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Regional Environmental Governance: A Strategy For Ecological Sustainability In India's Western Ghats

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Abstract: Our project focuses on the strategy for ecological sustainability in India's western ghats and we have mentioned about the importance in conserving and preserving the environment and the ecosystem which abides everything. In order to achieve this Ecologically Sensitive Regions (ESR) are targeted and these regions are the ones which has to be protected. In our study we mainly focused on the western ghats region such as Kerala, Karnataka, Gujarat, Goa and these regions usually have a warm tropical weather which is suitable for everyone. Futhermore, we have discussed about three major issues in this paper and those issues are development pressure, biodiversity issues and climate change

Index Terms **- Western Ghats, ESR(Ecologically sensitive region), Agroforest, Species distribution model**

I. INTRODUCTION

Need for study

The pursuit of environmentally friendly development goals require the need to conserve and manage the ecosystems in a more sustainable way. Understanding intricate process of the ecosystem, their variety in the number of resources, the commodities and services they provide, and how specifically they sustain human survival is necessary for this. Ecologically Sensitive Regions are units having particular biotic and abiotic components (ESR). Environmental variables' geographical, ecological, and social dimensions are considered for identifying ESR. This study uses a full weighted methodology to rank the ESR (1-4) and map the ESR at the village level in the River basin in the Central and Western Ghats (biological, geoclimatic, social, etc.)

Statement of problem

Development Pressures: The region is seriously threatened by urbanisation, as well as by the increase of agriculture and animal grazing. The Western Ghats region is under more development pressure than many areas which are safeguarded around the globe due to its projected population of 50 million people.

Biodiversity problems: The Ghats continue to be impacted by issues like the need to preserve the habitat, fragmenting them and degrading them using by exotic plant species, and may also lead to the loss in forest. Wildlife corridors and appropriate habitats outside of protected areas are becoming less common due to fragmentation brought on by development pressure in the Western Ghats.

Climate Change: At this time, the climate issue is getting worse: In Kerala's ghats region, flooding has wreaked havoc three times in the past four years, killing hundreds and destroying infrastructure and way of life. In 2021, flash floods wreaked havoc on the Konkan Ghats region. The west coast is particularly vulnerable to hurricanes as their intensity rises as the Arabian Sea warms. Industrialization is a threat because

additional polluting businesses, quarries and mines, roads, and townships could be built in the absence of the ESA Western Ghats strategy. The delicate landscape of the area will likely sustain further harm as a result.

Research Question

Ecological units with particular biotic and abiotic components are called ecologically sensitive regions (ESR). ESR that detects ecological and social dimensions that spatially account for environmental factors aids in ecological and conservation planning under the Government of India's Biodiversity Act 2002. By prioritising areas at the Panchayat (Local Administrative Units) level in the Uttar Karnataka region of the Central Western Ghats in Karnataka and taking into account characteristics (biological, geoclimatic, social, etc.) By weighted statistics, this study aims to integrate ecological and environmental factors in administrative management. The area in Karnataka, India, with the largest percentage of forest cover is subject to significant pressures that have an impact on the biogeochemistry, hydro issues, food, climate, and socio-economic systems. The emphasis of CSR helps to create a sustainable development framework with effective conservation methods because of the involvement of local players.

Rationale for the study

The Western Ghats, a chain of mountains passing through the south Indian states are the basis for this study. They run parallel to India's western coast. The region's warm, tropical climate is mediated by the Ghats' influence on the monsoon weather condition of India. They serve as a protective wall against the south-westerly monsoon winds that carry heavy rain. There are 325 species that are globally threatened in the Western Ghats' tropical evergreen forests.

Objectives

1) Understanding the concept of ecological sustainability

2) understanding the importance of ecological sustainability in the western ghats.

3) Learning about the different methods of ecological sustainability in the western ghats.

4) learning about the impact of lack of ecological sustainability in the western ghats

5) understanding the different factors that affect ecological sustainability in the western ghats

6) providing strategies for ecological sustainability in India's Western ghats.

Operational definitions

The Gadgil formed as an organization also termed as the Ecological Panel of the western region, it recommends that the entire Western Ghats be declared an Environmentally Sensitive Area (ESA), classifying the areas where only limited development is permitted.

The Kasturangan Commission is trying to equal the conservation of the environmental protection, not the system proposed by the Gadgil report. This organization also encouraged to include the whole region in the ghats in the ESA also mentioning that 37% of the total area should be included in the ESA and practices like mining, quarrying and of sand extraction should not be permitted.

Study variables

29 geographical layers were constructed from remote sensing detectors as they variate in the SDM or retrieved as readymade predictors for the study. Bhuvan is the name of India's Geographic Database, which offers pre-processed and layers of canopy cover. The Food and Agricultural Committee of the United Nations offers near-surface water layers and soil-like layers. The 2015– 2017 timeframe is represented by the raw Landsat 8 image. In order to prevent too much cloud cover, every Landsat 8 view is from the end of the month inter monsoon.

Also, that time period is typically the roughest of the year, when processed results in a conservative assessment of the environmental index for the research area. According to the core research, the most limiting factors for many simulated species are hitting water and vegetative growth thresholds, hence pictures from this time period were intentionally. A not supervised classification of the land in the area of study is carried out using an image and the different layers of the parts of forest.
The country's Geospatial committee Laboratory has validated this process, which is based on Bhuvan's methodology. The three types of forest cover—dry, wet, and mixed—as well as grassland, modern, full of rocks, watery, constructed and mixed, agricultural, and scrub are among the designated land cover classes.

Hypothesis

1) Determine changes in forest cover and health in Western Ghats from 2001 to 2011 in the area of interest,

2) Analyze different forest management practices in the states and areas of interest

3) Use GIS and remote sensing techniques to determine if there is a direct link between management practices and forest transition.

REVIEW OF LITERATURE

(B.M Kumar and K. Takeuchi, 2005) focuses on the agro-forest region in the western ghats of India and Japan and compares them both together to find out which of the two lands are more sustainable. Mainly talking about the Agroforestry in the western ghats and a rural land called Satoyama in Japan. This paper tells us about how technology is being used in agriculture and how it has been revolutionized in these years. These two regions are chosen because they have similar land and they both use traditional systems for agriculture and other farming techniques. Though they are same type of land, they have varied weather conditions also including difference in canopy, Satoyama has less unitay canopy whereas the Agroforestry has multiple layer canopy and it also has a intensive management which means it is managed intensively and the Satoyama is managed extensively.

(Claude A.Garcia, Shonil A.Bhagwat, 2017) talks about how to protect and conserve the agricultural landscapes and what are the obstacles and opportunities the Agroforests in the western ghats are facing. The researchers examined the coffee Agroforests in the western ghats and they spoke about six strategies out of which only one talks about the conditions of the livelihood. The main approach is conservatism and bring them together with the livelihood of the people. They conclude by saying that it fails to meet the expectations of the farmers and persuading us by stating that it is equally important to conserve and protect our biodiversity as much as we consider about the local livelihood.

(Kamaljit S.Bawa, Gladwin Joseph, 2007) emphasizes on the poverty, biodiversity, and the other forest agriculture ecotone regions in the western ghats and eastern Himalayan ranges in India. Being mentioned that these ecotones are hard to preserve, the authors mainly focus on the three aspects which are the ways in which the land in the ecotone region can be preserved, how to use the land in a sustainable way and how to contribute to the betterment as well as for the development of the biodiversity in these regions. In order to develop these areas, a lot of social and human capita is required.

(T.V Ramachandra, Setturu Bharath, 2018) targets on the ecological sensitive regions in the western ghats of India. These regions contain both biotic and abiotic factors, and the main purpose of this research is to bring together and integrate ecological and environmental elements in place and mainly focusing on the panchayat areas in the Uttar Karnataka district. This region is said to have the most greenery in the state and also going through hydrology and other climatic changes. By prioritizing this, we can see a major change in the sustainable development and will only be possible if the local stakeholders are involved and their contribution would definitely have a huge impact.

(SijiMol K, Suma Arun Dev, 2016) reviews the functions of the Reed bamboo in western ghats region. Reeds are a type of grass which are tall and green and they fall under the genus called Ochlandra. They are considered to be one of the important key elements of the ecosystem since they are helpful in providing stability for the forest and is also a source of food for several herbivores and also prevent in greenhouse gas emission. The main purpose of this research study is to bring into people's notice of the reeds, to bring awareness, to talk about their importance since they are depleting and there is an immediate need to preserve these species which are about to get endangered. This paper also focused on the importance of these species and how helpful they are to the ecosystem.

(Margarita Triguero-Mas, Naveen Jha, 2009) discusses Dandeli Wildlife Sanctuary in the western ghats and the urban and rural areas which are protecting it. The researchers start by stating that, in the countries with less income, it is highly necessary to have immense support from the locals living around that area. So data was collected from the locals living in the different parts of the Dandeli Wildlife region. Their response towards this protection of the sanctuary was pretty satisfactory and did show positive attitude mainly from the residents of the city, because their response will help a lot in the development and implementation of several strategies. This paper mainly compares the perspectives of locals living in the city and around the sanctuary.

(Shonil A. Bhagwat, Cheppudira G. Kushalappa, 2005) focuses on the areas which are safeguarded informally in western ghats of India and their role and importance in it. When the researchers studied about the areas in Kodagu in the western ghats near the cultivated land, they discovered that there are several trees, birds and others around that area with medicinal and other important properties which are highly useful for the humans. Therefore, they conclude by stating that even these areas require equal protection as the cultivation and farming land and even the informally protected areas are as important.

(Hebbar Priti, N.A. Aravind, 2016) talks about the effect of the change in the climatic conditions on the Myristicaceae species in western ghats area. This paper mainly talks about the significant effect climate change can have on the varied species in the biodiversity and data also tells that several human changes have already made an impact on the species and may even lead to extinction. Though the future climate changes are hard to predict, some assumptions are made, focusing on how the distribution of the species will have an impact on the upcoming climatic conditions and this needs to be taken in consideration for conserving the various species in the ecosystem.

RESEARCH METHODOLOGY

This approach towards the ecosystem considers the values of the nature's variability and the impact it has on the man's interventions on crucial indications of the nature and its productivity is necessary for the sustainable development of a region (Ramachandra et al. 2007). Ecological systems are the unique biological factors which support the nature. They distinguish themselves by different variety of functions, such as the change of nutrients, biological processes, and hydrologic cycles. Depending on state the landscape, they are related in both space and time in intricate dynamic patterns (Lin et al. 2018). Ecological sustainability is the capacity of an ecosystem to withstand different types of environmental disturbances which has the capacity to negatively alter the characteristics of the surrounding places while preserving the availability of natural resources (water, soil, etc.)

"Ecological units" with particular biotic and abiotic components are called ecologically sensitive regions (ESR). ESR that detects ecological and social dimensions that spatially account for environmental factors aids in preservation and safeguarding plan under the Government of India's Biodiversity Act 2002. By prioritising areas the Panchayat (which is the local level area) level in the Uttar Karnataka region of the Central Western Ghats in Karnataka and taking into account characteristics such as biological, geoclimatic, social, etc. By weighted statistics, this study aims to integrate ecological and environmental factors in administrative management. The area in Karnataka, India, with the largest percentage of forest cover (80.48%) is subject to severe anthropogenic pressures that have an impact on the bio geochemistry, water related, food related, climate, and other socio-economic conditions.

Research gap

Reserved areas are a crucial tool for attaining conservation goals in the twenty-first century, particularly in regions where biodiversity is at risk from land use change. For the sake of conservation, this study gathered over 300 non-surveyed plants and amphibians native to the Western Ghats in India, which is a recognized biodiversity place. In order to re-evaluate network coverage and enhance estimates of biodiversity dispersion, the gap study updates 4042 earlier analyses. For 35 of these species classified in accordance with the Range approach, the Assisted Habitat Modelling software queries the Species Distribution Model (SDM) and potential predictors. It then inputs data for batch modelling of distributional maximum entropy, producing a sparse set of predictors and scoring performance for SDM (Maxent).

These were the regions with the highest levels of biodiversity: these were the regions with the lowest levels of information about biodiversity. To find gaps in the high prevalence of these species distributions in the blanket areas, hotspot assessments for the region were created using the assembled distributions and compared to the current network of protected areas (PAs). With the exception of three amphibian distribution zones and six plant distribution regions, two of which overlapped between clades, the PA network encompassed the majority of the high species co-occurrences of the amphibian and plant distributions. The majority of the species in this study were never modelled or included in gap analyses, in contrast to earlier studies that employed largely or only secondary data for their assessments. The analyses in this study provide fresh ecological data for specific species and new insights into how to plan for protection of threatened biodiversity hotspots.

Our analysis highlights these two locations as conservation gaps and suggests including the seven high-risk sites in future Western Ghats conservation initiatives.

Target area of study

This survey focuses on the construction sites for the Shiradi Ghats Bypass Project and the lift component of the Yettinahole Project, where the implementation of the bypass road alignment and intake structures for the Yettinahole Project is anticipated. In addition to the projected construction of the road aliment of the Shiradi Ghats Bypass Project, a literature and interview survey encompassing the aforementioned area was also undertaken.

The Western Ghats are where the project area is situated. It has a remarkable biodiversity and is primarily covered with forest. The state of Karnataka has declared the largest portion of those two projects as Reserved Forest. The Indian government has established a National Park in the project's northern region, and a Wildlife Sanctuary in its southern region.

In 2012, UNESCO designated the "Western Ghats" as a world heritage site. The Western Ghats alone cover 160,000 km2 along India's western coast, which is a sizable area. 39 locations in the region have been designated as World Heritage Sites, and they are significant from the standpoint of biodiversity.

The Indian Government designates National Parks and Wildlife Sanctuary as sites to promote environmental preservation at the national level in accordance with the Wildlife (Protection) Act 1972. These protected locations are not part of this project. The Kudremukh National Park is about 30 km to the northwest, while the Pushpagiri Wildlife Sanctuary is about 14 km to the south.

CONCLUSION

To conclude, a solution for ecological sustainability in India's western ghats is regional environmental governance. One of the world's most significant biodiversity hotspots, the Western Ghats of India are home to rare and delicate ecosystems that are threatened by human activities including deforestation, urbanisation, and agricultural growth. Setting up a strong regional structure of environmental governance is essential to guaranteeing the Western Ghats' long-term ecological survival. The establishment of a network of protected areas, such as national parks, wildlife sanctuaries, and reserves, which can act as safe havens for threatened species and their habitats, would be a crucial component of this plan. These regions must to be handled by qualified experts who are well-versed in the ecosystems they are attempting to safeguard.

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