

ENVIRONMENT IMPACT ASSESSMENT FOR HIGHWAY: A REVIEW

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ABSTRACT

The Environmental Impact Assessment is a systematic investigation of both positive and negative impacts on the physical, biological socioeconomic environment, which would be caused or induced due to a proposed project. EIA provides a plan to reduce the negative environmental effect of proposed development project through alternative approaches, design modification and remedial measures. Highway construction is a major activity of economic development countries. Road development is major source of damage to the environment, including ecological destabilization, habitat disturbance and damage to flora and fauna. In this study, environment impacts are analyzed. The study concentrate on the environmental impact assessment of the project in the light of the existing situation at the site. The parameters covered in the study are socio-economic, biological, air, dust, water, noise ,accidental, ecological and soil, sample of air, water and soil were taken to analyze their present condition. Data was also collected from various government offices like the PWD (HARYANA) department. Noise level were found exceeded permissible limits. Drainage system of the stretch was found was very poor at some locations. Minimum soil contaminations was observed. Highway capacity was analyzed it was observed that the present to lane highway insufficient to handle the current traffic volume so the section require four laning immediately to accommodate more traffic. After analyzing different parameters and discussing the probable impact suggestion are made regarding the mitigation measures that can be taken at different stages in order to reduced the environmental impacts.

I. INTRODUCTION

Highway development enhances mobility and is critical to the economic growth of a community and a country as a whole. Unfortunately, inappropriately planned, designed, and constructed highways can aggravate the conditions of the poor, and harm the natural and socio-economic environment. The common adverse impacts of highway development include damage of natural landscape, habitat and bio-diversity, destruction of cultural and social structure of affected communities, creation of air and water pollution, and generation of noise and vibration. To minimize adverse environmental and socio-economic impacts, highway infrastructure must be built to a high quality and maintained to a high standard. This can be achieved by integrating environmental considerations into highway development planning, design, and construction. The process consists of three key elements:

1. Identification of the full range of possible impacts on the natural and socio- economic environment
2. Evaluation and quantification of these impacts.
3. Formulation of measures to avoid, mitigate and compensate for the anticipate impacts.

The above process which systematically deals with these elements is called Environmental Impact Assessment (EIA).

II. ENVIRONMENTAL CONSIDERATION IN HIGHWAY PROJECTS

Roads impact on the environment in many different ways. This applies from the initial construction to maintenance, upgrading and usage. Roads that impede drainage or cause run-off to be concentrated or polluted, can seriously degrade the environment. Vehicles travelling on roads can add to ambient noise and reduce air quality, which has the potential to affect people's health. All road development proposals must go through a process of consultation with other government agencies to identify possible impacts on the Environment and the community. Depending on the size and potential impact of the project, a formal assessment may be required under the Northern Territory's Environmental Assessment Act. For example, a large road project with potential for adverse environmental impact or public concern may be subject to a Public Environmental Report (PER) or a more detailed examination through an Environmental Impact Statement (EIS).

Projects with limited environmental impact, such as the widening or duplication of a road, require an environmental clearance from the Office of Environmental and Heritage, which administers the Environmental Assessment Act. Routine maintenance does not usually need environmental assessment under the Act. The environmental impact of roads does not end with construction and maintenance. Motor vehicles using roads can cause problems such as traffic noise, reduce air quality, dust pollution and contamination of natural water resources as well as landscape degradation and soil erosion. The environmental problems which are associated with the highways, stragulate the road system in most of the cases.

The most common problems are:

1. Air pollution
2. Noise pollution
3. Water pollution
4. Vibration
5. Discharge of effluents on the road sides
6. Wild life disturbance
7. Deforestation
8. Accidental data
9. Contamination of soil
10. Setting up of brick kilns and other industries along the highway

III. REVIEW OF LITERATURE

Various study was done by different authors are explaining below:

A) Fernandez et al.(2000) The use of an Integrated Landscape Ecological Approach on the evaluation of the impact of a proposed highway over a high sensitive habitat of the highly endangered Iberian Lynx (*Lynx pardon L*) is described. This method prevents the occurrence of common errors in the decision making process by allowing an increased knowledge of the ecological constraints of the project. paper describes how, within an Environmental Impact Assessment (EIA) Process of a highway running through a highly sensitive ecological

area, the Integrated Landscape Ecological Analysis (ILA) produces an evaluation and prediction of the target species ecology, allowing a comparative evaluation of alternatives without the bias of prejudgments over “less negative” alternatives. The project objective of the EIA process considers the construction, in the short term (2000–2001), of a highway between Lisbon (the capital) and Algarve (the southern part of Portugal). paper considers the EIA of the projected highway section crossing the chain of mountains that separate the Algarve from the rest of the country and should be located approximately 50 km eastward from the present main access road that, together with the railway, follows a valley through a natural geological fault..

B)Kuitunen et al.(2007) discussed about the results of EIA and SEA compared by using Rapid Impact Assessment Matrix (RIAM) Method. There are many techniques that have been developed for use in impact assessment processes, including scoping, checklists, matrices, qualitative and quantitative models, literature reviews, and decision-support systems RIAM was originally developed to compare the impact of alternative procedures in a single project. In this study, we used RIAM to compare the environmental and social impact of different projects, plans and programs realized within the same geographical area. RIAM scoring is based on five separate criteria. The RIAM criteria were applied to the impact that was considered to be the most significant in the evaluated cases, and scores were given both on environmental and social impact. Our results revealed that the RIAM method could be used for comparison and ranking of separate and distinct projects, plans, programs and policies, based on their negative or positive impact. One of the purposes of Environmental Impact Assessment (EIA) is in advance to identify and evaluate the important environmental consequences of proposed projects.

C) Tullos et al.(2008) Analysis of the EIA process for the Three Gorges Project (TGP) in China as a case study for evaluating this feedback between the EIA and science and policy this paper presents an investigation into whether patterns exist between the scientific interest (via number of publications) in environmental impacts

1. The identification of impacts as uncertain or priority by the EIA.
2. Decisions or political events associated with the dam.
3. Impact type recommendations about those institutional changes needed to improve the feedback between the science and policy, and ultimately the environmental sustainability, of large dams.

Large dams offer society many benefits but simultaneously impose adverse, and often irreversible, impacts on the environment As climate change increases the potential for flooding and drought and the global demand for energy and of a growing human population also increase, a surge in new large dam projects is likely to occur. However, without comprehensive investigation of the potential impacts of a major project, irreversible and impacts to the environment will occur.

D) ZHOU et al. (2011) China’s EIA Law came into effect in 2003 and formally requires road transport infrastructure development actions to be subject to Environmental Impact Assessment (EIA). EIAs (including project EIA and plan EIA, or strategic environmental impact assessment, SEA) have been being widely applied in the expressway infrastructure planning field. Three case studies (one expressway project EIA and two PLEI plan SEAs) were examined to understand currently how EIAs are applied to expressway infrastructure development planning. The reasons causing those problems are analyzed and possible solutions are suggested aimed at enhancing EIA practice, helping deliver better decision-making and ultimately improving the environmental performance of expressway infrastructure. From the case studies, the key issue to emerge was the

institutional and governance failure to provide the appropriate level of assessment to the relevant scale of infrastructure and decision making. The lack of programme level SEA and the misapplication of project-level EIA to strategic infrastructure is the root of the problem for the PLEI network programme assessment.

E) Villarroya et al. (2012) Discussed about reduction ecological impacts caused by development projects, avoidance, minimization and compensation techniques have to be taken together into consideration along Environmental Impact Assessment (EIA) procedures Environmental impact assessment (EIA) aims at improving the sustainability of certain environmentally regulated projects, by identifying their significant environmental impacts and proposing measures to counter new practices in EIA have to be fostered together with new conceptualizations if we want to attain more sustainable projects. And not only are new concepts and practices needed but also specific proposals to push them to be undertaken across real EIA contexts. Impact avoidance and minimization are present not only in the mindset of EIA professionals in Spain but also in their everyday practice. Something similar should be promoted for compensation. The central role of ecological evaluation and the way it operates in EIA procedures may be unnoticed by the public. As a result, ecological impact remains partly shadowed, particularly regarding residual impacts and ecological compensation neglected in some EIA contexts, as in cases in Spain. The review of 72 road and railway Records of Decision (RODs) in Spain showed that most RODs (and, consequently, EIA) in Spain prioritize impact avoidance and minimization measures over compensation and furthermore that ecological evaluation and residual impact evaluation—the base and measure for ensuing compensation practice—is very weak, if not missing in one of the main legally binding, publicly available documentary sources on EIA decision making.

F) Sharma et al. (2005) discussed about the salient features of the revised EIA procedures and guidelines with particular reference to roads and highways and compares vis-à-vis earlier May 1994 notification. The extensive list of 32 projects in the pre-revised (MAY 1994)EIA Notification has been replaced and regrouped into 8 main heads and sub heads(i.e. categories and sub categories)(based on threshold of pollution potential. The regrouping has been done on the basis of need of environmental clearance between central government (category A) and state government (category B).The projects under category A necessarily require environmental clearance from EAC (i.e. MOEF at central level) whereas the project following under category B may further classified in Category B1 and B2 require environmental clearance decided by the state environmental impact assessment authority at state level .Various road and highway projects have been categories into category A and category B projects [category 7f] depending upon the screening criteria specified revised EIA notification. ALL road highway projects coming into category A and category B1 will have to necessarily carried out public consultation including public hearing as per the revised procedure specified under revised 2006 notification.

G) Paliwal et al. (2006) evaluated EIA process in India through strength , weakness , opportunity and threat (SWOT) analysis and she suggested that in India environmental impact assessment (EIA) relied on the institutional frame work that has a strong supporting legislative , administrative and procedural set up. Both central and state authorities together are sharing the responsibility of its development and management.

The SWOT analysis taken up of the EIA suggested that there are several issues that need to be readdressed. Several constraints, ranging from improper screening and scoping guidelines to ineffective monitoring and post project evaluation were highlighted. The opportunities addressed for improving EIA were increasing public

awareness, initiatives of environmental groups business community and forward thinking to integrate environmental consideration into plans and pollution. It was mentioned that improved effectiveness would also depend on strength of government agency coordination, integrated decision making adequate training to various stake holders and supporting infrastructure for purpose full monitoring and enforcement. It was further recommended that project level EIA needs immediate attention but efforts should also be targeted to include environmental conservation concerns at policy and planning level. Such initiatives would help in filling up the gaps in coordination between various government authorities involved in planning and execution.

H) **Chopra et al. (2011)** The analysis highlighted the importance of EIA in the sustainable development of highway project with case study of vital link of about 20 kilometers. The study concentrated on the environment impact assessment of the above project in the light of the existing situation at the site. The parameters covered in the work were socio-economic, biological, air(dust), water, noise, ecological, soil, and cultural. Based on existing data and the assessment evaluation and analysis of the potential, impacts, total impact was calculated by the matrix method. Based on nature and type of impacts, an appropriate mitigation enhancement measure were suggested that will be implemented during construction and operation phase. It was thus concluded that though there are some major impacts associated with the road construction the overall project was environmentally beneficial. From the literature review, it can be concluded that effectiveness of EIA process suffers from failures stemming not from one domain, but different ones; technical methodology and procedural, public participation is an important component of the whole process and it should be strictly incorporated and monitored. The EIA process should be improved and improved effectiveness will depend on strength of government agency coordination, integrated decision making adequate training to various stake holders and supporting infrastructure for purposeful monitoring and enforcement. To remove existing constraints the EIA system should be regularly revisited for progressive refinement. Inclusion of new methodologies like geographic information system(GIS)based map overlay method, SIAM(Spatial impact Assessment Methodology), RIAM method(rapid impact assessment matrix), etc will help a great deal to make the process more effective and less time consuming.

I) **Panigarhi et al. (2012)** Environmental impact assessment (EIA) was first introduced in India based on the Environmental Protection Act (EPA), 1986. But formally it came into effect, when Ministry of Environment and Forest (MOEF) has the main purpose of EIA is to provide information to decision makers and public about the environmental implications of the proposed project activity before decisions are made. Besides providing information, it also suggests measures for preventing or reducing those impacts and mitigation plans paper evaluates the EIA system of India. It is based on:

- (1) Review of relevant literature on evaluation of EIA practice
 - (2) Analysis to various legal provisions, guidelines and procedures by Government of India.
 - (3) Secondary data on various projects and approval process of EIA reports in the country.
 - (4) Opinions of Government officials, Present and Ex- members of EIA Approval committee, Environmental Consultants, Research Laboratories, Project proponents, NGOs, Expert professionals from various background
- In the past, a number of methodologies have been developed to evaluate the effectiveness of EIA processes. India is one of the developing countries that has sound legal framework for EIA. Furthermore, a comprehensive package of EIA guidelines exists. It appears that EIA in India is evolving steadily; an overall evaluation of the

EIA system reveals several weaknesses, not only in the institutional framework, but also in implementation and actual practice.

IV. CONCLUSIONS

1. From the analysis of traffic data it can be concluded that present two lane highway is insufficient to handle the current traffic volume. NH-73 is a plain terrain as per IRC-SP-84, this section will require four lane. From the public consultation it can be concluded that highway condition is not too much good.
2. From the testing of water, ground water near the Jagadhari shows the high TDS value which is greater than the permissible values hence unfit for the drinking purposes.
3. Results of SPM testing are exceeding the permissible limits & the values of SO₂, NO₂ are below the limits.
4. Noise values at the locations exceeded the permissible limits hence proper mitigation should be taken during the construction phase to keep the noise values under the permissible limits.
5. There is no contamination with respect to soil, but there are many chances of occurrence of contamination during construction Phase.
6. Traffic congestion is a major problem along the highways.
7. Pavement condition was very vulnerable proper drainage is required, at many places. During the survey, various pot holes and cracking were found on the selected stretch.

Some impacts are of short duration it can be reduced by appropriate mitigation measures. Operation phase are also less magnitude can be prevent from mitigation measures concludes that the proposed project will be environmental friendly

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