ENVIRONMENTAL ANALAR

A Journal of Environmental Analysis

NO. 4, Dec. 1999

ISSN 1595 - 0174

ENVIRONMENTAL SYSTEMS CLUB INC.

ENVIRONMENTAL ANALAR

Env. Anal. 4 (1999) pp 316-327

REVISITING SOME FUNDAMENTAL ISSUES IN ENVIRONMENTAL IMPACT ASSESSMENT

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Accepted 10th November, 1999

Abstract

For over two decades, environmental issues have been of importance especially pertaining to sustainable development world wide. Due to perceived and experienced positive and negative impacts of developmental activities on the environment, it has become inevitable to assess the impact of defined projects upon a given environment. This is sequel to the fact that since projects and environments are dynamic, the relationship between them is dynamic, such that a project could reverse ecological trends, accelerate them or have no effect on them. Given that the reversal of ecological trends do have economic costs, it is necessary to assess the difference between the effect of development project activities on specific environmental issues with and without the project. To be able to do this, scoring in environmental impact assessment (EIA) is done on a scale from highly positive to highly negative. The positive and negative impacts of a project are then used as inputs in the overall economic cost - benefit analysis criteria for determining the viability of a project.

1.0 Introduction

Discussions on "the Environment" became an international issue which culminated in the United Nations Conference on Human

Environment (UNCHE) held in Stockholm in 1972 (Oyeshola, 1995). Environmental Impact Assessment (EIA) is an integral aspect of a wide range of environmental issues which come under consideration in almost all discourse pertaining to sustainable development.

An EIA is an assessment of the impact of a defined project upon a given environment. Projects and environments are dynamic, the relationship between them is dynamic and most project environments are human ecosystems. Projects in a given environment do take place against a background of either improving or declining ecological trends. Therefore a project design and implementation could reverse these trends, accelerate them or have no effect on them.

EIA takes the environmental issues and scores them against project activities like engineering works, agricultural development, social development, community economic development etc. (Aston-Jones 1994)

Recently, the need to avert adverse environmental impacts of human and other activities has brought the issue of environmental impact assessment (EIA) to the forefront. The inevitability of (EIA) is further strengthened by the fact that most industrialization and other development projects do impact significantly on the environment. In Nigeria the Federal Government enacted the Environmental Impact Assessment (EIA) Decree 86 of 1992 as a veritable means of general environmental protection. The discovery in 1988 of some toxic wastes dumped by an Italian firm at Koko in southern Nigeria spurred the government to pay more attention to the environmental issues. This prompted the establishment of the Federal Environmental Protection Agency (FEPA) as well as State Environmental Protection agencies (SEPA) in each state of the Federation.

The EIA Decree, among others, make environmental impact assessment mandatory for new major industries and prescribes the process, follow up actions and conditions. Decree 86 contains a schedule of mandatory study activities relating to 19 vital sectors of the economy. These include agriculture, airport, drainage, and irrigation, industry, mining, petroleum etc (see Umoh 1997). The

decree, among other things empowers the environmental protection agencies to enforce the involvement of government agencies, members of the public, experts in relevant disciplines and other interest groups in decision making relating to the environmental impact of projects and/or other activities. Even government projects are bound by the Environmental Impact Assessment (EIA) Decree, except those specifically granted waiver by the President.

2.0 Environmental Economy

Unfortunately most analysis in economic development and planning, hitherto had nothing to say about environmental issues. This is capable of creating some bias in economic analysis of development. In which case where the analysis of the environmental cost of development projects are left out, the outcome of such developmental efforts may not be optimal. The neglect of the environment in development economics has a human cost (Ekpo 1998). This cost shows up as the deterioration of human capital via ill health and premature mortality resulting from environment risks, as forgone gross national product (GNP) due to the failure to recognize the high economic rate of return to many environmental investments, and as the erosion of the natural capital base on which the development of many countries depend.

It is certain that environmental assets and natural capital play very fundamental role in the analysis of development. Given the importance of savings and investment in economic theory as well as the actual process of economic growth of a nation, then the depleting of natural resources and environmental degradation must have negative impact on national savings and therefore growth. This implies that the exclusion of these effects would render national saving values unreliable due to possibility of overstatement. Such omissions are due to the fact that most economic models do not take natural resources depletion and environmental degradation into account. Furthermore the UN system of National Accounts (SNA) ignores

depletion and degradation of the natural environment. Hamilton (1994) maintains that the most natural alteration of traditional saving concepts could be achieved by enlarging the concepts of net saving to include the depletion of natural resources. This is because the depletion of a natural resource is, in effect, the liquidation of an asset and so should not appear in any measure of net national product, or by extension net savings. (Gandhi, 1995).

The valuation of depletion, discovery and growth of commercial natural resources in the context of the system of National Accounts (SNA) Constitute a problem. More problematic is the valuation of environmental degradation. However the UN guidelines for environmental accounting favour valuing degradation in terms of maintenance cost. That is the cost of restoring the environment to its state at the beginning of the accounting period. Gandhi (1995) has used an approach which suggests that the marginal cost of pollution are the correct basis for valuing water emissions to the environment.

The conclusion, therefore, is that environmental degradation gives rise to major economic costs in developing countries like Nigeria in terms of:

(i) impairment of the human capital stock through premature mortality and morbidity
(ii) loss of marketed GNP through health effect and degradation of assets such as soil and forests
(iii) loss of non-marketed GNP that could be subject of capture through appropriately designed policies, domestic and international; and
(iv) reductions in genuine savings, which amount to the diminishing of the capital base on which many developing countries depend.

These economic costs justifies an evaluation of the fundamental issues in environmental impact assessment.

3.0 Environmental Impact Assessment

To be able to achieve a successful EIA of a project, one needs to have a fair knowledge of the project and every thing about the

human ecosystem of which the project is to become part. Furthermore, one needs to know how the human ecosystem will react to being stimulated by the project. It must, however, be noted that the EIA may have to be conducted with less than perfect knowledge if sufficient facts are available to give a broad assessment of the likely environmental impacts of likely project options. Of the relationship between proposed project activities and the environment, the prime issues which could arise include: Loss of forest vegetation and wild life habitat; degraded soil conditions; effect on water tables; water pollution and effect on aquatic life forms; loss of biodiversity; effects on settlement and migration patterns; effect on human health; effect on the scenic landscape and location of amenities.

However, projects also have positive environmental impacts. The positive and negative impacts of some industrial and agricultural activities are shown in Table 1. Most of the impacts are harmful to both the environment, and animals within it in their different habitats. The impacts are however subject to mitigation while others are inevitable as far as the activities which produce them are concerned. These activities pollute the air, water and soil and thereby render the ecosystem either unviable or less viable than it would otherwise have been.

Table 2 discusses the positive and negative environmental impacts of an agricultural development project. These impacts are stated in terms of engineering works e.g. flood control, irrigation, soil moisture conservation, construction of road and burrow pits; agricultural activities e.g. intensification of cultivation of vegetables and tree crops; and aquaculture e.g. fish farming, effect of pesticides and fertilizers. The environmental issues related to the above include effect on vegetation and wildlife habitat, soil conditions, water table and surface water, settlement and migration patterns and human health etc.

Table 1: Possible Environmental Impacts Of Specific Industrial And Agricultural Activities

Activity	Impact
Metal Fabrication and Finishing	Produces harmful Cyanide, metals, oils, caustic soda and acids
Synthetic fibres and plastics	Emission of volatile organic compounds (VOC) and other water effluents with high concentration of acids and pigments
Food processing	Causes Oxygen depletion and turbidity
Textile production	Effluents causes aquatic pollution
Fertilizer Production	Air pollution by nitrogen compounds
Cement Production	Air pollution by cement dust, particulates, Co, SOx, NOx, hydrocarbons, aldehydes and ketones.
Petroleum and Petrochemical industries	(i) Oil spillage causes loss of aquatic animals, eutrophication of water bodies, loss of fishing grounds and associated livelihood pursuits, vegetation and other forms of ecological damage. Others include emigration of wildlife and consequent decline of hunting, loss of drinking and industrial water and its importation or deriyation at extra cost, destruction or reduction of agricultural and related activities, increased economic and other burdens entailed in pollution clean ups, impairment of human health, forced population migration, worsened rural under-development and the embitterment of affected individuals and communities. (ii) Gas Flaring causes atmospheric pollution, thermal pollution of the air, land and water, destruction of vegetation and wildlife, damage to buildings and other structures by acid rain, soil and crop damage by heat, photogenic pollution which causes nuisance and loss of source of livelihood.
Agricultural Activities	(i) Market Impact due to the cultivation of more land, increased hunting and gathering of more forest products than needed for subsistence. As a result of trading and monetized nature of the economy, land is cultivated beyond local needs so that the criteria for cultivation is both for subsistence and market demand. In Nigeria, the demand for agricultural and forest product is effectively infinite. The limiting factor is land resources which is exploited to exhaustion. (ii) "Tragedy of the commons" which explains why once conservative traditions have broken down. An example is the reckless exploitation of the forests for timber and fuel wood especially where the forest is held as common property. The same effect is true of overgrazing and its attendant deforestation, soil erosion and desertification. (iii) Problems of unregulated use of pesticides, herbicides, fertilizers and other chemicals which are related to crop agriculture. (iv) Problems of soil wash and fertility attributable to mono-cultural farming (v) Problems of overcropping and attendant soil impoverishment due to polycultural farming.

Source: (1) Compiled by the author
(2) Umoh, 1997
(3) Umoh, 1998

Table 2: Positive And Negative Environmental Impacts Of Agricultural Development Projects

ACTIVITY	Positive Environmental Impact	Negative Environmental Impact
Engineering Works (i) Flood Control by dykes	- Additional farm-land - better water management - better control of water-related diseases	- Loss of some or all remaining forest vegetation and habitat due to loss of flood protection from agriculture - Loss of silt deposition - reduction of forest water tables and alteration of forest drainage regimes - interference with fish ecosystems, especially breeding grounds - alteration of forest and river landscape.
(ii) Flood Control by drainage	- additional farm-land - better water management - possibilities of fish farming - better control of water-related diseases.	- Loss of some remaining forest vegetation and habitat - interference with traditional farming and fishing systems. - risk of reduction in soil pH - borrow pits
(iii) Polders	- additional farm-land - possibilities of fish farming - better control of water-related diseases.	- loss of remaining forest vegetation and habitat due to loss of flood protection from agriculture - reduction of forest water tables and alteration of forest drainage regimes - interference with traditional farming and fishing systems -interference with fishing ecosystems especially breeding grounds - inward human migration - alteration of forest and river landscape
(iv) Dams	- additional crops and yields on irrigated land, - possibilities for fish farming - possibilities for farming in the dams at lower water - possibilities of increasing biodiversity by afforestation of catchment - possibilities of addition to Landscape and amenity (but not at low water) - possibility of some resistance to the trends of declining biodiversity	- Loss of farm-land - increased risk of water-related diseases - alteration of landscape borrow pits
(v) Irrigation	- additional crops and yields on irrigated land - improved water management - possibilities for fish farming - possibility of some resistance to the trends of declining biodiversity.	- low risk of salination - increased risk of water related diseases.

(vi) Upland Soil and Soil Moisture conservation Bunds	- improved soil conditions in the uplands - chance of improved biodiversity in the uplands - reduced pressure of inward migration to the swamps - reduced contact with water-related diseases - improved landscape and amenities	- some loss of silt deposition in the swamps
(vii) Road Construction	- social and Economic development	- possible risk of erosion, flooding and water - logging if badly designed. - borrow pits
(viii) Borrow Pits	- possibility to increase fish biomass by fish farming - possibility to increase local biodiversity	- Minor loss of farm-land - human health problems arising from flooded pits - habitat for disease vectors and the danger of drowning if used as playground by children - landscape impact.
(ix) Intensification of cultivation (a) vegetables (b) Tree Crops	- Improvement in health due to better nutrition -improved soil conditions - increased biodiversity - improvement in health due to reduced poverty	- introduction of fertilizer, pests and pesticides - accelerated decline in biodiversity. - Possible introduction of fertilizers, pests and pesticides. - accelerated decline in biodiversity due to forest loss.
(x) Fish Farming	- increase in fish biomass - improvement in health due to better nutrition	None
(xi) Use of Pesticides	- increased yields	- Water pollution - decline in biodiversity leading to ecosystem simplification - introduction of pests due to eradication of predators - decline in fish health - risk to human health.
(xii) Use of Fertilizers	- increased yields - increased soil fertility - possible increase in fish biomass	- possible increase in water BOD - possible decline in fish health - risk of reducing pH by the mismanagement of fertilizers.

Source: Compiled by the author

4.0 Formal Scoring in Environmental Impact Assessment

The environmental impact of projects and other socio-economic activities is the difference between the effect of those activities on specific environmental issues with and without the project activity. In environmental impact assessment of a project or an activity the scores show the likelihood of a positive, nil or negative impact and the implication of the impact if any. The scores are not values. Moreover EIA does not suggest that one environmental impact is more intrinsically valuable than another. For example if we compare the environmental impact of an agricultural development project on the habitat of *Tilapia spp.* with the impact on human health, EIA does not decide which is more important. The scoring in EIA is done on a scale from highly positive to highly negative as follows:

(a) **Positive High:** Where a beneficial environmental impact is both highly likely and also likely to have positive implications locally and beyond. (i.e nationally and internationally)

(b) **Positive Medium:** Where a project is highly beneficial but unlikely to have wide implications beyond the project locality.

(c) **Positive Low:** Where a project's environmental impact is possibly beneficial but may not occur

(d) **Nil:** Where a project has no environmental impact at all.

(e) **Negative Low:** Where the environmental impact is possible, costly, but may not occur. In other words where a project's environmental impact accelerates an existing definite trend and mitigation may be essential but in some cases only desirable.

(f) **Negative Medium:** Where a costly environmental impact is highly likely but unlikely to have wide implications outside the project locality. In which case it accelerates an existing definite trend and mitigation may be essential but in some cases only desirable.

(g) **Negative High:** Where a costly environmental impact is not only highly likely but also likely to have wide implications both locally and beyond. In this case there is no current discernible trend and mitigation is essential.

According to Aston-Jones (1994) negative scores do not necessarily imply that a project activity is environmentally unsound for four reasons:

(i) Environmental Impact Assessment (EIA) is an integral part of Economic Cost-Benefit Analysis (ECBA) which may indicate that the economic benefits of a project outweigh the environmental costs. There are very few projects which may not have negative environmental impacts. They all have costs in terms of resource use which has an impact on the environment. EIA does not say that negative environmental impact is bad, it merely points it out. A farm may have negative environmental impact but may be a good thing in terms of human development. On the other hand, some projects which may have positive environmental impacts do also have negative effects (e.g erosion control which incorporates environmental improvement but results in reduced silt down stream).

(ii) MITIGATION: If EIA spells out some mitigation which are actually built into a project, then the negative impacts may be reduced, become nil or even positive.

(iii) RISKS: EIA brings to the fore the possible environmental risks of a project and tries to grade the risks as negative low, medium and high. EIA therefore measures the likelihood of these risks and not their certainty. A high negative score does not therefore suggest that the risk is higher.

(iv) PROJECT REALITY: The EIA provides the raw materials for ECBA, points to a more efficient project decisions, and may indicate the wider environmental implications and potentials of project design.

5.0 Conclusion

The environment referred to in EIA is a complex of human ecosystems which make up the human biosphere. Therefore to talk about a project having an impact on the environment implies that it has an impact on human ecosystems. Mankind had, hitherto, lived in

ecological balance with their environment as viable mankind exploiting the ecosystems of which they were part in a sustainable manner, so that the ecosystems remained healthy and were able to continue to supply the resources that mankind required from them. However modern mankind has, overtime, infringed on the original natural ecosystem in his quest for development and survival. The several socio-economic project activities initiated and undertaken by modern mankind has greatly impaired the natural ecosystem by undermining its viability. The natural ecosystem thus becomes diminished in terms of biodiversity, bioactivity and biomass, thereby becoming less able to withstand shocks.

Cognisance of the dangers of environmental degradation due to human action, governments worldwide have, since 1972, brought to environmental issues the prefront of discussions, especially as far as sustainable development is concerned. Environmental Impact Assessment thus became inevitable in order to assess the impact of a defined project activity on a given environment. Since a project in a given environment takes place against the background of either improving or declining ecological trends, a project design and implementation could have the impact of reversing these trends, accelerating them or having no effect on them.

In Environmental Impact Assessment, environmental issues are scored against project activities. The positive and negative impacts of a project are then used as inputs in the overall economic cost-benefic analysis (ECBA) criteria for determining the viability of a project.

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