

Ecological Impact Caused By Roadway Construction and Operation.

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Abstract- Roadways are an important means of transport all over the globe. Increasing population demands larger and faster roadways network and it has become a necessity rather than a luxury. But every coin has two sides, along with so many benefits offered with increasing road network, has a price to pay. This paper reviews the impact of highway construction on the ecology. There are numerous reports of death on the highways constructed near the ecologically sensitive zones over the past decade. These highways also fragmentizes the natural habitat of various species ceasing the use of corridors and hindering their day to day activity such as feeding, breeding, and birthing. Hence Environmental clearance should be obtained in order to assess whether the project has any harmful impact on the ecology around it, which is done through EIA (Environment Impact Assessment). This paper also reviews the standard procedure that has to be followed in order to obtain Environmental clearance.

Keywords: Deaths, Corridors, EIA, Environmental Clearance, Fragmentize.

1. Introduction

Roadways are an evidence of the development of any nation, integrating the remote, underdeveloped and urban areas. Development of roadways creates employment opportunities, provides door to door service of goods and also connects farms and fields to factories and markets. But roadway has its own aids and hindrances. Construction of roadway begins with clearing of forest cover, damaging top fertile soil and fragmentizing wildlife habitat ends in injuring the ecosystem. Operation and maintenance of roadways has long term effects of noise and air pollution further causing harm to ecosystem. Although individual road segment may seem to cause minor environment impact but combined effect cause serious damage to the ecosystem. Therefore mitigation measures should be taken in order to conserve this ecosystem and the ecosystems within this ecosystem.

The area within 10 kilometers of the national parks, wildlife sanctuaries, Biosphere reserves etc are declared as Eco sensitive zone or Eco-fragile zone. Highway or any other construction is highly opposed in these regions unless utmost necessary and an environmental clearance have to be compulsorily obtained before construction.

2. Literature Review

Development is a noteworthy biological factor that speaks to the home range and also living space use of a creature. Both development and movement relies on the accessibility of normal nourishment and water. Changes in season and shortage of water and regular feed species compel wild creatures to leave a place for couple of months and came to new nourishing justification for satisfying their sustaining and reproducing necessities [1] The effect of street on wild creatures and plants might be ascribed to human formative exercises. Aside from crashes, fire and plastics assume significant parts in creature mortalities. The impact of street can't bound to single species so single species administration won't be affected. The borderlines of roadside brambles ought to be evacuated to build perceivability with the goal that drivers can maintain a strategic distance from mischances and increment the bashfulness for creatures to cross the streets. Underpasses, sparkling sign sheets, and speed breakers can limit the street murdering of substantial bodied creatures or little creatures of land and water and reptiles [2]. Engine streets are the prime damaging component of the territory fracture process. In north India, they turned into a noteworthy issue in the administration of natural life and they disturb the transitory passageways for a few wild creatures, including the lead species – the elephant.

The RNP and its bordering secured living spaces (HFD, LFD and Dehradun Forest Division) is a vital natural territory and it has awesome potential for the preservation of imperiled species. Amid the most recent decade, the expanded vehicle movement on different national parkways, the prepare activity on the Haridwar– Dehradun railroad track, the fast development of engine streets and the high extension rate of high pressure electric lines negatively affected the conduct of natural life. At show, a railroad track and four national roadways are running over this secured natural surroundings, which holds one of the most advantageous populaces of elephants and panthers in northern India [1].

3. Ecological Impact of highway construction

One of the major effects of roadway construction and development is fragmentation of the natural habitat of various species. Most of the animal species tend to follow fixed patterns for their daily and seasonal movements for feeding breeding and birthing across their natural habitat. These fixed patterns or routes of their movements are termed *corridors*. If and when a roadway construction intersects or blocks the corridors it causes the cessation of use of that corridor since the animal species are either reluctant to cross the roads and if they do they are caught in accidents with the fast moving vehicles on the highways causing their death and the driver. Hence fragmentation of the natural habitat weakens the population of the species pushing them towards their extinction for example decline of songbird species.

Migration pattern of animals gets affected for example elephant in Rajaji National Park. Serious threat to Shivalik wildlife was observed due to expansion of transportation network. Some species are reluctant to cross highways like golden mouse, salamander, fox etc. Direct mortality from road kills is prominent problem around the world. In the span of 2 years between June 2009 to May 2011 352 individuals of 39 species were found dead on NH 72 and NH 74 running across Rajaji National Park. Most affected species was birds (38%) followed by mammals (27%) [1]. Similarly 68 reptiles were killed due to vehicular movements in Kaziranga National Park, May 2004 to September 2004. 423 road kills belonging to 29 species were recorded in Bandipur Tiger Reserve, Karnataka from January 2007 to June 2007 out of which 82 (19.39%) mammals, 57 (13.48%) Aves, 159 (37.59%) reptiles, 125 (29.55%) were amphibians [2]. From 1986 to 2004 elephants had killed 47 persons in Rajaji National Park because of human settlement in their habitat and 134 elephants were died because of road accident and poaching[4]. The street execute of vertebrate fauna by vehicular activity on interstates at Mudumalai Tiger Reserve, southern India. At least 180 street murders of 40 types of reptiles, birds and warm blooded creatures were recorded between December 1998 and March 1999[5]. Total 228 animals of 32 species of birds were found dead on the roads in KWS during the period of 1995-1999[6].

Other consequence is alteration of topography, vegetation removal, erosion, and sedimentation results in physiological stress and decreased reproduction, disruption of normal behavior and segmentation of interbreeding population. Erosion during and after construction can contribute large amount of silt and sediment to runoff, deteriorating water quality and lead to fish kills. Debris and spillage from construction can be absorbed by soil declining its fertility and carried with runoff water to lakes worsening their water quality.

Operation and maintenance phase causes air pollution and mortality from road kills. It also increases human activity in forests. The principle results of burning of engine powers are carbon dioxide and water however wastefulness in motor can cause the discharge of numerous different toxins, for example, Nitrogen oxides, Hydrocarbons, Carbon monoxide, Sulfur dioxides, Particulates and Lead. Vegetation is influenced both physically and synthetically via air pollutants. Dirt settles on leaves and can meddle with fertilization and photosynthetic capacity if collection is noteworthy. Fermentation of surface water can meddle with supplements take-up by roots, influencing development. Plants can retain poisonous contaminations, for example, lead from air, and making utilization of them unsafe. Air pollution causes respiratory problems to animals while acidification of aquatic ecosystems can cause adverse effect on health of aquatic animals.

Hence roadway project needs to be assessed before its commencement and periodic assessment should also be done to minimize the fatal impacts that are caused to the biodiversity.

3.1. EIA (Environmental impact assessment)

Ecological Impact Assessment (EIA) is an imperative administration device for guaranteeing ideal utilization of normal assets for practical advancement. A way towards EIA was started in our nation with the effect evaluation of stream valley extends in 1978-79 and the degree has directly improved to cover numerous advancement areas, for example, enterprises, warm power ventures, mining plans and so forth. To guarantee a gathering of ecological information and readiness of administration designs, rules have been advanced and circled to the concerned Central and State Government Departments. EIA has now been influenced required under the Environmental (Protection To act, 1986 for 29 classes of formative exercises including ventures of Rs. 50 crores or more[3].

Environmental appraisal committees have been constituted for various sectors like Mining Projects, Industrial Projects, Thermal Power Projects, River Valley, Multipurpose, Irrigation and H.E. Projects, Infrastructure Development and Miscellaneous Projects, Nuclear Power Projects etc with experts in each sector. An Environmental impact assessment procedure has to be followed in order for the project to get approved. The committee decides with the information provided or even makes few field visits if necessary to the project site in order to recommend or reject the project. According to EIA guidance manual for highways the projects are classified into two categories: Category A and Category B. Category A projects include construction of New National Highways, Expansion of NH greater than 30Km, includes land acquisition and passes through more than one state. Category B includes all the State Highways, SH expansion in hilly terrain or in ecological sensitive areas.

Environmental clearance is mandatory for both the Categories of Highway projects. EC process includes Screening > scoping > Public consultation > Appraisal. Even after the project is recommended, monitoring is undertaken by regional offices of the ministry. The motive behind such conduct is to ensure the adequate implementation of the suggestions made.

4. Mitigation measures to minimize ecological impact

There are progressions of moderation measures that can be considered in future street arranging ventures. It is prescribed to introduce basic beneath street sections (e.g. metal ducts) at interims (150– 300 m) to give chances to creatures of all body sizes to abstain from intersection streets. At bends or curves in streets where perceivability is decreased the borderlines ought to be broadened to dishearten collisions [7].

The following measures should also be considered.

- Locations vulnerable for landslides should be avoided in hilly areas.
- The fertile top soil should be separated and stored for reuse from the subsoil during excavation.
- Tree plantation should be encouraged.
- Sensitive natural environments should be identified in early planning stage and alternatives routes should be suggested.
- Provision of wildlife underpass and hydraulic structures.
- Regeneration of rare plants should be done.
- Provision of wildlife crossing should be provided.

Conclusion:

The main conclusion of above is that the cumulative effect of highway on Ecology is predominant. Roadways not only affect the surrounding environment but also flora and fauna significantly. The steps should be taken to mitigate the effect of environment. The use of culvert for crossing of reptiles and mammals is partially successful as it is not effective for large mammals and few species show certain degree of unwillingness using culvert. The warning board should be placed in National Park at potential accident site. Alternate routes should be considered to avoid crossing through an ecologically fragile zone. There is still need to take more steps to protect flora and fauna.

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