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ECO SENSITIVE REGIONS IN WESTERN GHATS

Swati Gupta[1, 4], Shweta Gupta[1, 4], Ramachandra T. V.[1, 2, 3]
[1]*Energy & Wetlands Research Group, Centre for Ecological Sciences,*
[2] *Centre for Sustainable Technologies (Astra),*
[3]*Centre for infrastructure, Sustainable Transportation and Urban Planning (Cist UP), Indian Institute of Science, Bangalore – 560012, India.*
[4]*Department of Remote Sensing, Banasthali University, Rajasthan, India.*
email: cestvr@ces.iisc.ernet.in

ABSTRACT

The Western Ghats, also known as Sahyadris is one among the 35 global hotspots of biodiversity. The region is a magnificent and continuous mountainous chain and biological richness. It harbours a high percentage of endemic species of flora and fauna; the reason being existing geographical, climatic and phenological conditions which provide for the humid environment and habitats. This paper focuses on assessment of eco-sensitive regions in Western Ghats taking into account the species of flora and fauna in accordance with IUCN status i.e. Critically endangered endemic, Endangered endemic and Vulnerable endemic. Prioritisation is carried out on the basis of occurrence of number of species of flora and fauna at a particular location currently not under any protection measures by adopting geospatial techniques. The number of grids falling under protected area in Western Ghats is 89 (approx.). A total of 157 grids (approx.) in Western Ghats fall outside the current protected areas which needs prioritisation for conservation. Western Ghats, the wealth of existence of diverse life forms, the hallmark for medicinal findings, science and technology, climate changes as well as economic vitality, requires immediate prioritisation efforts for conservation so as to have a positive impact on sustenance of biodiversity.

INTRODUCTION

India with 2.4% of land area, 7-8% of the species of the world, about 91,000 species of animals and 45,500 species of plants is one among ten bio-geographic zones. Among which 12.6% of mammals, 4.5% of birds, 45.8% of reptiles, 55.8% of amphibians and 33% of Indian plants are endemic being found nowhere else in the world (http://indiabiodiversity.org/biodiversity_in_india). 70% of biodiversity is contained by just 17 of the world's 190 countries. Research has been carried out to determine areas that deserve high priority for conservation (Olson and Dinerstein,1998; Stattersfield et al., 1998; Myers, 2003) to preserve increasingly threatened species and habitat with scarcity of resources (Brooks et al., 2002). Among 35 biodiversity hotspots, 20 of them lie in tropical countries whose natural resources are limited and are exposed to serious threats. Several studies have substantiated the significance of these areas as worldwide priorities (Rodrigues et al., 2004). Few works have been carried out in the interior of tropical hotspots, especially in Asia where the resources for safeguarding are scanty and the urge for prioritisation is utmost (Rodrigues et al., 2004). Scientific studies on amphibians and reptiles in Western Ghats have shown that around 86% of amphibians and 62% of reptiles are endemic (Gunawardene et al., 2007 and

Dinesh and Radhakrishnan, 2011). The critically endangered endemic, endangered endemic and vulnerable endemic species of flora and fauna must be considered while prioritising the conservation areas as these are the ones which if not preserved will lead to the extinction of the same i.e. the biodiversity lost once could not be recovered back.

Though extensive work has already been carried out for identification of conservation areas in Western Ghats (Gadgil and Meher-Homji, 1986; Karanth, 1986, 1992; Rodgers and Panwar, 1988; Daniels et al., 1991; Nair, 1991; Ramesh et al., 1997; Prasad et al., 1998; Venkatraman et al., 2002; Rodgers et al., 2002) and these studies are deficient in replicable and scalable approach which cannot be extrapolated to the entire Western Ghats. Various approaches have been followed for prioritisation exercises such as interactive heuristic algorithms, optimization algorithms or scoring. The scoring technique has been found to be less effective than heuristic approaches; Pressey and Nicholls, (1989) offers flexible and interactive solutions for actual planning situations (Pressey et al., 1996). Prioritisation has also been done on the basis of endemic and threatened biodiversity using iterative approach based on the irreplaceability principle (Das et al., 2006). To assign conservation value to a particular area, irreplaceability was selected as it is a degree of how crucial a given area is to be designated as conservation area (Ferrier et al., 2000).

Eco sensitive regions (ESR) are the regions with low levels of resilience thus challenging to be recovered if affected by outward influences. The main motive behind ascertaining ESR's is to endorse eco-friendly management regimes and preservation of ecological prosperity of the site. The establishment of national parks, wildlife sanctuaries and biosphere reserves are essential but it leads to non-consideration of some equally important areas such as floral plateaus, myristica swamps. (Gadgil et al., 2011) Wildlife Protection Act (1972) gives the provision that even small areas such as sacred groves, traditionally valued by local human communities can be conserved. The grassland has their own importance in regulation of ecosystem because it serves as catchment areas for important rivers which provide agricultural and food stability to people living in and around these areas. The growth and nurturing of such a wide spectrum of fauna and flora may not be possible unless the zones are strictly protected under the state laws. So this study aims at assessment of eco sensitive regions in a tropical biodiversity hotspot in Asia: the Western Ghats of India taking into account critically endangered endemic, endangered endemic and vulnerable endemic species. The objective of the study is to assess eco sensitive regions in the Western Ghats based on IUCN status.

STUDY AREA

The magnificent range fringing the west coast of India in the form of a gigantic wall is the Western Ghats extending from 8˚ 0' N to 22˚ 26' N and 72 ˚ 55' E to 78 ˚ 11' E. It stretches nearly 1600 km in length from Tapti River in the north to Kanyakumari in the south. Western Ghats traverses the six states of Indian continent viz. Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu. The biogeography of the region supports greater level of endemism in Western Ghats. Evergreen forest are found in the central and southern parts and varies to moist and dry deciduous forest types in northern part of Western Ghats. It encompasses varied habitats which support a number of species of terrestrial, aquatic and arboreal animals. It is a home to numerous endangered endemic species of flora and fauna (Nilgiri langur, Nilgiri tahr, etc.). Conservation of these areas is crucial because loss of species leads to the degradation of unique biodiversity hotspots which in turn affects the rainfall patterns, river flow, water

supply and climate across large areas of the country. The degree of threat on Western Ghats is increasing as the demand for forest resources is rising continually. This pristine ecosystem needs preservation as it is a rich biodiversity hotspot constituting high endemism in amphibians, reptiles and many plant species which fall into the category of threatened species. If conservation is neglected, these species would become extinct soon.

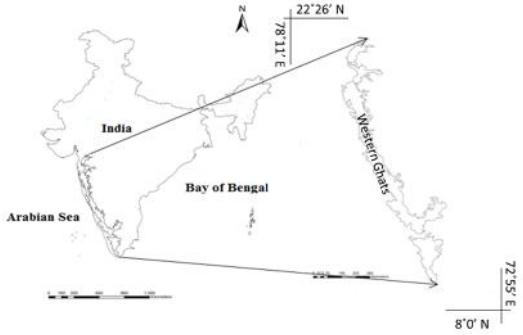

Figure1: Study area

METHOD

The data pertaining to select fauna and flora in Western Ghats compiled from published literatures and categorised as critically endangered, endangered and vulnerable according to IUCN status. The baseline parameter for this study is the endemic species of flora and fauna. In this study, fauna includes amphibian, reptile, fish and mammal. The grid size of 4.5 km X 4.5 km has been taken into account so as to represent the species occurrence at a finer scale. Each grid covers 20.25 km^2 area allowing better assessment of the available datasets. The spatial layers of endemic tree species, amphibians, reptiles, fishes and mammals were prepared and weights have been assigned according to the IUCN status as shown in table 1. The layer of existing protected areas was also prepared. The protected area layer and taluk boundary were overlaid onto the spatial maps of critically endangered, endangered and vulnerable species of fauna and flora to assess the eco-sensitive regions in Western Ghats. The method adopted in this study is shown in figure 2.

Status	Weight
Critically Endangered Endemic	3
Endangered Endemic	2
Vulnerable Endemic	1

Table 1 shows weights according to status

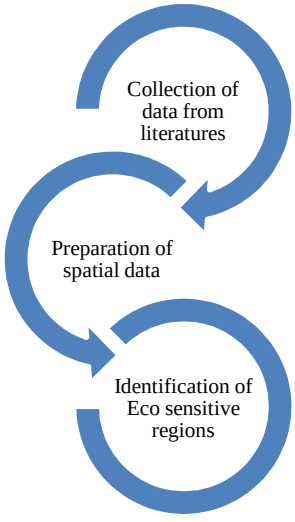

Figure 2: Method followed in the study.

RESULTS:

The grids selected for conservation are on the basis of presence of critically endangered endemic, endangered endemic and vulnerable endemic species of flora and fauna. Figure 3 shows spatial distribution of endemic flora and fauna in which 74 species in northern, 177 species in central and 337 species in southern Western Ghats. This means that the potential areas of southern Western Ghats, rich in endemism, needs urgent prioritisation under conservation measures. Figure 4 depicts the spatial distribution of critically endangered endemic flora and fauna in which 5 species are in northern, 17 species in central and 31 species are found in southern Western Ghats. This emphasizes that species population is so less that it has high probability of extinction in the wild soon if favourable habitats are disturbed and encroached by anthropogenic activities. Figure 5 shows spatial distribution of endangered endemic flora and fauna in which 22 species in northern, 57 species in central and 119 species in southern Western Ghats are reported. The areas falling under endangered species are also of prime concern because it faces the threat of being categorised as critically endangered soon in the near future, also demanding protection measures in its entirety. Figure 6 shows spatial distribution of vulnerable endemic flora and fauna in which 23 species in northern, 37 species in central and 93 species in southern Western Ghats are traced. This portrays that the species are at a higher risk of being exposed to the possibility of being attacked or harmed, requiring special protection to safeguard the existence of such species. Figure 7 shows combined spatial distribution of critically endangered endemic, endangered endemic and vulnerable endemic flora and fauna of northern, central and southern Western Ghats. Beginning from the southern to the northern part of the Ghats, the forests range from lush evergreen rain forests to moist and dry deciduous types, the fauna ranges from rich amphibian dominated species to mammals including *Nilgiri tahr*, *Macaca silenus*, *Viverra civettina*.

Figure 8 shows combined spatial distribution of critically endangered endemic, endangered endemic and vulnerable endemic flora and fauna of northern, central and southern Western Ghats by overlaying protected area and taluk boundary from which the number of grids falling under current protected area in Western Ghats is assessed as 89 (approximately). Since numerous species lie in the vicinity of protected areas, a 5 km buffer around the current protected area must be conserved. Figure 9 shows eco sensitive regions in Western Ghats that needs to be conserved. A total of 35 grids in northern western Ghats, 46 grids in central western Ghats and 76 grids in southern western Ghats fall outside the current protected areas, needs to be prioritised for conservation. Along the entire range of great escarpment, the results shows that the southern parts of the Ghats being very rich in biodiversity and facing serious threats needs immediate conservation efforts.

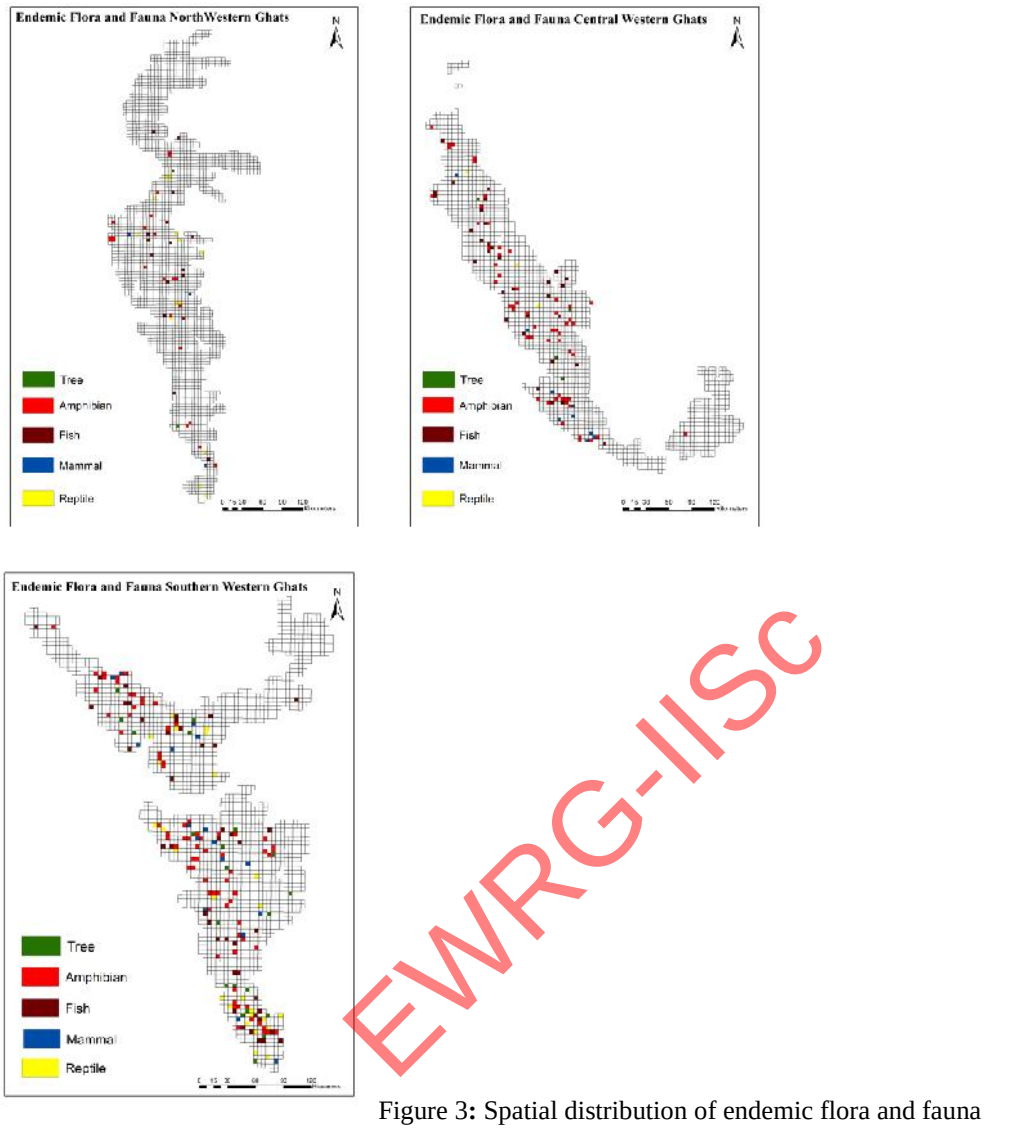

Figure 3: Spatial distribution of endemic flora and fauna

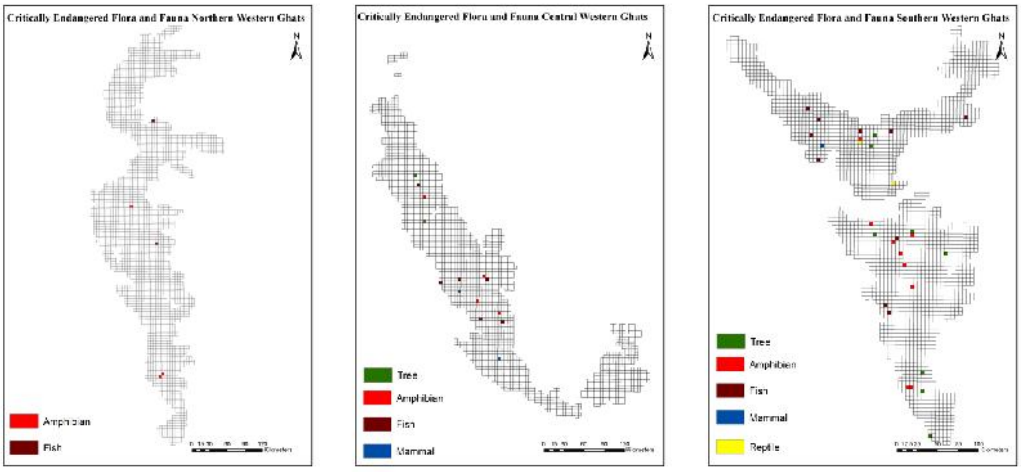

Figure 4: spatial distribution of critically endangered endemic flora and fauna

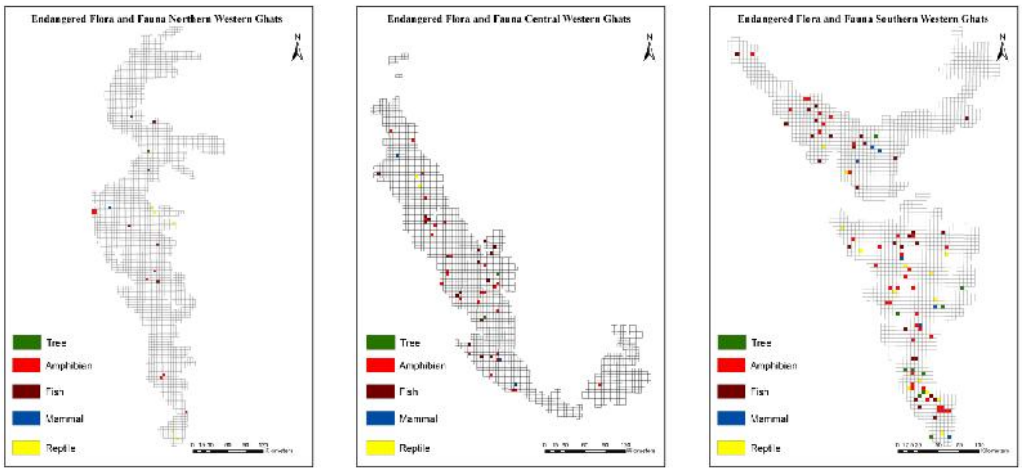

Figure 5: spatial distribution of endangered endemic flora and fauna

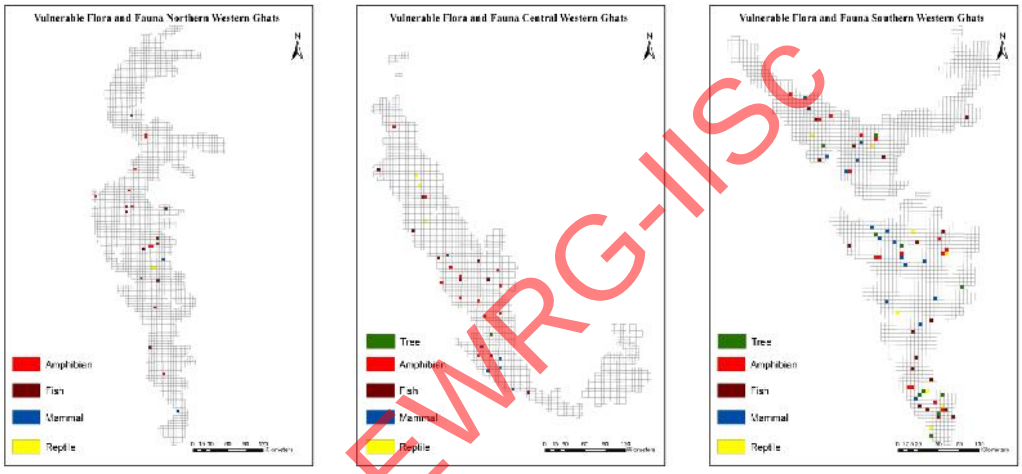

Figure 6: spatial distribution of vulnerable endemic flora and fauna

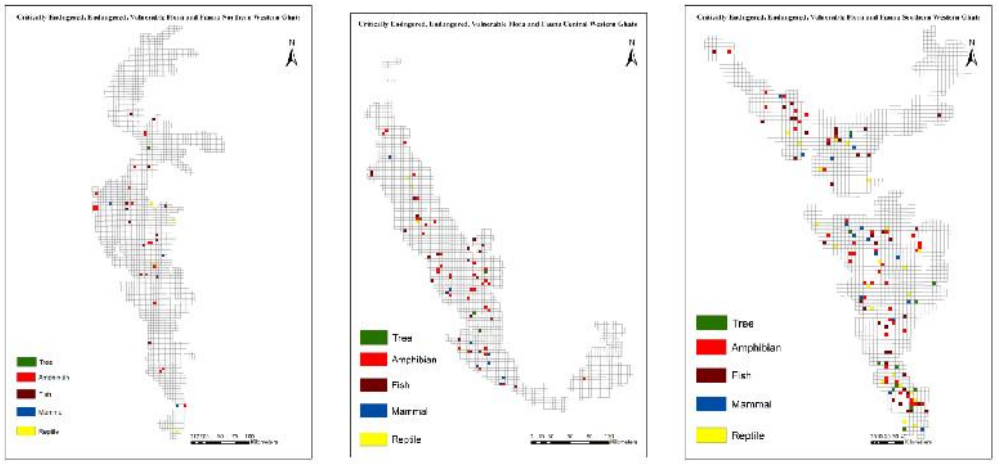

Figure 7: combined spatial distribution of critically endangered endemic, endangered endemic and vulnerable endemic flora and fauna

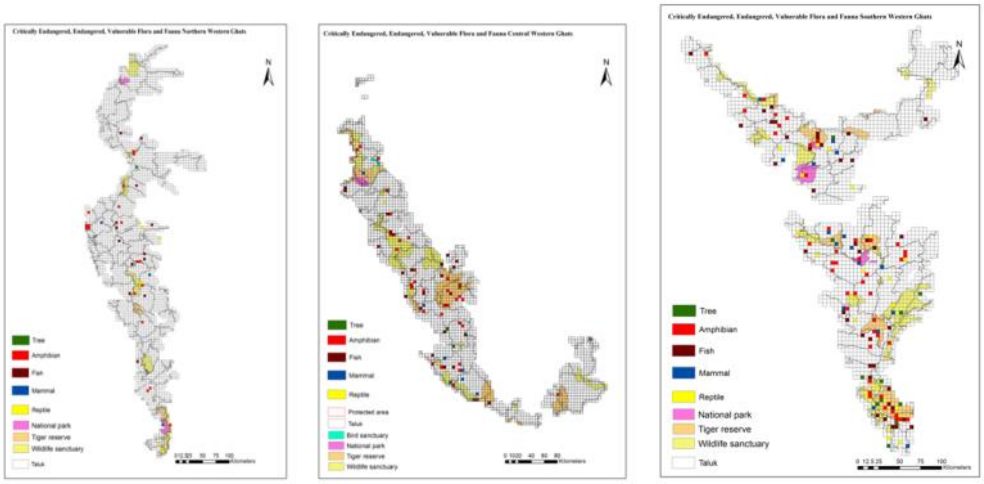

Figure 8: distribution of critically endangered endemic, endangered endemic and vulnerable endemic flora and fauna with protected areas and taluk boundaies.

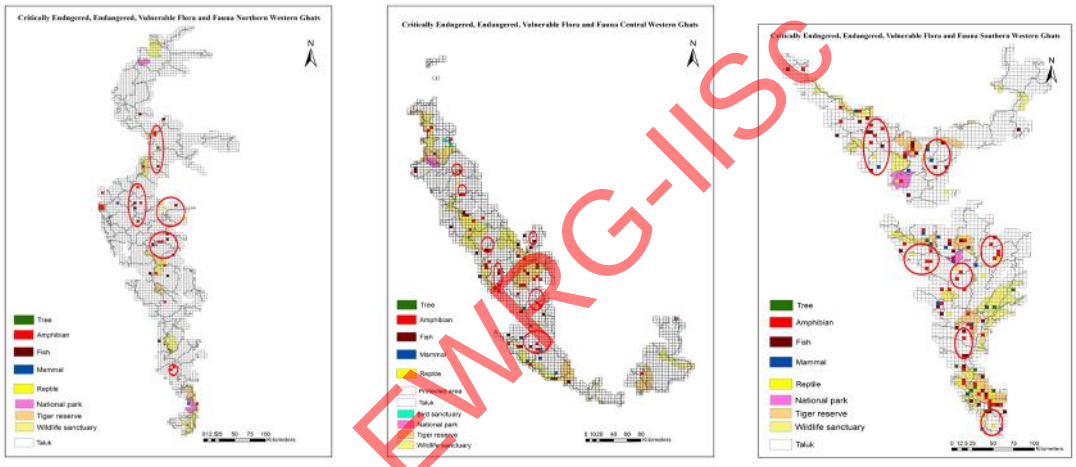

Figure 9: Eco sensitive regions in Western Ghats

CONCLUSION

As per the study carried out, certain areas marked as eco-sensitive regions in the figure 9 requires attention for preservation of biodiversity rich regions reinforced by conservation programmes. The potential biodiversity rich areas of Southern Western Ghats and the core areas of Central Western Ghats have higher reserves of natural resources and biodiversity, gaining utmost priority in the conservation practices. Deforestation is a serious concern in tropical rainforests because the forests are home to greater number of the world's biodiversity. It is particularly rampant near more populated areas, roads, rivers, etc. in the form of agriculture, plantation, illegal logging, mining activities and other developmental projects. The state of Kerala, adorned with dense tropical evergreen rain forests is facing threats relating poaching activities and number of species becoming extinct, so it requires attention and conservation efforts. Western Ghats was and will remain a limelight of various natural resources as well as habitat for occurrence of diverse biodiversity, if the conservation practices are implemented and the areas rich in endemism under threat are to be preserved on priority. Long-term monitoring and management requires co-operative efforts across

entire landscapes else in near future, the survival of human beings will be in peril.

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