



IMPACT OF MODERN ROAD CONSTRUCTION PRACTICE ON ENVIRONMENT

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ABSTRACT:

Road construction practices means not only building a road but it prepare and maintain the complete environment for building and living, above as well as underground. If miss the environment from the road construction practice then that road is not solid road. Road construction practices can also cause adverse impacts on natural water resources and discharge areas. The three most damaging effects of road construction and management are noise, dust and vibrations. This study ware depends on modern road construction practices impact on environment. Observation can be either the main method in a project or one of several complementary qualitative methods. This study was done in Amravati district with the help of new road construction sites i.e. Amravati to Morshi; Amravati to Paratwada; Amravati city internal roads; Amravati to Akola roads. The observations and results show that this practice affects the environment i.e. problems of dust, noise, vibrations, hydrological and geomorphological aspects of watersheds and landscapes, impact on biotic environment and it also kills the wildlife. From the above study we can conclude that, by constructing the concrete road sustainability can achieve it is best to construct concrete roads.

Keywords: Road, Construction, Impact, Environment, Amravati.

INTRODUCTION:

The “Future of Roads” project is focused on supporting Indian governments and industry to respond to issues and risks related to climate change, availability of natural resources, and issues related to energy especially oil. As such it is important that the outputs of the program are relevant and timely. In order to do so the project is working in close consultation with government, industry and university stakeholders.

What is a sustainable or green highway? It is a system of roads which limit their impact on the environment to a minimum through different sustainable practices. The goal is to maximize the lifetime of a highway while restricting its emissions. Amongst the different construction techniques, we find the use of recycled materials, the establishment of an ecosystem management, the implementation of energy reduction actions or storm water retrieval systems. First and foremost, all projects involving roadway construction are subject to the mandatory Environmental Impact Assessment (EIA) procedure by the Ministry of Environment, Forest and Climate Change.

Highway construction requires a lot of energy at different levels: for the production of asphalt and cement destined to pavements and excavating materials, for road maintenance, and by

vehicles stuck in congestion due to poorly designed highways. To reduce the level of energy consumption, warm-mix asphalt (WMA) can be used to replace hot-mix asphalt (HMA). Besides the fact that WMA is produced at a lower temperature, it also induces great benefits such as an improvement of working conditions (less exposure to heat and fumes) and asphalt compaction, reduction of paving cost and longer hauling.

According to the current trends of road construction, how can we foresee the future of this sector? Several approaches can be explored such as for instance the UAV's – unmanned aerial vehicles. In spite of certain concerns, the usefulness of these “tools” is real: monitoring jobsites, inspecting structures, getting an aerial overview of road project... This allows the construction management team to review all the aspects of the construction process by getting accurate pictures of road conditions and therefore, to adopt appropriate actions.

The level of the disturbance caused by sound will depend on its extent and intensity, and on the sensitivity of the persons affected. Noise is not normally a major problem for roads in the Northern Periphery as the region is generally relatively sparsely populated and the road networks on the whole run through uninhabited or lightly populated areas. Most roadworks in the Northern Periphery are usually carried out outside the built-up areas, with the result that the effect of noise on the local surroundings is not generally a special consideration. Standard working measures within the site must of course be observed. The condition of roads has an effect on noise level.

Greater consideration must therefore be given if roadworks are likely to create noise. Noise disturbances may cause irritation as well as agitation and stress to livestock.

Dust is an almost inevitable consequence of roadwork. Gravel and crushed gravel and hard rock aggregates always contain a proportion of fines, and if the material is dry, a fairly heavy dust cloud can be raised when it is mobilized. The resulting dust can disturb both the population and the local environment. Northern Periphery is a fairly sparsely populated region and dust from “clean” materials seldom represents a serious problem, even though it should not be ignored.

Good handling of materials can enable most residual materials to be put to use in one way or another. If the quality of material is too poor to use in the road structure, it can usually be employed as landscaping material, e.g. to level out steep slopes. Some waste will of course always occur, e.g. packaging material, oil residues and the like, but these should be minimized.

Dangerous wastes in roads operations are fuel, accumulators and accumulator acids, brake fluids, transmission oils, shock dampers, different acids, etc. The main sources of these dangerous goods are vehicles (both road users and maintenance). During road construction and maintenance all vehicles on the site need to be serviced appropriately to ensure that there are no leaks.

Every road produces some impact on the environment. The construction phase is potentially the most damaging phase in this respect and measures should be taken as necessary to mitigate any impacts caused. Before this can happen the sources and movement routes of pollutants should be identified. The rule of thumb in mitigation is “source – pathway – target”. These define the three major parameters in mitigation. Mitigation methods can be carried out both ex-situ and in-situ.

If any pollutants reach the specified limit level the only possible mitigation measure is remediation (in-situ) or compensation (ex-situ). Compensation means economic or replacement measures. In practice compensation means, for example, that some form of payment is made to the landowner whose land has been polluted. Remediation is normally only

used when deleterious or adverse effects impact an environmental area. In practice this means that the areas with contaminated materials are replaced with new, clean material.

The risk of finding previously polluted soil is not particularly high, although it is conceivable. A number of warning signals are however possible. Oily water in a ditch for example is a clear warning sign. The reason for the oil may be spillage from road operations, but it may also be due to existing old pollutants. The nose, or rather the sense of smell, is an excellent instrument for detecting pollutants. Care should be taken if the smell of oil, Sulphur, etc. is detected. Pollutants can also be tangible, such as rubbish found in the ground. Soils may also be discoloured. Human actions are controlled by strict environmental legislation. Damaging or destroying nature within environmental areas are criminal offences. Human activities such as constructing roads can create scars in the environment and for this reason actions that are likely to damage the environment need permission from the environmental authority. Materials used in roads operations must be closely controlled in order to prevent new pollutants. Likely sources of pollutants include solvents and oil products. Leakage from vehicles and other equipment is the simplest source of pollution but also the most insidious. This type of pollution can generally be avoided by regular servicing of vehicles and equipment, but some will remain. Site rubbish is normally easier to deal with. Rubbish is simple to collect and a sorting station can easily be arranged on site.

Road construction has such large environmental impact, it must be done with caution. According to (Roadex, 2020), there are notably, three high profile negative effects of road construction like noise, dust and vibrations. There are also many benefits of road construction, even though the benefits are more of economic and social rather environmental. According to (Gerilla and Inamura, 1999) roads are used to enhance the provision of public services and other security services.

empirical research on road construction has revealed that many of the projects undertaken have not only failed to improve the lifestyle of resettled people, but have also aggravated their multigenerational marginalization (Dietz *et al.*, 2001).

many of environmental impact indicators such as green-house gas, acidification potential, ozone depletion, and smog are linked to various stages of the road construction projects. The general environmental impact indicators can be divided into direct, indirect, and operational emissions (Glasson *et al.*, 1999). Environmental variables are measures placed to inform people on what is going on in the environment, since the environment is complex. These variables give a more practical and economical way to carry out and monitor the environmental activities carried out during road construction (Horsley, 2003).

The material is drawn from regulations, circulars and guidance and is designed to help individuals understand what EIA is and in what circumstances it should be applied (Chokor and Odemerho, 1991).

Noise is just a sound that is unpleasant to the listener. The amount and intensity of the disturbance generated by sound, as well as the sensitivity of the people affected, will determine the level of disturbance (Roadex, 2020). The exploitation of borrow pits and quarries and the transport of construction materials created noise and dust. In addition, installation and operation of plants, and loading and unloading of materials will cause dust, noise and exhaust emissions that will likely affect neighbouring residential areas (Segni, 2020). The use of dust binders near residential buildings or use of alternative material choices during production could reduce the impact of the dust on the environment. When dust binders are used, they should be installed with utmost care so as to avoid contamination of ground water (Ibrahim, 1994). As with noise issues, a simple and effective solution is to notify people about upcoming road construction so that they are aware of the cause for the work and when it will be completed (Umar, 2010). In the long run, the walls of buildings might begin to crack making it vulnerable to collapse if the impact was beyond bearable limit. Study of genetics at hibernacula showed that in hibernacula that were blocked off by roads, genetic diversity was lower than in those that occurred across contiguous habitats (Clarke *et al.*, 2010).

METHODOLOGY:

The choice of method must always be adapted to the initial research problem and the scientific

context of the study. Observation can be either the main method in a project or one of several complementary qualitative methods. At the outset of the study, it may give an inspiration for interesting scientific topics. Impressions and experiences from a long-term observation may help to revise a research problem, which in turn can create a need for additional methods and theoretical perspectives in order to better explore it. For example, starting a project with direct non-participant observation, a researcher might discover that some aspects of a certain subculture—for example, that of boxers, nurses, or musicians—can only be fully understood by an active involvement in their reality, experiencing first-hand their daily

lives and sharing their joys, concerns, and successes. Access to the Field It is an extremely important task to identify and define a specific “Field” for observation. In ethnology and anthropology, the prevailing tradition was that the area of research is unequivocal of a physical place—for example, a tribal village or a town quarter. Correspondingly, in organizational research and economics, it could be a company, a bank, or any other institution. However, as Hammersley and Treseder, (2007) remind us, settings (e.g. the office) should not be confused with cases. Within any setting there may be several different contexts (e.g. frontstage and backstage) requiring different kinds of behaviour as well as several interesting cases for research. In today’s global, mobile, and multimedia transformed realities, it gets even more complicated. The inhabitants of a village or employees of a company may have extensive contacts with the “outside” world; Internet communities often do not have any connection with any physical place.

Road Observation Methods and Analysis: In Amravati city from previous 4-5 years changes road construction practices (new road replace the old one). Place of new road (modern) construction practices performed: Amravati to Morshi; Amravati to Paratwada; Amravati city internal roads; Amravati to Akola. This road construction practices currently performed and, in this project, during this project observed their good bad effects on environmental and surrounding people. Observation is one of the most important research methods, used in a range of research strategies (case studies, ethnography, etc.).

OBSERVATION AND RESULT:

Roads can have both positive and negative influences on people and the environment. On the positive side roads provide the opportunity of mobility and transport for people and goods.

On

the negative side roads occupy land resources and form barriers to animals. They can also cause

adverse impacts on natural water resources and discharge areas. The three most damaging effects of road construction and management are noise, dust and vibrations. Noise mainly occurs during road construction phases but it can also occur to a lesser degree during maintenance operations. Dust is created during the construction of gravel roads and unbound aggregate layers. Excess dust production can be treated by a range of means such as watering, the use of alternative materials, and by using dust binders near houses. Vibration can be caused by uneven road surfaces and can pose significant impacts and problems to houses close to the source.

Noise: The condition of roads has an effect on noise level. For example, if a road is in poor condition and cars are traveling fast, this can cause more noise than if the road is in good

condition. Greater consideration must therefore be given if roadworks is likely to create noise. Noise disturbances may cause irritation as well as agitation and stress to livestock. A simple but fairly effective measure to manage the effects of noise is to notify the persons likely to be affected that work is about to start. This can be done by delivering information leaflets through letterboxes and/or by posting notices on notice boards. For major work, it may be sensible to convene an information meeting. If people are notified, their acceptance of the disturbance is usually higher. It is wise to work within normal working hours as much as possible. Where this is impossible, the persons affected should be given special notification. There are only limited ways of reducing the noise level. Noise can obviously be reduced by noise fences or similar structures, but these are often impracticable on roadwork sites, particularly for minor works of short duration. A general piece of advice that applies to noise is to use modern equipment wherever possible. Such equipment normally has better noise and vibration attenuation than older machines. Modern machinery also offers other benefits, such as reduced emissions, etc.

Vibrations: It disturb people close to roads but they may also cause damage to buildings and sensitive equipment. Vibrations, and also noise, can affect local fauna. Moreover, vibrations can cause damage to geological and archaeological objects. Unnecessary high vibration sources, such as compaction with heavy vibration rollers or bedrock blasting, should be avoided or minimized in built-up areas. Heavy vibrations can cause damage to buildings and installations, which can give rise to damage claims. Methods and equipment that minimize vibrations should therefore be employed.

Dust: It is an almost inevitable consequence of roadwork. Gravel and crushed gravel and hard rock aggregates always contain a proportion of fines, and if the material is dry, a fairly heavy dust cloud can be raised when it is mobilized. The resulting dust can disturb both the population

and the local environment. New roads facilitate travel and opportunities to visit new and possibly undisturbed areas. There are, therefore, implications for impacts of tourism in new areas as a result of new roads. This aspect was not considered within the brief of the present study. However, it may be important to note those studies about human disturbance on plant species richness in 'isolated' conservation areas. The park is isolated by roads and is strongly affected by human activity. found an increase in exotic species and a decrease in native species (155 out of 422 species had gone). These changes coincide with increased human disturbance.

Soon after commencing this task it became evident that there was a huge amount of literature about the effects of roads on the physical environment. In particular, the physical and geological effects have been well researched. The effects on water run-off and effects of pollution from roads and traffic have been well documented. The geographical location of roads may have implications in terms of altering the hydrology of an area and also sediment flow.

Hydrological and Geomorphological Aspects: Landscape changes result when roads alter the hydrological and geomorphological aspects of watersheds and landscapes. They can cause important changes (some for short periods, others for longer periods) in fluvial dynamics, sediment production, and chemical balances, which can adversely affect floodplain functioning and alter ecological conditions in aquatic and riparian areas. Roads also affect water movements, sedimentation, and transport of pollutants. Because they often interrupt or otherwise alter sheet flow and runoff patterns, roads can affect the amount and quality of water that goes to recharging groundwater, and they can affect surface waters in many ways. Because road embankments trap dust and dirt and they face the low winter sun at an angle, they can accelerate snowmelt (NRC 2003). Roads and associated ditches can become part of hydrological networks. Several geomorphological processes and factors influence change. The

nature of geomorphological processes affected by roads is strongly influenced by where and how roads are constructed, by the geology of the area, and by storm characteristics.

Biotic: Roads can have biotic effects on the genetics of populations, on species, and on ecosystems, and their effects can accumulate over space and time. The framework prepared by the Environmental Protection Agency (EPA) also is a helpful way to conceptualize the ecological effects that roads can have. In general, their effects can operate through a variety of ecological mechanisms. Roads can impede animal movements by direct mortality or avoidance behaviour. The barrier effect varies between species, road types, and adjacent habitat quality; however, traffic volume and speed strongly influence the effect. Some authors have suggested that divided highways with 90 m of cleared areas as barriers are as effective as bodies of water twice as wide in obstructing dispersal of small forest mammals.

Roadkill: It can have demographic consequences for some species of wildlife. Roads and traffic

can reduce wildlife population densities and ultimately affect the survival probability of local populations. Traffic-related mortality has contributed to the decline of several species. Roads have large, widespread effects on aquatic habitats. When roads fail, landslides and torrents of water-borne debris can have serious adverse effects on stream habitats. Roads and their associated structures, such as bridges, culverts, and berms, modify stream flows and sediment transport and often make passage for aquatic organisms more difficult or even impossible. Because paved roads (and to a lesser degree, unpaved roads) are impervious, they increase runoff and otherwise alter hydrological patterns.

CONCLUSION:

Road's infrastructure affects both biotic and the abiotic components of ecosystem by changing the dynamics of populations of plants and animals in the landscape, introducing exotic elements, and changing levels of available resources, such as water, light and nutrients. Thus, the above discussion infers the view that comprehensive impact of highway expansion has not been carried out elsewhere. This necessitates to carry out impact of highway expansion on air quality, soil quality, water quality, human health and socio-economic condition of populace residing nearby the highway. There is vast contraction on the choosing which road is best according to environmental point of view sustainability is the ability to meet our needs without compromising the ability of next generations to meet theirs. This concept integrates the economic, societal and environmental aspects. From the above study we can conclude that, by constructing the concrete road sustainability can achieve it is best to construct concrete roads.

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