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# ENVIRONMENTAL BASELINE DATA: A PANACEA FOR ENVIRONMENTAL CRISES IN NIGERIA*

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## 1. INTRODUCTION

Environmental crises in Nigeria encompasses issus like overpopulation, soil depletion, natural resource depletion, air, water and land pollution, gully and marine erosion, desert incursion, flooding and siltation as well as the problem of solid waste disposal. All these, among other problems constitute environmental degradation and/or deterioration. Enoh (1998) outlines the causes of our environmental and ecological crises to include over population, population implosion, conspicuous consumption/wasteful pattern of consumption, and unwise use of technology. Others include crises in management, over-simplification of ecosystem as well as I-centered behaviour. Moreso, Ezeh (1989) maintaines that environmental abuse which lead to crises may be due to mismanagement and abuse of natural laws pertaining to physical and natural resources management.

## 2. THE PROBLEM

Environmental crises manifest two major effects on the socio-economic lives of the citizens of a given ecosystem. First is the market impact. In this case, subsistence need, the need and pressure to satisfy market demand and the lure of the monitized nature of the economy gives impetus for over exploitation of the natural environment. The limiting factor is the ecosystem which is exploited to exhaustion. Second, the tragedy of the commons explains the breakdown of conservation traditions. In which case environment based resources are recklessly exploited due to infinite demand for them. (Umoh, 1997)

This paper explores the necessary environmental base line data the availability of which would ensure efficient eradication and/or mitigation of environmental crises in Nigeria. The paper is made up of six sections. Section one is the introduction while section two outlines the problem warranting the paper. The third section explains the concept of the

environment while section four explores the needed base line data on the environment and the methodology of acquiring them. Section five discusses environmental baseline data as a panacea for environmental crises in Nigeria while section six concludes the paper.

## 3. THE ENVIRONMENT

The environment is made up of the land, air and water as well as everything that are in them. This view of the environment sees the concept as the physical and biological systems in which other organisms live. According to Baba (1992) in Filani (1998), the environments is the components and systems of the geosphere (e.g soil, flora and climate) or the reservoir of resources upon which man and other living things depend for survival.

From a geographical point of view, the environment consist of the physical and human aspects. The physical environment encompasses rocks, rivers, hills, climatic and weather characteristics such as rainfall, sunshine etc. The human environment entails all human activities on the physical environment, such as agriculture, mining, industrilization, etc. We also have rural environment and urban environment. Ofomata (1976), however, maintains that the environment consist of three realms: the realm of nature, the realm of man and the realm of nature and man.

## 4. METHODOLOGIES FOR ACQUISITION OF ENVIRONMENTAL BASELINE DATA.

(a) Literature Review: This includes the consultation of materials in various available and accessible libraries. Such materials include reports, maps, photographs, etc.

(b) Consultation with stakeholders and Experts: This involves consultation of experts in relevant fields and leaders of thought in the given locality. Host communities are also consulted to relay historical facts about the environment e.g. flooding.

(c) Field Studies: This is used to verify and compliment literature data. The aspects of ecology, socio-economics, health status of the human populations in the ambient environment are covered under field studies.

Baseline data acquisition is the foundation of any environmental protection, assessment and planning. It covers climate/meteorology, air quality, aquatic ecosystems,

hydrology, vegetation, forestry, topography, acquatic ecology, fisheries and wildlife. Others are archeology and culture elements as well as waste generation and disposal.

## (i) AIR QUALITY STUDIES

This is conducted through sampling. In undertaking the above, the sampling locations, number of locations needed and the frequency of sampling must be determined (Blokker 1973). These are necessary to ensure that the air sampled are representative of the air quality in the area studies.

The Federal Ministry of Environmental approved guidelines for air quality is presented in table 2 below.

Table 1: FMENV Guideline on Air Quality.

| Pollutants | FEPA |
|---|---|
| SPM | 250 |
| $NO_2$ | 75 |
| $SO_3$ | 260 |
| $NH_3$ | 200 |
| THC | 160 |
| $H_2S$ | 8 |
| $C_O$ | 10 |
| $Co_2$ | 325 |

Source: Federal Environment Protection Agency (FEPA) 1991

Note: SPM - Suspended Particulate matter
$NO_2$ - Nitrogen dioxide
$SO_2$ - Sulphur oxide
$NH_3$ - Ammonia
THC - Total hydrocarbon
$H_2S$ - Hydrogen sulphide
$C_O$ - Carbon monoxide
$Co_2$ - Carbon dioxide

Where the concentration of pollutants exceed the guideline, it calls for proper monitoring as these would pose serious environmental concerns. SPM by itself or in combination with gaseous pollutants could be detrimental to human health by causing damage to the respiratory system and reduce visibility (Manahan 1979, WHO, 1988)

The major source of hydrogen sulphide is the microbial decay of organic malter and the reduction of sulphate ion (Manahan 1979)

$S0_4^{2-} + 2(CH_2O) + 2H^+ = H_2S + 2Co_2 + 2H_20$

Hydrogen sulphide at levels above ambient concentrations irritate respiratory tract and damage the central revious system (Manahan 1979). Increase of carbon dioxide in the atmosphere can result in "green house effect" whereby the temperature of the earth rises slowly.

The choice of method, however, depends on criteria such as stability, sensitivity, sensitivity, repeatability and capability for calibration.

**(ii) MICROBIAL POPULATION ANALYSIS**

These involve analyses of soil microflora and aquatic microflora (see Okpokwasili and Okorie 1988), for analytical methods.

**(iii) VEGETATION: This involves determination of**

(a) Plant density computed as

$$\text{Relative Density (\%)} = \frac{\text{Total individual species A}}{\text{Total individual of all species}} \times 100$$

(b) Vegetation composition (ie species checklist). In this case, plants are identified on the field according to harbarium practices (Hutchinson and Dalziel, 1972)

(c) Vegetation vigour evaluation.

**(iv) SOCIO – ECONOMIC SURVEYS AND HEALTH ASSESSMENT**

These include determination of the following:

(a) Demographics and political institutions which constitute the social environment.

(b) Economic environment embracing occupation, income levels etc.

(c) Community Health status of the people encompassing sanitation, food types, common diseases/ailments, existing health infrastructure etc.

**(v) CLIMATE AND METEOROLOGY**

This involves the determination of rainy months, dry season, wind speed, air temperatures, humidity, solar radiance and monthly precipitation.

**(vi) NOISE LEVEL**

Noise pollution is a serious public problem that can easily disrupt a vital train of thought. FMENV recommends 90dB as the standard noise exposure limit for Nigeria in an 8 hour working period (FEPA, 1991). Anything above this constitutes a menace.

**(vii) SOIL, AGRICULTURE AND LAND USE**

The data needed on the soil include:

(a) Particle size distribution (PSD)

(b) Fine sand (FS)

(c) Coarse sand (CS)

(d) Soil moisture content (SMC)

(e) Clay (c)

(f) Sandy clay loam (SCL)

The following standard methods for the acquisition of environmental base line data may be empirical or ethnographic.

(i) Census and community profile

(ii) Modeling through population projections

(iii) Direct content which involves discussions and interviews with key informants and other knowledgeable individuals in the environment

(iv) Surveys through structured questionnaires with community representative (chiefs, elders, community development committee members, youths and women groups as well as households forming the sample population units).

(v) Simple descriptive methods and univariate summary statistics e.g means, range, mode and percentages as well as graphic data, maps etc.

Environmental data gathering and analysis are based on advocated philosophy of "triangulation". That is, use of variety of data source, multiple perspectives and multiple methods of analysis.

## 5. ENVIRONMENTAL BASELINE DATA: A PANACEA FOR ENVIRONMENTAL CRISES IN NIGERIA

**(a) AIR POLLUTION:** With data availability it would be possible to compare emission standards in Nigeria with internationally prescribed standards. Such comparison would then help where necessary in setting air pollution control standards.

Moreover, adequate information on air pollution sources would help in its mitigation (see Filani 1998)

**(b) VEGETATION:** Baseline information on vegetation of various ecosystems in Nigeria would be important in the formulation of conservation policy. It would guide policy implementation to ensure that more vegetation is not exploited than is replenishable.

**(c) LAND USE PLANNING:** Land use planning employ cartography and Geographic Information System (GIS). GIS is used in the interpretation of data facts that pertain to the earth surface. GIS is made up of database and cartography and is used in storing, retrieving, transforming, displaying and analysing spartial data. Such data are then useful in the demarcation of areas of suitability for conservation, recreation, urban extension, housing, industry, agriculture, wild life etc, therefore helping in ensuring equilibrium and stability of the ecosystem.

**(d) SOCIO – ECONOMIC SURVEY:** Field surveys on the socio-economy of an environment reveal the level of awareness of the stakeholders to their environmental problems. Such knowledge and ability to order environmental problems, deriving from the stakeholder's perception could help in the preparation of reliable environmental action plan for the given community. Moreover, socio-economic data is important in emigration control to relieve a community of population pressure on scare and /or limited resources.

**(e) NOISE POLLUTION:** Noise and aesthetic pollution are detrimental to human health. Constantly updated database on noise levels in an environment would provide a bases for checking whether the actual noise level is writhin officially approved standards. Table 2 below shows officially allowed noise exposure limits for Nigeria. Where the actual noise level voilets the official figures, then appropriate measures may be taken to reduce them.

Table 2: Noise Exposure Limits for Nigeria.

| DURATION PER DAY (HOURS) | PERMISSIBLE EXPOSURE LIMIT (db) |
|---|---|
| 8 | 90 |
| 6 | 92 |
| 4 | 95 |
| 3 | 97 |

Source: Umeh and Ughegbu (1997) citing FEPA (1991)

**(f) DESERTIFICATION**: The causes of desertification include overgrazing, deforestation and erosion (UNEP 1993, Southwick 1976); as well as diametric (Climatic) changes.

For effective measures to be adopted towards the eradication of this problem, there is need for a knowledge of these causative factors for a given case.

**(g) INDUSTRIAL WASTE DISPOSAL:** Information on environmental waste treatment facilities of industries is necessary in knowing whether they are of internationally acceptable standards. Furthermore, information on the nature of waste disposed is necessary in policy formulation as to whether to permit externalization or enforce internalization of such wastes.

**(h) OIL SPILLS:** For a country whose main stay is the petroleum and petrochemical industry, data base on soil spillage and its frequency of occurrence would be helpful for mitigation readiness where spills are unavoidable.

**(i) CLIMATE AND METEOROLOGY**: Availability of baseline information on climate and meteorology over time is inevitable in forcasting the future state of the environmental and possible environmental crises that may be averted before occurrence.

## 6. CONCLUSION

There exists a dialectical relationship between living creatures and the environment in which they live and from which they survive. This dialectical relationship implies that as man and other living creatures influence the environment, the environment influences them in

return. Environment crises which results from human and natural causes may be mitigated or averted if adequate base line data is available on a given environment. This paper maintains that no sound and implementable environmental planning, environmental policy formulation and monitory would succeed in the absence of environmental data. We, therefore rest our case by recommending the setting up of environmental data bank at all levels of governance in Nigeria. By so doing, Nigeria shall have taken a step in sensitivity towards environmental preservation, protection and control.

**REFERENCES**


Baba, J. M. (1992) "Sustainable Development and the Nigerian Environment" Nigerian Geographical Journal, Vol. 1, pp 1-19.

Blokker, P.C. (1973) "Major Aspects in Air Pollution Monitoring in Urban and Industrial Areas" CONCAWE, The Hague.

Enoh, C. O. E. (1998) "Genesis 1:28. The philosophy Behind our Environmental and Ecological Crises" In I. E. Ukpong (ed) Geography and the Nigerian Environment. The Nigerian Geographical Association pp13-20

Ezeh, I. O. (1998) "Combating Erosion and Environmental Problems in Anambra State" In the Environment and Sustainable Development in Nigeria. FEPA.

Federal Environmental Protection Agency (FEPA 1991) National Guidelines and Standards for Industrial Effluents, Gaseous Emissions and Hazardous Wastes Management in Nigeria pp. 59-66.

Filani, M. O. (1998) "Transport And The Environment" In I. E. Ukpong (ed) Geography and the Nigerian Environment. The Nigerian Geographical Association pp.2-12.

Hutchinson, J. and J. M. Dalziel (1954). Flora of West tropical Africa vol. 1 & 2. Crown Agents, London

Manahan, S. E. (1979) Environmental Chemistry, 3rd edition; Willard Grant Press, Boston, Massachusett:. pp. 331 – 398.

Ofomata, G.E.K. (1976) Geography and the Nigerian Environment: A presidential Address of the Nigerian Geographical Association (N.G.A.)

Okpokwasili, G. C. & Okorie, E. B. (1988) "Biodeterioration potentials of micro-organisms isolated from car engine lubricating oil" Tribol. Int. 21: 215 – 220.

Southwick, C. H. (1976) Biology and quality of our Environment: London Nostrond Co.

Umeh, L. C. and Ughegbu, S. N. (1997) Principles and Procedure of Environmental Impact Assessment. Computer Edge Publishers, Lagos.

Umoh, O. J. (1997) "Environmental, Development and Poverty in Nigeris" Nigerian Journal of Economic and Socal Studies Vol. 39, Nos. 3 Nov. pp 253 – 271.

UNEP/WHO (1993) GEMs/AIR – A Global proramme for urban air quality, monitoring and assessment. WHO/PEP. 93.7, p.2.

WHO (1998) Assessment of urban air quality, World Health Organisation, GEMs/AIR, Geneva, Switzerland.