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ECOLOGICAL UNDERSTANDING OF NATURAL SITES

The last few decades have seen drastic changes in the urban, suburban and natural landscape of our country. There is a change in agriculture patterns, plantations, and developmental activities that has caused a dramatic decrease in quality and quantity of natural resources and natural processes. Global warming, climate change, ozone layer depletion, depleting biodiversity, recent water chaos and other natural disasters are well known effects of this disturbance and deforestation or forest fragmentation.

There are various factors affecting this forest fragmentation such as shifting cultivation, grazing, mining, hydro electric projects, atomic reactors, infrastructure development like roads and railway, uncontrolled extraction of forest products, commercial plantations of non native species, poaching of wild animals etc. In the process, the needs of flora, fauna, and other 'non-human' components of ecosystems are neglected, with no provision to allocate resources to them.

Due to the heavy degradation of our natural areas, the restoration and conservation of natural resources is the need for long term sustainability of any kind of project. To achieve this it is necessary to apply an ecological perspective to the project right from planning till execution and operation. An ecological assessment of the site is first stage in this process. This is a screening tool to assess the present situation and potential of the land. It is necessary to identify the status of existing biological diversity, natural resources and natural processes. In this assessment a detailed analysis of soil, water, flora & fauna and natural processes is carried out. Based on the survey results, an ecologically appropriate land use can be decided, along with the ways to enhance productivity and self-sufficiency of the land.

Sacred groves are the forest patches dedicated to local deities or ancestral spirits. As the name suggests these are holy groves i.e. thick forest patches. These are totally protected forest by local communities through social traditions and taboos that incorporate spiritual and ecological values. Local people believe that they will be punished by God even if they cut a single tree or pick up dead wood from that grove or pluck a flower. These groves represent the index of natural vegetation, with rare species of plants and animals of that particular region. The importance of these sacred groves is significant because these groves are the only forest patches remained like a live museum for original diversity. Due to complete protection, micro climate needed for specialist species is preserved. With such specialist species diversity, the status of such groves becomes very fragile. If these habitats are lost, it is nearly impossible to restore it back to its original state. So these sacred groves hold heritage value which is beyond evaluation.

A detailed Ecological Assessment requires twelve months to observe seasonal changes which impacts planning to great extent. There are various steps to gain an ecological understanding of the area:

- Regional understanding of the area;
- Study of climax ecosystem;
- Assessing current ecological conditions;
- And, its integration in project planning.

A regional understanding of the area under study is critical. The biogeographic / climatic zone of project site has certain basic characteristics which needs to be studied and considered while planning. In India, the fundamental thing we need to understand is that “we live in tropics”. But most of the times designers tend to copy western countries which commonly have a temperate climate. For example, beautification is often restricted to lawns as the main element. In tropical countries lawns prove to be most energy and resource consuming element as they have to be watered daily and maintained with regular doses of fertilizers in a labor intensive manner. Whereas in a temperate climate water-use is less of a concern. We need to come up with creations which are appropriate and eco-Logical to a tropical climate.

We must remember basic characteristics of tropical climate i.e. high temperatures, production of dust, high decomposition and seasonality. These four factors should be used as strength

instead of weakness. Every season can exhibit its own unique beauty which slowly gets converted into another form with altogether different experience. We underestimate our natural landscape by creating the same green appearance throughout the year. India has 11 different biogeographic zones; each of these has various unique characteristics. But even then designed landscapes look similar right from Delhi to Kanyakumari - the same lawn patches and Duranta / flowering edges. While we need to create a congenial atmosphere by increasing green cover, it should be integrated with seasonal surprises. Creating such seasonally varying landscapes could be a good challenge to the creativity of planners and designers.

The study of a climax ecosystem, if any, is necessary to know the actual ultimate character of the ecosystem, which needs to be restored on a site. A climax forest is the ultimate state of forest favored by that particular local climate, rainfall and physical conditions; without any biological interference. As discussed earlier most of the land is in a degraded condition and needs to be restored to its original state. The most significant way to imagine its virgin state is to study the protected forest patches from its surroundings. Such protected areas could be in the form of government forests or national parks or sanctuaries or sacred groves (see box). Though with current trend of development even such protected areas have been exploited by biotic interference mainly

humans and cattle, so most often it is “remnants” from the original system that play a key role in the ecological understanding of the area. Once we know the original composition of flora and fauna and natural processes, every activity of the project should be planned in a way to support and increase these.

A knowledge of socio cultural practices / traditions helps to understand the ecological changes in an area over a period of time. For example, shifting cultivation in hilly regions has destroyed forests, and their floral and faunal diversity to a great extent. In this kind of cultivation, local people cut down a patch of forest on a hill slope, and spread the all cut branches and leaves on floor and burn it just before monsoon. With the onset of the monsoon they cultivate hill millets like *nachani*, *warai*, and sesame for three consecutive years. After these few years of cultivation this patch is left fallow for 10-12 years to let the forest grow and cultivation is shifted to next patch of forest. But in present times, this fallow period has been reduced to two or three years. So, the benefits from a grown forest cannot benefit cultivation and therefore the productivity of the land decreases substantially. This practice itself is also not sustainable nor is it beneficial to natural systems.

Once we know such stresses on natural systems, we can provide solutions by giving alternatives to such cultural practices. For instance if we





are prohibiting fuel wood cutting, we need to provide the people who depend on it an alternative fuel energy. Also - all these degraded areas are in mode of succession. Succession is a step by step process to achieve climax ecosystem conditions. Each stage is definite, orderly and predictable if we know the kind of stress. Understanding all such socio-cultural issues helps to do integrated and holistic planning though significance of this study changes as per the objective of the project.

An assessment of current ecological conditions is the actual study of the project site. It is done with respect to following components,

- Natural resources (mainly soil and water);
- Bio-diversity i.e. flora and fauna;
- Ecologically Important and Sensitive Sites;
- And, Ecological Processes.

The status of soil and water could be established from indicator species. If needed lab testing can be carried out. The natural drainage pattern must be studied to understand the water regime, along with perennial sources, sub surface flows etc. so that it can be incorporated in planning.

An inventory of the floral and faunal species is done during over the course of one year. This survey must be planned at regular intervals of the year to record seasonal changes in flora. In the monsoon the highest diversity is recorded. But along with quantity, the quality of the species also should be determined. Instead of having 50 species which are indicators of degradation, 10 species indicating good health of the forest have more potential.

Some areas on a project site could be very sensitive by the presence of a very rare tree species, endangered orchid, perennial ooze, habitat for wild any animal, or roosting for birds etc. All such places need to be identified and marked carefully on plan as 'ESS' and treated specially.

Ecological processes such as regeneration, pollination, sediments and nutrients flow in a stream etc. are very important components of natural systems which take years to establish and once disturbed cannot be restored easily. Development activities that disturbing these processes should not be planned or executed. In this manner a complete understanding of the site can be gained. The important next step is to integrate all these observations in planning so that planning itself improves ecological health of the area. There are many restoration and conservation techniques which can be executed irrespective of project type. Also, while establishing plantations, using 'native' species will help directly to start various ecological processes. A project based on such ecological perspective would definitely contribute to improve ecological potential of an area.



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Checklist | Flora & Fauna

A short checklist to take quick ecological noting of the unknown area.

This is also useful for general travelers as well.

• Date:	Time:	
• Location:	Biogeographic Zone:	
• Area covered:	Line (km)	Plot (m2/km2/acres)
• Substrata:	Rock / Murum / Soil (shallow/deep)	
• Land character:		
	Slope: Steep / moderate / gradual	
	Plain land: Low lying/elevated plateau	
• Climatic conditions:		
	Rainfall (Av annual) :	
	Current status of climate:	
	Windy / Breeze	Hot / Cold
	Cloud cover in % : Scattered / High / Low cloud / Overcast	
	Rainfall: Drizzle / Torrential / Normal / No	
• Details of water body:	Stream / River / Lake / Well	
	Natural / Manmade	
	Water : Perennial / Seasonal	
• Vegetation:		
	General Character:	Perennial cover / Seasonal cover
	Type of cover:	Trees, shrubs, grass, herbs, climbers, liana
	Species list:	Name – flowering, fruiting, fall, foliage
	Invasive / non native species:	
• Fauna:		
	Name, Number, Activity, male/female, Sighting / Call	
	Feed / Nesting / Roosting / Courtship / Hunting parties	
• Other remarks:		
• Special features (striking)		

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