refuse, night soil, sludge and most industrial wastes may have high concentration of sulphates.

Benka-Coker and Bafor (1999) in their study of the pollution potential of the Teboga Waste tip in Benin City, Nigeria on the physical and chemical characteristics of the Adjacent Ikpoba River suggest that the leachates have the potential to pollute both surface and underground waters as could be inferred from the generally acidic nature of the waters of the Ikpoba river when compared to previous years values.

Sangodoyin (1989) examined the quality levels of both river water and adjacent dug wells along the Ogunpa stream in Ibadan, Nigeria infer that the quality of the water as determined by several quality parameters fall far below established standards.

Little interest has been shown in the contamination of groundwater by pollutants. This may not be unconnected with the slow movement of groundwater, as well as the slow degradation of many pollutants, the latter sometimes persisting for years (Cohen et al, 1984).

In Nigeria, the awareness of waste pollution is very low, thus tapping groundwater through shallow wells, sometimes very close to an excreta dump is not uncommon. Similarly, extensive use of water downstream of effluent discharge points is not uncommon. The pollution of natural

and artificial waters by waste matters resulting from human activities constituted one of the most important, difficult and complex problems confronting public health authorities in Nigeria.

In Nigeria, which is regarded as a developing country, the pressure for the improvement of various aspects of living is tremendous and economic development is always on the highest priority of any government. The large increase in industries has brought about huge increases in the quantity of discharge and a wide diversity of types of pollutants reaching water bodies.

Increased industrial activity has also led to migration of people from the rural to the urban centres. The population explosion has resulted in huge generation and discharge of municipal waste. The combined discharge of industrial and municipal waste in highly populated concentrated nodal points has undesirable effects on human and other organisms in the aquatic environment.

4.0 Trend in Pollution and Pollution Loads by Domestic and Industrial Effluents in Nigeria

The discharge of wastewater into surface waters and the resultant deleterious changes in water ecology have been reported by several researchers (Law, 1980; Okoronkwo and Odeyemi, 1985; Odokuma and Okpokwasili, 1993) who also expressed concern over human health and the possible accumulation of human enteric pathogenic microorganisms by aquatic organisms.

Incidences of water-borne diseases in rural areas of developing countries leading to millions of deaths have been reported (UNU, 1983). Some of these deaths have been traced to the use of waters grossly polluted by untreated waste (De Silva et al, 1988; UNEP, 1991).

Akpata and Ekundayo (1978) also reported an increase in the number of total coliforms and of *E.Coli* in particular when faeces were added to the Lagos lagoon. Okoronkwo and Odeyemi, (1985) reported a similar trend in the pollution of a stream by wastewater from a sewage lagoon. Egborge and Benka-Coker (1986) also reported relatively higher faecal coliform loads at stations on Warri River in Nigeria that received faecal matter from slaughterhouses and raw sewage from human sources.

The discharge of wastewater from bathroom, laundry, slaughterhouses etc have been used to explain the deterioration of most tropical rivers as they pass through inhabited places (Oluwande et al, 1983). The condition, pollution load and effluent effects on water sources in Nigeria are as follows:

Table 3: Physico-chemical characteristics of industrial effluents from Nigeria

Parameter	Sugar Factory	Paper miss	Brewery	Textile factory	Soft Drink Factory	Petroleum Refinery	Steel making Plant	Tannery	FEPA's Effluent Limit for Discharge into Surface Water
Temperature	-	-	32.0	39.0	31.44	7.0-8.2	-	39*C	Less than 40*C
PH	4.8	4.4	9.0	7.1	3.2-11.4	-	6.90	10.2	6 – 9
Total Solids	1415	905	3170	2200	130-680	560-740	-	6960	2000
Suspended Solids	468	790	406	10	10-30	5-620	-	2470	30
Dissolved Oxygen	-	-	-	-	5.0	Nil-7.3	0.7-4.8	4.50	
BCD	1633	100	2110	103	-	-		2000	50
COD	1954	730	3000	710	1000-2600	72-800	-	46.50	-
Chloride	2.0	-	1.0	285	6-30	268-720	28	2300	2000
Phosphate	1.7	-	1.9	-	0.04-1.60	17-64	-	-	5.0
Iron	0.35	0.65	-	0.5	2.4	0.20-6.30	-	-	20
Chromium	-	-	-	-	-	-	-	39	-
Oil and Grease	-	-	-	10	25	3.7-260	-	-	20
Sulphide	-	-	-	3.0	0.98	0.85-1.0	-	127	0.20
Nitrate	-	-	-	-	11	1.0-1.5	1.0	-	20
Sulphate	-	-	-	-	32.5	0.03-2.30	6.50	1500	500
Colour	Yes	Yes	Yes	Purple	Yellow	Yellow	-	-	-
Odour	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-

Sources: Adekanbi (1983); FEPA(1991); Osibanjo et al (1988)

Table 4: Metal concentration in Nigerian inland and coastal waters (µg)

	Hg	Cd	Pb	As	Cu	Zn	Mn	Fe	**Reference**
INLAND WATERS:									
Kaduna Rivers, Nigeria					240	200	1300	3800	
Oyi River, Kwara State, Nigeria					100		300	1800	
Ona River, Ibadan		0.40	5.0		8.0	7.5	450	1247	
IITA lake, Ibadan, Nigeria		0.95	1.3		0.8	1.5	212	436	
Agodi Lake, Ibadan, Nigeria		0.84	4.9		2.3	4.7	774	1375	
Ogunpa Stream, Ibadan, Nigeria		0.38	13.1		8.9	5.8	1155	2213	
Shasha Stream, Lagos, Nigeria		100			900	70	2900	14400	**Ajayi & Osibanjo 1981**
Calabar River, Nigeria		1.35	13.9		3.2	10.3		188	
Warri River, Nigeria		2.3	17.9		32.1	42.9		625	
Ogun River, Lagos, Nigeria					210	460	70	7350	
Majijun Creek, Lagos, Nigeria					270	7	50	70	
COSTAL WATERS:									
Lagos Lagoon,		2	9		3	15	21	86	
Lagos Lagoon Iddeo Jetty					30	610	60	7	
Lagos Lagoon Oko Babs Sewmill					410	2300	50	400	
WHO Maximum Limit.		10	100		1500	15000	50	100	
USHPA Limit		10	50		100	5000		300	

Table 5: Ground water quality in Nigeria

Location	PH	Total solids (mg/1)	Total Hardness (mg/1)	Suspended solids (mg/1)	Chlonne (mg/1)	Sulphate (mg/1)	Oil & grease (mg/1)	Iron (mg/1)	Mangance (mg/1)	Zinc (mg/1)
Ibadan City, Oyo State (20 Samples)	5.5-7.7 6.7	104-1956 750	ND-66; 14	11-221; 182	28-22 91.2	4-23; 403				
Lagos Metropolis Lagos State (20 Samples)	2.6-8.0 5,8	93-1303. 429	ND-55; 7.9 7.9	4-390, 88 88	6.5-2 126	22-400; 168	0.09-0.39	0.01-01-13.9	0.01-0.97	ND-6.27
Kaduna, Kaduna state* (12 Samples)	6 5-7.9	113-12.30 416	8.659	30-350. 105	4-37	10-117,38	<0.10-9.3 1.1	0.25-160	0.10-5.44	0.08-1.90
Warri, Delta State*	3 6-6.5	101-1459	13-954	6-128	1-700	2-108	<0.10-1,8 <0.10-4014	0.50-30	<0.01-0.40	0.01-0.80
WHO Acceptable Level	7.0-8.5	500		100	200	200	0.01		0.05	5.0
WHO Max Permissible Level	6 5-9.2	1500			600	400	-	0.10 1.0	0.50	15.0

Source: FEPA (1991); Osibanjo et al (1988)

The effect of uncontrolled disposal system renders surface waters and underground water systems unsafe for human, agricultural and recreational use, destroys biotic life, poisons the natural ecosystems, poses a threat to human life and is therefore against the principles of sustainable development.

As the drive for increased control of the environment gathers momentum, the financial expenditures for pollution control also increases. This becomes necessary to prevent a deterioration in the quality of life arising from rapid economic development.

Nigeria, like other developing countries suffer from a number of primary environmental problems mainly attributable to under-development and attendant poor living conditions. Added to this is the fact that numerous industries are fast springing up in different parts of the country. Consequently, failure to begin waging an early war against environmental degradation today is likely to affect output adversely and increase costs in the future.

However, if the adverse effects of river pollution and spread of water borne diseases are to be mitigated in Nigeria, it would appear that current planning laws and waste disposal practices should be reassessed (Sangodoyin, 1989).

5.0 The Use of Market-Based Instruments for Pollution Abatement in Nigeria – Merits and Challenges

The market based approach to environmental management is concerned with creating conditions in which the production of goods and services can flourish with the support of an enabling environment for private sector activity and an economic framework of incentives and reward for good organizational performance.

Environmental management in Nigeria was until now characterized by a “command and control” approach. The limitations of this approach included an acute shortage of government funds, managerial skills and administrative enforcement capacities. Hence, the use of economic and financial instruments to complement the traditional command-and-control system could

overcome some of these difficulties and also help in achieving economic efficiency in the use of the resource.

The market-based instruments approach involve setting up an appropriate taxes and pollution charges on generators of pollutants that is above the marginal cost of pollution control to or above the environmental cost that their pollutants impose on the affected population or communities. The environmental taxes and charges would have the simultaneous benefit of generating financial resources while also acting as disincentives to polluters. This include emission charges or taxes based on the quantity and quality of pollutants discharged (water effluent charges).

The pollution levy system would involve imposing charges only for pollutants that exceeded emissions standards by the Nigerian Federal Environmental protection Agency and then only for the one pollutant most in violation. To provide incentives for enterprises to further reduce the within-standard pollutant discharges into water, a fee is also charged on the total quantity of wastewater discharged into river bodies.

The major challenges to the adoption of the market-based instruments approach in Nigeria include the need for an accurate monitoring network, transparency, a working legal system and a realistic incentive to trade. Other challenges include corruption, favouritism and poor environmental enforcement. In addition, other unique challenges include the fact that there are fewer trained people and the best people tend to be concentrated in capitals rather than in field post, equipment for monitoring and data collection are scarce and most basic data are unreliable.

Other limitations include high administrative and transaction costs as the implementation of economic instruments entails significant administrative and transaction costs. The market-based instruments approach require some monitoring such as effluent fees and this monitoring is more complex and costly than required by regulation. Another challenge is the fact that the use of economic instruments may be complicated by several types of uncertainty as the marginal abatement cost functions need to be known otherwise effluent charges on polluting activity cannot be estimated effectively.

However, despite the challenges of the market-based instruments approach enumerated above, the system still offer high potential for efficient and cost-effective environmental management approach in Nigeria when mixed with the traditional “command and control” system. Hence, the argument for economic instruments above suggests that the efficiency gains from their use are an outcome of incentives for pollution abatement innovations and the ability of firms to reduce emissions in the most cost-effective manner. However, as the impediments to the use of economic instruments indicate, in practice such instruments would require substantial government involvement and significant administrative costs.

6.0 Nigerian Environmental Regulation and the Challenge of Sustainable Development: The Way Forward

Sustainable development poses important question as to how economic growth is conceived and managed through incentives and regulation. The examination of environmental regulation and sustainable development principles in Nigeria shows that the nation need to integrate the

principles of sustainable development into the country policies and programmes in order to reverse the loss of environmental resources. In spite of the fact that the country have now embrace the concept of sustainable development, Nigeria is far from pursuing the normal goals and objectives contained in sustainable efforts at developments. The impediments are as follows;

- There is the absence of appropriate national guidelines and standards on environmental pollution and natural resources conservation, although some progress was made in this direction by FEPA. This implies that pollution problems and the damage to the environment cannot be adequately monitored and enforced especially in the industrial sector.
- There is the general absence of effective resource pricing instruments for resource conservation and nature protection. The major implication is that resources are still being wantonly exploited by individuals, groups, communities and corporate bodies without any concern for environmental damage.
- Appropriate instruments and techniques for environmental damage costing especially one that takes into consideration damage to the value of natural ecosystems is yet to be fully developed in Nigeria. Without this, it would be difficult to speak of attaining both a balance and compatibility between resource conservation and economic growth.
- There is the absence of economic incentives and disincentives for natural resources conservation and environmental management.
- There is the absence of a system of national resources accounting and auditing especially one that takes reversible and irreversible damage to the environment into account.

7.0 Summary Discussion, Recommendation and Conclusion

Most developing countries are aware of the impact of sound environmental management in the process of national economic development and in the case of Nigeria, a wide array of policies and institutions have been put in place over the years to tackle the problem of water pollution.

One of the major goals of environmental regulation from the inception has been to reduce water pollution, there have been no clearly established, coordinated policy framework and standards for attaining such goal especially through resource pricing, incentives and taxes. Rather, heavy reliance has been placed on qualitative legal rules. However, the benefits of clean environment would be available only if the generators of pollutants are encouraged to invest in pollution prevention and abatement technologies with the help of a judicious mix of regulatory policies, economic incentives and fiscal instruments.

The options available to the policymakers include *Legislation and regulation* indicating the water quality standards for rivers and lakes, for effluents discharged into water bodies and for providing the machinery for implementation of these regulations; *Quantitative restrictions* (quotas) on effluent discharged by each industry or a group of industries; Influencing the behaviour of industrial firms by selecting appropriate levels of *effluent charges and pollution taxes;* and by providing *investment support and soft loans* for investments in effluent treatment plants installed by a single unit or a group of small scale industries or by a municipality for common treatment facilities.

The funding issue is also critical to pollution abatement programmes. The gross under-funding of the environmental sector in Nigeria over the years is indeed one of the major reasons why the Federal Environmental Protection Agency had shifted an aspect of her responsibilities especially the enforcement of legislation to the States Environmental Protection Agencies and the Local Town Councils. There is hence the need for the Federal Environmental Protection Agency to make concerted plan to attract more consistent and increased budgetary allocation in order to be able to grapple with this increasing problem of water pollution.

Moreover, there is the need to establish a national resource accounting system that shows in monetary and non-monetary terms change in resource use and endowment. Hence, there is the need to modify the national accounting system from the one based on Gross National Product (GNP) which often exclude environmental losses and pollution costs, especially with respect to the cost of environmental renewal to a system in which expenditure on pollution abatement are added to GNP while those incurred as environmental damage are assessed and deducted from GNP. There is also the need to create an environmental monitoring network with an environmental data bank for environmental monitoring.

There is the need to improve on the current conservative policy option with regard to public education. The abject level of environmental deterioration noticeable in Nigeria gives a strong impression that the current state of knowledge of the public regarding public health matters is very low. There is also the need for supported active research into waste minimization strategies, waste avoidance technologies, cleaner production processes and zero emission concepts in Nigeria.

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