INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE & TECHNOLOGY
© VISHWASHANTI MULTIPURPOSE SOCIETY (Global Peace Multipurpose Society) R. No. MH-659/13(N)
www.vmsindia.org

Impact of road construction and modifications on wild flora in Amravati City, Maharashtra

Sachin K. Tippat
Department of Environmental Science, Arts, Commerce and Science College, Kiran Nagar Amravati
Email: sachintippat2@rediffmail.com

Abstract
Amravati is a divisional city of Maharashtra state having its own floral and faunal diversity. Beside that of the roadside plantation there is vast floral diversity along the empty spaces of city area. As Amravati is becoming a developing city, some constructive as well as developing steps to be undertaken by the city planning department of Municipal Corporation. Along with the widening of main roads, the Municipal Corporation starts cementing of sides of the secondary as well as the colony roads since last five years. For the constructive purpose there is lot of disturbances in natural habitat particularly for the road construction. But as we know, the roadside empty spaces are the only area in the urban environment which not only causes water infiltration but also involved in temperature regulation. On the other side these area provide the habitat for the survival of several herbaceous as well as shruby species. Since the onset of road side development the well adapted species becomes rare and may remove from the urban environment like Amravati in the coming future. The present work tried to focus on the ongoing road development in the Amravati city and the destruction of floral patches which was well established in the city environment since long time.
Key Words: floral diversity, urban environment, road development, habitat loss, habitat fragmentation

Introduction

Amravati as a divisional and developing city

Amravati is one of the main districts of Maharashtra is a historically rich and 8th most populated area in the state. Amravati is second largest growing industrial city in Vidarbha region, situated at 156 Km towards west from Nagpur. New flyovers and roads are being built to renovate the city, and other improvements are also going on. The people of the city are well literate, better educated, healthier and more prosperous than that are any time during the past. Vowing this infrastructure the city remains crowded throughout the year. With the course of time and increased living standards the desirability of the people also increased. The people of the city are well literate, better educated, healthier and more prosperous than that are any time during the past.

Local urban flora and their status

Amravati is a divisional city of Maharashtra state having its own floral and faunal diversity. Beside that of the roadside plantation there is vast floral diversity along the empty spaces of city area. These areas provide the habitat for the survival of several herbaceous as well as shruby species. According to Flora of Amravati District authored by Dr. M. A. Dhore (1986) there is about 347 naturalized species associated with the urban environment. Some Common local species are as under. *Acalypha indica, Jatropha gossypifolia, Aereva lanata, Withania somnifera, Solanum xanthocarpum, Indigophera linifolia, Indigophera linaei, Indigophera cordifolia Goniogyana hirta, Tridax procumbance, Soncus asper, Tragia hildebrandtii, Physalis minima, Caparis zeylanica, Caparis horida, Kickcia ramosisima, Sida cordifolia, Sida linifolia, Abitulon hirtum, Alternanther spinosus, Amaratus viridis, Amaratus spinosus ,Achyranthus aspera, Oxalis corniculata, Euphorbia heterophyla, Euphorbia geniculata, Argimone Mexicana, Cassia tora, Tephrocia vilosa, Tephrocia parpuria Psorelia caroliformis, Datura metal ,Datura innoxia, Lagecia mollis, Vernonia cinera Blumea lacera, Diegera muricata, Justacia simplex, Meremia gangetica ,Pergularia daemia, Cryptostegia grandiflora, Cocculus hirsutus, Tinospora cordifolia, Cleome cherimoli, Cleome gynandra, Cleome viscosa ,Clitoria ternatea, Rhynchosia minima, Ipomoea obscura, Rivea hypocrateriformis, Dregia volubilis.*

Road development and expansion status in Amravati

The road network consists of a system of interconnected paved carriageways which are designed to vehicles; the road network generally forms the most basic level of transport infrastructure within the city, and will link with all other areas. In Amravati city the road network facilitates the movement of people allowing for social interaction. Amravati is a served by about 8183.48 of road network including national highway No. - 6. Besides national highway, 6 major state highways connect Amravati with other important cities of the state as well as country. In Amravati city for transportation the existing road network length is of about 1682 km.

Presently in Amravati old road surfaces, fences and sides have been removed for the modifications. Now single carriageway road is converted into dual carriageway by building a second separates carriageway alongside the first, the original carriageway is changed from two ways

to become one way, while the new carriageway is one way in the opposite direction. Due to double road constructions obviously there is, habitat loss, habitat fragmentation, landscape changes, changing aquatic habitats.

Impact of road development:

During road development the ecological effect of road includes physical disturbances of the landscapes, habitat loss and soil erosion. Extinction of populations of several local species near the road edge, mortality of wild life of road edge and habitat loss and dispersal of wildlife (including invasive species and alien species).The most important serious impact during road development is to be on nature is through habitat fragmentation, habitat loss, soil erosion, loss of water lodging areas, loss of roadside community, endangering of local species.

The issue of impacts of urban development on flora is much broader than a concern for human welfare and thus, any useful discussion in this area must be considered in the larger context of biodiversity conservation. Since the onset of road side development the well adapted species becomes rare and may remove from the urban environment like Amravati in the coming future.

Material and Methods

The present work is carried out from March 2016 to April 2017 as under.

1) Collection of data about road development and road network: The data about the road networking and the road construction along with maps of Amravati city was collected from in Amravati Municipal Corporation. The information and map about the road network later surveyed for actual observation. During the survey observations were made related to road and their associated natural habitats.

2) Survey and observation of road developing status in Amravati: The present study is the result of extensive and intensive exploration of almost all the possible urban habitats associated along with the roads of Amravati city. Each and every road was explored with respect its present status, expansion, lengthening of width, side cementing and block fittings. These developmental statuses were focused with respect to the associated natural habitats, related local flora and other ecological properties.

3) Observation of ecological disturbances due to road expansion and road development: Widespread attention continues to be drawn to the ecological effects of road development and the disturbing associated habitats, especially as the road system continues to expand. Extra focus was also made over the present requirements of the developing road for the related area.

4) Observation and study of road associating habitats with respective floristic network: The study also evaluated the type of habitats associated along with different roads of the city. Each habitat later investigated with respect to its floristic composition, its distributional status, abundance of different species and its ecological properties.

5) Analysis of degradation of species richness along roadside: In the final stage of the investigation attention was focused over the indigenous floristic record associated with the road side and their present status. Each species was analyzed with respect to its area of occupation, space if distribution and state of degradation. The rare and endanger status of the local species was also list out.

6) Collection of Photographic evidences: Photographic evidences of almost all the observations were made with help of Nikon Coolpix Li20 digital camera. The evidences later utilized for making conclusions.

All the above observation later analyzed with respect to the species availability, its richness, endanger-ness and present status. The observations finally put forward to make some conclusions.

Results and Discussion

The intensive and extensive exploration of road network in Amravati city related to their development and associated ecological problems are worked out as under.

1. Habitat loss:

Habitat loss is the primary environmental cause of biodiversity decline at local, regional and global level due to anthropogenic activities. As Amravati city is one of the developing cities road networking is also imparting with course of time and demand. The intensive survey during the present investigation observed that since last 8 - 10 years Amravati city has been developing as far as its internal road network is concern. Due to this the roadside habitat belts are going too vanished. Although the basic ecological patterns and processes (e.g. predation, decomposition) are the same in cities and more natural areas, urban ecosystems possess features that distinguish them from other, non-urban ecosystems (Rich *et al.*, 1994). The survey in different areas of Amravati city before the road construction, at the time of road construction and after the road construction it was observed that, there is much consumption of land and thus consequent loss of natural habitat during road development.

2. Habitat Fragmentation

Fragmentation is a process whereby large natural habitats are subdivided due to some development and converted into small patches. In urban area such fragmentation usually developed due to major projects like industrialization, flyovers or new high way constructions. Habitat fragmentation from human activities is not limited to urban areas. In Amravati city, it has been observed that, habitat fragmentation usually occurs because of human activities such as new roads, parking lots and housing development. Habitat fragmentation created isolated patches of landscape in some areas which becomes harmful for local biodiversity. Organisms need their specific habitat for survival, and fragmentation is a leading threat to many terrestrial animals.

3. The potential impact on vegetation and flora

The urban road development as well as modification processes not only disturb the geography but also shows potential impacts on the related flora and fauna. During the investigation eight potential impact on the vegetation and flora have been identified,

a) Loss of plant species richness: The present investigation examined the response of vascular plant species richness to long-term habitat loss and fragmentation. This impact is most relevant to the Greenfield region, as it is extremely rich in plant species and is recognized as an important centre of plant endemism. The road will pass through some extremely species-rich area and an effort has been made to avoid these sites. Road cutting can cause fragmentation of the ecosystem and barriers to dispersal, pollination as well as destruction of flora and fauna.

b) Loss of species of special concern: Species of concern in this area are mainly the endemics, the rare and endangered species and especially those species found in extremely small isolated region. It was observed that some local species like *Cleome gynandra, Cleome cherimoli, Euphorbia geniculata, Croton bonplandanium, Basella rubra, Tragia heildenbrantii Peristrophe bicalyculata, Withania somnifera, Psorelia caroliformis*, *Rivea hypocrateriformis* are becomes endangered in the Amravati urban locality

It was observed that due to loss of road side habitats, several local species has become rare or completely loss from the city area. Some species which came across during the observation are listed below along with their present ecological status.

Sr. No.	Name of observed species	Family	Ecological Status
1	*Withania somnifera*	Solanaceae	Rare
2	*Euphorbia heterophula*	Euphorbiaceae	Rare
3	*Euphorbia geniculata*	Euphorbiaceae	Rare
4	*Soncus asper*	Asteraceae	Rare
5	*Amberboa ramose*	Asteraceae	Rare
6	*Basella rubra*	Basellaceae	Very rare
7	*Cleome gynandra*	Caparidaceae	Endanger
8	*Cleome cherimoli*	Caparidaceae	Endanger
9	*Rivea hypocrateriformis*	Convolvulaceae	Rare
10	*Trichodesma zeylanica*	Scrophulariaceae	Rare
11	*Tragia heildenbranchi*	Euphorbiaceae	Rare
12	*Vicoa indica*	Asteraceae	Rare
13	*Caesulia axillaris*	Asteraceae	Rare
14	*Solanum xanthocarpum*	Solanaceae	Rare
15	*Abitulon hirtum*	Malvaceae	Rare
16	*Diegera muricata*	Acanthaceae	Rare

c**) Loss of plant communities:** The loss of plant communities' is concern with sensitive area of the urban habitat. Loss of communities occurs either directly as a result of the road construction or indirectly in the longer term due to ecological change caused by the presence of the road within the plant communities. In the investigated area large number of open spaces becomes under development. New roads get constructed as per demand and the present roads get imparted their widths. Due to this several inhabited plant communities get completely or partially vanished. According to Tyser and Worley 1992, Haigh *et al.* 1995 native vegetation imparts greater soil strength and requires less maintenance than weedy competitors.

d**) Fragmentation and loss, and change in ecosystem functions:** The construction of major highway causes a fragmentation ecosystem and consequently a number of changes to the ecosystem due to changing condition within it. These fragmentations can create island of ecosystem that have little practical value and construction of road should be done in a way as to minimize the small fragment. Ecosystem function can also be impaired due to the isolation of fragments, which means that the there are change in the dispersal of species. The result of

these changes can be a change in the species. Spellerberg and Morrison (1998) reviewed the ecological effect of new road development in New Zealand and conclude that the lengthening as well as widening of urban roads not only disturb the ecological characteristics but also endangered the human community with the course of time. It has been observed that in the investigated sites due to community fragmentation the overall functioning of the ecosystem becomes alter.

e) Loss of medicinal and other plants used by the local community: As mentioned earlier several species becomes rare and vulnerable from the urban circumstances. As per the literature these species has lot of medicinal properties. Means the loss of cover of such species from the urban area is nothing but the loss of urban medicinal wealth. Watkins (1981) reviewed the environmental impacts of road and traffic in London. According to his work there are many reports about the effects of roads on the physical environment.

Thus in all the present investigation revealed that no doubt the roads and their proliferation are the present demand of urban area but on the other hand the activity becomes the victim of loss of urban ecology.

Conclusion

Amravati city is a divisional and one of the developing cities of Maharashtra. With the course of time the city is developed in all infrastructural facilities along with the road network. During the last one and half decade the picture of internal roads of the city is completely changed. Beside that of widening of main roads the colony passes are also becomes strong because of their cementing. For the easy approaches several new roads are also constructed on the E class land. The road side habitats utilized for the widening and ornamentation of the city.

During the present study it was observed that, due to such development there is fragmentation of habitats, loss of plant communities and several local indigenous species becomes vulnerable. Loss of plant communities occurs either directly as a result of the road construction or indirectly in the longer term due to ecological change caused by the presences of road. Besides that, it was also observed that the widening, cementing and block fitting along road side vanishes the natural water percolating areas of the city. Such a ecological disturbance becomes susceptible for increased amount of run-off during rainy season which in turn causes road flooding and blockages of urban severs. When new roads are built, or old roads improved, the roadside and adjacent lands are drastically altered. While floristic study it was observed that due to loss of road side habitats several local species has become rare or completely loss from the city area. Some species which came across the observation are listed in the observations.

Thus on the basis of all the observations it is concluded that there is fast loss of local flora due to so called urban development. Thus there is immediate need of an Environmental Impact Assessment of the city area.

References

Dhore, M. A. (1986): *Flora of Amravati district*. Ph. D. Thesis, R.S.T.M. Nagpur University.

Haigh, M. J; J S. Rawat; M. S. Rawat; S. K. Bartarya and S. P. Rai (1995): Interactions between forest and landslide activity along new highways in the KumaunHimalaya. *For Ecol. Mgmnt*, **78**:173-189.

Rich, A. S.; D. S. Dobkin and L. J. Niles (1994): Defining forest fragmentation by corridor width: the influence of narrow forest-dividing corridors on forest-nesting birds in Southern New Jersey. *Conserv .Biol.*,**8:** 1109-1121

Southerland, M. T. (1995): Conserving biological diversity in highway development projects. *The Environmental Professional* **17:** 226–242

Spellerberg, I. F.; and T. Morrison (1998): The ecological effects of new roads - a literature review. *Science for Conservation~, 84*.Department of Conservation,Wellington, New Zealand.

Tyser and Worley (1992 Hobbs and Humphries 1994) Native vegetation imparts greater soil strength and requires less maintenance than weedy competitors.

Watkins, L. H. (1981): Environmental impact of road and traffic, Applied Science Publishers. London. 268 – 276.

Wong, M. H.; Y. H. Cheung and W. C. Wong (1984): Effects of roadside germination and root growth of *Brassica chinesisn* and *B. parachinesis Sci. Total Environ.*3 (3): 87-102


Roadside Habitats with local floral community


The road side cementing and block system in Amravati


Expansion of roads by destructing side habitats in Amravati city

❖❖❖❖