



## Environmental policy and slaughterhouse waste in Nigeria

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MOST DEVELOPING COUNTRIES have long established laws and formal government 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, 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 environmental management 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 as a complement to the "command and control system" otherwise they would have little to show for their efforts in terms of a cleaner environment. The paper is also directed at making policy makers understand the extent to which resource and environmental conditions impinge upon macroeconomic performance.

### Trend in pollution and pollution loads by abattoir effluents in Nigeria

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 (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.

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. 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, many slaughterhouses dispose of their waste directly into streams or rivers and use water from the same source to wash slaughtered meat. Such is the situation in most private and government abattoirs in south-western Nigeria.

Sangodoyin and Agbawhe (1992) investigated the possible interaction between abattoir effluent and surface and groundwaters in Ibadan, Nigeria. Findings indicated that slaughterhouse waste generally has a high polluting strength. The chemical composition of the groundwater approximately 250m from the abattoir site was found unsatisfactory as raw water source for drinking purposes.

The impact of continual discharge of untreated slaughterhouse wastewater on the quality of Ikpoba River, Benin City, Nigeria was investigated by Benka-Coker and Ojior (1995). Although an improvement of the water quality was observed some 400m downstream, probably as a result of self-purification and dilution effects, the slaughterhouse waste did not meet established standard for food processing industries and therefore might pose a potential health hazards to the public.

Seven pathogenic species of bacteria species have been identified in abattoir wastewater in South-Western Nigeria. These species were *Staphylococcus*, *Streptococcus*, *Salmonella*, *Escherichia Coli* and *Norcadia* species and an unconfirmed bacillus species. Many of the pathogens of slaughtered animals have the potential for surviving in the environment and thus affecting animal and human health (Coker et al, 2001).

The pollution load and effluent effects on water sources from five abattoirs at Ibadan and Benin City, Nigeria as investigated by Sangodoyin and Agbawhe (1992) and Benka-Coker and Ojior (1995) are as shown in the Table below;

The effect of such 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.

### Environmental policies and pollution control measures in Nigeria

Right from the inception of British Rule in the 1900s, the colonial economic development policies and plans con-

**Table 1. Pollution load from washdown of abattoirs in southwestern Nigeria**

Parameters	Abattoirs					Maximum Acceptable
	Bodija	Feranjeba	Sasa	Moniya	Ikpoba	Limits
PH	8.5	8.4	8.8	8.6	6.9	6 – 9
Suspended solids	15784	13984	8834	10723	5750	50
Phosphate	150	168	115	175	19	5
Nitrate	79	86	120	105	120	10
BOD <sub>5</sub>					1075	50
COD	2500	2220	2200	2935		250
Total coliform					2.0 x 10 <sup>8</sup>	400
Faecal coliform					2.6 x 10 <sup>8</sup>	400
Heterotrophic bacteria					1.29 x 10 <sup>9</sup>	400

All values in mg/l except PH units in and coliform count in cfu/100ml and heterotrophic bacteria in cfu/ml

Source: Sangodoyin and Agbawhe (1992); Benka-Coker and Ojior (1995); FEPA (1991); World Bank (1998).

tained little or no stringent rules to conserve the natural resources or to limit industrial and water pollution. Later the 1979 Federal Constitution focussed on environmental hygiene, with emphasis on refuse disposal, and liquid and solid wastes management in abattoirs, residential homes and streets, all of which came under the supervision of local government councils (Ola, 1984).

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 (Chokor, 1993).

However, 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 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 (FEPA, 1991). 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.

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.

However, 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.

### **Pollution prevention and control measures for abattoirs in Nigeria**

The pollution load generated from abattoir wastewater in South-Western Nigeria reported in Table 1 above is clear evidence that the meat industry has the potential for generating large quantities of solid wastes and wastewater with a high biochemical and chemical oxygen demand.

Hence, the pollution prevention measure suggested for abattoirs in Nigeria is a product recovery and waste minimization strategy. The amount and strength of wastes should be reduced by dry removal of solid wastes and installation of screens on wastewater collection channels. The pollution control measure recommended for abattoirs in Nigeria is an appropriate treatment technologies. Wastewater from meat processing are suitable for biological treatment. Screens and fat traps are the minimum means of pretreatment. Flotation aided by chemical action would be needed to remove suspended solids and emulsified fats. However, the choice of an appropriate biological treatment system would depend on the wastewater load. Extended aeration is an effective form of treatment. Disinfection of the final effluent would be required since the abattoir wastewater quality in Nigeria has a high bacteria load. All the same, ponding would be a simple solution.

Proper effluent disposal could also be achieved with a septic tank and soak away system. However, for disposal into river bodies, pollution can be reduced by the construction of a detention basin to act as partial treatment and also to regulate the flow of wastewater into receiving river bodies (Sangodoyin and Agbawe, 1992).

Disposal of the solid component in an incinerator made up of cement base and built with bricks and mud is highly recommended. This has been tested in a number of slaughterhouses in Africa and has proved successful (Mittendorf, 1978). The final residues from the combustion can be disposed by sanitary landfill.

### **The market-based instruments – merits and challenges**

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 involves setting up appropriate taxes and pollution charges on generators of pollutants that is above the marginal cost of pollution control 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 includes 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. (BOD<sub>5</sub> for slaughterhouse waste). To provide incentives for enter-

prises 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. 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 offers 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.

### **The solution to Nigerian environmental problem and the way forward**

Adeoti (2001) reported that ‘the stimulus-response’ notion of environmental policy as a main driver of firms’ technology investment in pollution abatement is doubtful in developing countries where environmental policy is considered to be relatively weak. He provides evidence from Nigeria with interesting findings that factors relating to firm-level technological capabilities, firm-characteristics and environmental policy implementation strategy has profound implication for firms’ technology responses aimed at controlling industrial pollution.

Hence, while not neglecting the strengthening of environmental regulatory regime in Nigeria, investment of more resources in these factors could achieve desired technological impacts. Hence policies that promote the growth of existing small and medium scale industries into large scale have potentials of improving firms performance in technology investment in pollution abatement. In the same vein, divestment policies or policies aimed at encouraging multinational investments (e.g. foreign direct investment) offer good promise for technology investment in pollution control.

On the issue of environmental policy implementation strategy. There is the need for a reform of current policy framework and legislation to the adoption of implementation policies that promote public participation in the management of the countrys’ water resources. The command and control approach in ensuring compliance with environmental laws has to be supplemented by the notion of incentives and disincentives through the market-based

instruments. The latter option is more public involving and therefore more effective in securing compliance. Public participation should be encouraged by empowerment through education, public awareness, gender balance, participation, information exchange and networking.

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 the need to resuscitate the ecological fund which is a national account designated to receive two percent of the country's annual revenue which serves as a pool from where money could be drawn to tackle the nation's environmental problem. Moreover, apart from the ecological fund, concerted plans should be made to attract international grants and soft loans from relevant international environmental agencies.

There is also the need for detailed design of comprehensive and accurate environmental monitoring network for the nation with an environmental data bank for environmental monitoring in order for the market-based instrument to be effective. The monitoring programme would include ambient river quality monitoring to observe the status and trend of aspects such as pollutants and bacterial load. A bi-monthly sampling frequency is recommended for pollution from abattoir wastewater to start with. The observed loading pattern would determine subsequent sampling frequency. The suggested key parameters would include PH, Temperature, BOD<sub>5</sub>, suspended solids, nitrate and sulphate.

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.

### Summary discussion, policy reform, recommendations 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.

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