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ROADSIDE HABITAT MICRO ZONATION AND PAVEMENT PLANT SPECIES COMPOSITION ANALYSIS: A CASE STUDY OF GANGTOK TOWN

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Short Profile

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ABSTRACT:

Roadside habitats square measure the microlevel of environs with square measure fashioned by fragmentation of huge environs, some time it's developed my human effort. Most studies have focused on individual and population level effects of road edge. The study targeted on species variation, composition, richness and their purposeful alteration in proximity to roads. Twelve roads were chosen and survey was carried out upto 10 meters (10) distance at the each facet of the roads. activity of soil characteristics, infiltration rate, species composition and ecological significance square measure established depending on that micro-zones are delineate. The study has been supported entirely primary field survey.

KEYWORDS

Roadside, habitats, Species variation, infiltration, ecological significance.

INTRODUCTION :

Transport act as life line to urban system and read way is the primary mode of transportation, with the expansion of urban area length and complexity of road network increases, that creates harmful and beneficial effects on ecology. Generally, urban network is complex but addition with mountainous terrain condition makes it more complex. Primarily roads have fragmented the forest habitats and with the passage of time many habitats have become isolated. Habitats in question are found along both the sides of road which is distinctly different from the other types of habitat. The road network provides a range of diversify depending on vegetation characteristics. Road side habitats are characterized by many floral and faunal species. Many species of birds are found in these habitats, some mammals species fiend shelter here and some of the reptiles and amphibious choose the road site habitats as their breeding ground. Butterfly, among the insect, breeds in the road side habitat. Roads have considerable and diverse ecological effect at different spatial scales (as reviewed by Forman and Alexander, 1998). On wide spatial scales, roads are among the main causes of loss and fragmentation of habitats in many regions (Reed et al. 1996). Road edges display a variety of physical and chemical changes as a result of road operation and traffic (Forman et al. 2002). Moreover, roads contribute to the introduction and spread of exotic species to adjacent natural areas (Song et al. 2005).

2. INTRODUCTION OF STUDY AREA:

Gangtok is a small town in the mountainous tracts of Sikkim in India. Gangtok means “the town on the hilltop’ in the local Bhutia language. The city is situated between 88º 30' 36? and 88º 35' 49? East longitudes and 27º 17' 00? and 27º 22' 00? North latitudes. At an average altitude of the study area is 5500 feet. Gangtok is the capital of the state of Sikkim with a population of approximately 50,000, and it is s historically important transit point on the trade route to Tibet and became the capital of Sikkim in 1894.Being capital city, Gangtok is very important from administrative point of view. Physiographically, Gangtok can be said to have its feet in the ocean and its head in the sky. The altitudes vary from 300 meters to 8500 meters above mean sea level. The entire state is a young mountain system with highly folded and faulted rock strata at many places.

3. OBJECTIVES:

1. To find out micro-level roadside habitat characteristics of Gangtok city.
2. To examine the micro environmental variation within a habitat.
3.To study change of species composition beside the pavements.
4. To study impacts of urbanization on natural habitat.

4. MATERIALS AND METHODS:

The research was conducted in Gangtok, a mountain town of India. Twelve roads with 2000 m2 (200 x 10m) on each side of the roads have been taken into consideration for the study. Plot size was based on the necessary sampling effort for plants (measured by area sampled) determined in a preliminary study (Mandelik et al. 2002). Plots were parallel to the road and extended 10 m into the

adjacent scrubland starting from the bare unpaved shoulder bordering the road on each side. All study units have subjected to a similar level of low intensity cattle grazing, confirmed by survey of cattle dung density conducted in all plots at the end of the study (Mandelik, 2005).

5. CHARACTERISTICS OF ROAD NETWORK:

Roads are constructed on those areas which are physically more stable. In Gangtok, the roads are have been constructed along different suitable geomorphic sites. The road network is mainly zigzag which is the manifestation of terrain complexity the roads are narrow in comparison to the plain land. The accessibility and connectivity is lower and the feeder roads meet the main road at acute angles. Ridge tops are the more rational location for the roads but currently with rapid urbanization and increased necessity for connectivity, roads are being constructed also on lower cliff slope and middle cliff slope. Roads provide some socio-economic opportunities to the urban people. More road network means more accessibility to socio-economic needs. Mature urban centre newly constructed supplementary roads have some environmental implication by releasing the load of traffic along the main arterial roads. In that way the roads can be ranked on the basis of environmental roles they are playing.

- Assist economic regeneration
- Improved environmental quality
- Provision of private transport
- Provision of public transport facilities.

On the basis of ranking Indra Bye pass , B.R.Ambedkar road, Banupath get high, Status due to cater the socio-economic and environmental opportunities to us.

Table No.1 Environmental Ranking of Major Roads

Geomorphic Location	*Name of The Roads*	*Environmental Ranking*	*Average Width*
Ridge top	J.N.Road	10	4.5m
	T.V.Tower Road	9	
	C.M.Road	10	
Upper cliff slope	Bhanupath	12	6m
Middle Cliff Slope	N.H.- 31/A	15	6.5m
	M.G.Marg	6	
	Arithang Road	6	
	Diesel Power House Road	9	
	B.R.Ambedkar Road	11	
	Stadium Road	7	
Lower cliff slope	Indra Bye pass	13	10m
	Sichey Burtak Road	6	

Source: Prepared by author from field data, 2015

Fig-1

6. ROADSIDE HABITAT CHARACTERISTICS:

Road side habitat is unique in terms of it species composition (both flora and fauna), Geomorphic location and areal extension. Road side habitat is smaller in comparison to the other urban habitats and run parallel along the road. The fragmentation of the road side habitat is mainly done by human being by the establishment of housing blocks or other construction. Species diversity depends on some physical phenomena like climate and drainage condition.

CASE STUDY – 1

Micro ecological zones: Road side habitats can be classified into number of sub habitats depending on species composition, micro climatic and drainage characteristics. Human interference is also important in creation of micro ecological zones. Three micro zones can be identified road side habitat in case of Indra Bye pass.

1.Grass and shrub dominated open land environment dotted with tree in relatively drier condition.
2.Dhupi dominated sub environment with vigorous under growth in relatively moist condition.

3.Isolated patch of trees without under growth.

Species diversity of the micro zones: Each micro zone is diversified in nature in terms of species association.

Table No.2 Hydro-geomorphic Characteristics of Micro-ecological zones of Roadside habitat

Micro zones	Soil Condition			Infiltration rate	Organic matter	P^H	Major Plant Species	Number of Fauna Species		Signature of Urban Stress
	Depth (cm)	Exposure (%)	Texture					Avifauna	Insect	
1	20	20	Sandy Clay	20ml/30'	<0.5	8.5	3	4	6	1. Dumping waste material 2. Poor Drainage 3. Construction of house & road
2	23	10	Sandy Clay	18ml/30'	<0.5	7.0	2	3	6	
3	18	10	Sandy Clay	10ml/30'	<0.5	8.5	3	5	7	
4	10	0	Sandy	17ml/30'	<0.5	8.5	2	2	4	
5	16	0	Sandy	20ml/30'	<0.5	8.5	1	4	6	

Source: Prepared by author from field data, 2015

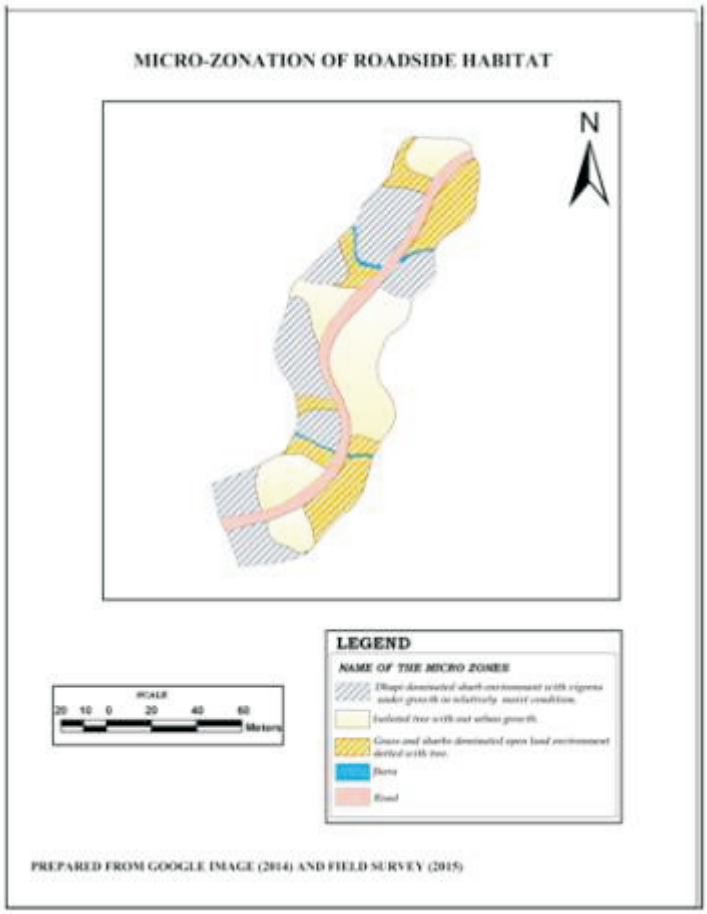

Fig-2

Signature of urban stress:

1. Road creates barriers to free movement of animals and often kill them during collision with vehicles.
2. Fragmentation and reduction of forest land.
3. Noise of vehicles reduced density of local breeding birds.
4. Increase air pollution led to de-foliage the leaves.
5. Lead, Cadmium from traffic reduces the fine roots and several needle losses. Plants colonizing pavement are affected by pollution from vehicles and trampling by human being.
6. Grasses on pavement are low growing because their tops are continuously damage by walking.
7. Distribution of pavement plant:

Pavements are the type of roadside habitat, lying on both side of the road. Pavement allows movement of human being and is restricted to vehicles. Plant species are variedly distributed over the pavements and plant species and density change away from the road. Pavements are mostly dominated by grasses, herbs and some creepers and fringed by long trees and bamboos. Distribution of plants varies with the variation of roads; species heights, no. of species, width of the leaves are also varies. Distribution of plant species are enlisted according to the road are listed below-

Table No. 3 Hydro-geomorphic Characteristics of Micro -ecological zones of Roadside habitat

Case study	No. of vehicles in 30'	No. of people in 30'	Total no. of plant clumps	No. of herbs species	No. of grass species	No. of species according to distance
Indra Bye pass	120	32	4	5	3	1m-0,2m-0,3m-0,4m-1,5m-3,6m-5,7m-8
B.R.Ambedkar Road	145	60	10	2	4	1m-0,2m-0,3m-0,4m-1,5m-1,6m-3,7m-3,8m-4,9m-4,10m-6
Sichey Bustee Road	47	28	5	6	5	0.1m-0, .2m-0,.3m-1,.4m-4,.5m-7,.6m-11,.7m-11
Palace gate Road	65	75	4	-	11	0.2m-0,.4m-4,.6m-8,.8m-11
Deorali taxi stand Road	5	23	28	2	1	0.5m-0,1m-1,1.5m-2
Enchy monastery Road	45	26	18	12	5	0.5m-0,1m-5,1.5m-8,2m-12
Old jail Road	22	47	11	4	0	.05m-1,.1m-3,.15m-5

Source: Prepared by author from field data, 2015

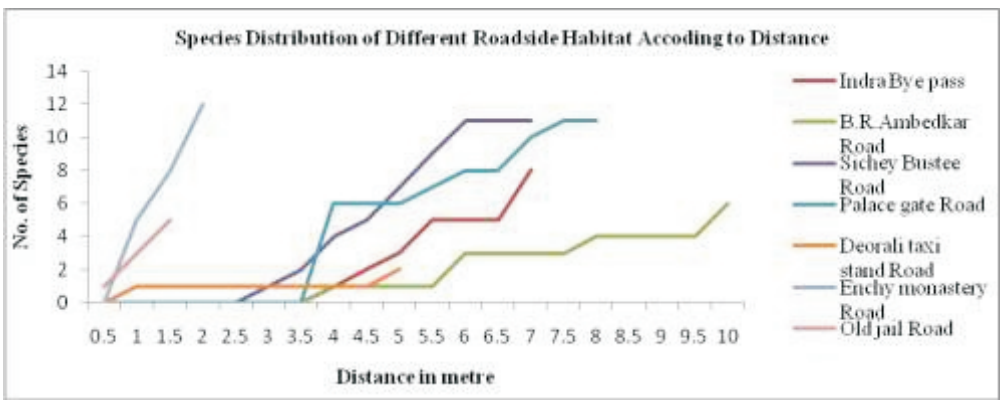

Fig-3

8. FINDINGS

1. Road creates barriers to free movement of animals and often kill them during collision with vehicles especially at night time.
2. Habitat fragmentation and reduction of forest land are major threat to the urban habitat of Gangtok town.
3. Noise of vehicles reduced density of local breeding birds.
4. Increase air pollution led to de-foliage the leaves.
5. Lead, Cadmium from traffic reduces the fine roots and several needle losses. Plants colonizing pavement are affected by pollution from vehicles and trampling by human being.
6. Grasses on pavement are low growing because their tops are continuously damage by walking and number of species increases with the distance from the roads.

9. CONCLUSION

The study reveals, the condition of roadside habitat and pavement species composition. The **extent of species varied** among different roads and their ecological condition which have been continuously affected by vehicular movement by tempering and air and noise pollution. **Species richness increased** and abundance along the road edge that extended hundreds of meters into the surrounding landscape, the contribution of the road edge habitat to biodiversity conservation. Micro-zonation mapping of roadside habitat is only the first step toward better managing and mitigating road edge effects. To gain a wider perspective on long term processes shaping road edge communities, it is important to **explore survival and fitness of individuals and viability of populations inhabiting the road edge habitat.**

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