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A STUDY ON ENVIRONMENTAL IMPACT OF ROADS

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A Study on Environmental Impact of Roads

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Abstract – The environmental impact of roads (both positive and negative) include the local effects of highways (public roads) such as on noise, water pollution, habitat destruction/disturbance and local air quality; and the wider effects which may include climate change from vehicle emissions. The design, construction and management of roads, parking and other related facilities as well as the design and regulation of vehicles can change the impacts to varying degrees.

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INTRODUCTION

Roads can have both negative and positive effects on air quality. Air pollution from fossil and some bio-fuel powered vehicles can occur wherever vehicles are used and are of particular concern in congested city street conditions and other low speed circumstances. Emissions include particulate emissions from diesel engines volatile organic compounds, Carbon monoxide and various other hazardous air pollutants including benzene. Concentrations of air pollutants and adverse respiratory health effects are greater near the road than at some distance away from the road. Road dust kicked up by vehicles may trigger allergic reactions. Carbon dioxide is non-toxic to humans but is a major greenhouse gas and motor vehicle emissions are an important contributor to the growth of CO₂ concentrations in the atmosphere and therefore to global warming.

POSITIVE IMPACTS

The construction of new roads which divert traffic from built-up areas can deliver improved air quality to the areas relieved of a significant amount of traffic. The Environmental and Social Impact Assessment Study carried out for the development of the Tirana Outer Ring Road estimated that it would result in improved air quality in Tirana city centre.

IMPACT ON NOISE

Motor vehicle traffic on roads will generate noise. Road noise can be a nuisance if it impinges on population centres, especially for roads at higher operating speeds, near intersections and on uphill sections. Noise health effects can be expected in such locations from road systems used by large numbers of motor vehicles. Noise mitigation strategies exist to reduce sound levels at nearby sensitive receptors.

New roads can divert traffic away from population centres thus relieving the noise pollution. A new road

scheme planned in Shropshire, UK promises to reduce traffic noise in Shrewsbury town centre.

IMPACT ON WATER POLLUTION

Urban runoff from roads and other impervious surfaces is a major source of water pollution. Rainwater and snowmelt running off of roads tends to pick up gasoline, motor oil, heavy metals, trash and other pollutants. Road runoff is a major source of nickel, copper, zinc, cadmium, lead and polycyclic aromatic hydrocarbons (PAHs), which are created as combustion byproducts of gasoline and other fossil fuels.

De-icing chemicals and sand can run off into roadsides, contaminate groundwater and pollute surface waters. Road salts can be toxic to sensitive plants and animals. Sand can alter stream bed environments, causing stress for the plants and animals that live there.

IMPACT ON HABITAT FRAGMENTATION

Roads can act as barriers or filters to animal movement and lead to habitat fragmentation. Many species will not cross the open space created by a road due to the threat of predation and roads also cause increased animal mortality from traffic. This barrier effect can prevent species from migrating and decolonizing areas where the species has gone locally extinct as well as restricting access to seasonally available or widely scattered resources.

Habitat fragmentation may also divide large continuous populations into smaller more isolated populations.^[14] These smaller populations are more vulnerable to genetic drift, inbreeding depression and an increased risk of population decline and extinction.

Another negative effect is the amount of space roads take up. When cutting through forests, they prevent the growth of many trees as trees cannot grow through paved roads. On unpaved roads, vehicle tires

and foot traffic compact soil and prevent plant growth. As trees take up CO² and as they also house animals, this increases the environmental damage inflicted.

IMPACT ON FLORA AND FAUNA

Roads that run through forests that house edible animals encourage/facilitate poaching. Especially in poor areas, the construction of roads has promoted not only poaching for personal consumption but also for sale to third parties.

Similarly, the construction of roads in forested areas has also promoted illegal logging as it becomes easier for illegal loggers to transport the wood.

IMPACT ON RECYCLING

Materials removed from a roadbed can be reused in road construction within the same project or in other locations. Road construction can also use waste materials from other industries.

Asphalt pavement is one of the most recycled materials in the United States. It is estimated that over 80% of asphalt pavement removed from roadways is reused as construction aggregate. It can be mixed into new pavement or used as a sub-base or fill material. Similarly, concrete from road or building demolition can be an excellent source of aggregate.

Common examples of waste products used in road building include coal fly ash (used to make concrete stronger), asphalt shingles and shredded tires (used in asphalt pavement), ground glass and steel mill slag (used as aggregates).

RESEARCH STUDY:

The open road, the wind in your hair, the scenery whizzing by: this is a primal scene of what it means to be an American. Clogged highways, however, are increasingly the reality. Transportation projects across the United States have faced a recurring pattern of local resistance leading to delays that can last, not just months, not just years, but decades. Local community groups, opposed to highways in or near their neighborhoods, are one factor in delays. Environmental groups, fighting to protect sensitive environmental areas and to maintain clean air, are another. There is no question that these stakeholders deserve an important role in transportation planning. Yet people need to get from point A to point B, from home to work to shopping to vacation. With population expanding, highways-or some form of alternative transportation--need to be built, and some communities must pay the price. Finding the balance between environment and urbanization is tricky. Each major highway or other transportation project impacts the environment in a variety of ways. The human environment is enhanced by access between existing communities; in addition, transportation networks encourage future development. Businesses also

benefit, encouraging economic growth. The most immediate negative impact on the human environment is the destruction of existing homes and businesses. Longer term impacts include noise, air pollution, and potential loss of living quality. Wildlife and plants, in concert with humans, suffer from habitat destruction and various forms of pollution. In addition, while facilitating transportation for humans, highways do the opposite for wildlife. Ecosystems suffer fragmentation; habitats and biomes that had worked in cohesion are separated. Migratory species find their progress blocked; some may be separated into genetic islands, impoverishing future biodiversity and leading to local extinctions. Transportation projects may also necessitate the draining or contamination of wetlands, crucial habitat for many species, and important for flood control and filtering and cleaning water. Current laws require that wetlands be reclaimed, or created somewhere else; however these may not provide the same benefits as the destroyed wetlands.

ENVIRONMENTAL IMPACTS OF ROADS

Environmental effects of roads include spatial and temporal dimensions and biotic and abiotic components. Effects can be local (along a road segment) or extensive (related to a large road network). In addition to direct loss of habitat and ecosystems caused by the footprint of resource roads, another spatial aspect is the "road-effect zone"³ that can radiate out from the sides of the road and/or extend downstream where effects on aquatic conditions may be located a distance from the source. The road-effect zone also changes light conditions and disturbs soils and thus creates conditions suitable for invasive plants.

Spatial effects of roads vary because species habitat requirements and ecosystem characteristics are diverse. For example, less mobile wildlife species tend to have smaller habitats whereas wide-ranging mammal and bird requirements tend to be spread across macro-environments.

Roads may negatively affect species, habitats, and physical and chemical characteristics at the site and landscape levels. In some cases, authors group road effects into direct and indirect impacts e.g. Gucinski et al. 2001. In another instance, Spellerberg summarized road effects as those common during construction, those along a newly completed road, and those with long-term impacts. In most reports highlighted in this article, researchers have focused directly on road effects; in other instances, researchers are testing for the effects of an array of variables including roads.

OTHER NEGATIVE EFFECTS OF ROADS

- Expanded unmanaged recreation (such as unauthorized snowmobiling and motorized off-road vehicle use) resulting in negative effects on wildlife, and degradation of soils and riparian and wetland areas.

- Increased invasive alien plants and animals that establish along the colonization corridors provided by roads; in addition, non-native plant species are often sown to stabilize slopes along roads.
- Increased spread of insects and disease.
- Increased fuel emissions (e.g., carbon dioxide) into the air.

CONCLUSION:

The emphasis placed on road transport in the 20th century has led to a great variety of environmental consequences. In industrialized countries, rates of vehicle production are often considered a fundamental indicator of economic health, while in developing countries and regions, rates of expansion in the highway network and all that pertains to regard as indicative of the health of the infrastructure. All this amounts to a relentless pressure to construct, widen and extend highways. The environmental impact of this tends to be persistent, ramified and cumulative. It can broadly be classified into aspects connected with the planning, construction and maintenance of roads. The most salient aspects of the last of these relate to surface erosion, pollution, and the effect of highways on adjacent flora and fauna. In addition, the environment will also have an impact upon the roads themselves, which has important implications for safety and spatial.

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