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Sustainable Ecotourism of UNESCO Approved Biodiversity Reserve in India: Way towards Carbon Neutrality and Resource Productive Economy

By Bikram Kumar Dutta & Mrs. Sanhita Bandyopadhyay

School of Planning and Architecture, India

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I. INTRODUCTION

The cornerstone of turning the Indian economy a low carbon one, is towards an integrated approach of produce economy and the conservation of the natural resources. Tourism is emerging as a key sector in the economy. India has spectacularly attractive natural and cultural tourist attractions. It is presently India's third largest foreign exchange earner after garments, gems and jewels. The comparative strength of tourism in creating jobs is very high. Hotel and restaurant industry creates 89 jobs, against 44.7 jobs in agriculture or 12.6 jobs in manufacturing industries for the same investment. The average for the tourism sector is 47.5 jobs.

The main problem with tourism economy today is high concentration of carbon emission rather than recreation. The future of tourism economy, to be

sustainable, will have to re-establish the concept of sustainable ecotourism to reach produce economy with zero carbon emission. Ecotourism is "responsible travel to natural areas that conserves the environment and sustains the well-being of local people." Under the umbrella of UNESCO's MAB (Man & Biosphere, 1976) programmed Panchmarhi, a Biosphere Reserve in Central Part of India is modeling system for integration of social, economic and ecological integrity paradise towards low carbon tourism.

The total area of BR is 4987.38 sq consisting three wildlife conservation units. The great diversity of geo-morphology and vegetation give rise to multitude of habitats and ecological riches that support rich wildlife. It is also famous for Tiger Sanctuary. Large numbers of caves contains historical rock paintings. The scenic beauty and ecological enriched hilly station attracts million tourists in year.

II. NEED OF THE STUDY

India, a country situated in south Asia, is of sub continental dimension with a population of over one billion people. India is primarily an agricultural economy and the livelihood of over 60% of the population continues to be based on agriculture. The growing trend of urbanization and industrialization diversification away from agriculture makes a question of sustainability in physical & social environment. The primary issue is one of poverty, with 320 million people estimated to be living below the poverty line.

India has spectacularly attractive natural and cultural tourist attractions. It provides for the generation of income, wealth and employment, and helps in the sustainable development of remote areas. In India, tourism provides direct employment to 9 million people and indirect employment to another 13 million persons, thus providing a livelihood to 22 million persons. It contributes an estimated 2.4% of the gross national product. Ecotourism in the Indian context has significant implications for nature and culture conservation, rural livelihoods and conservation education. The Panchmarhi BR acts as modeling system for integration of social,

Author ^α : Regional Planner, Associate Manager, IL&FS, India.

E-mail : bikramdutta@hotmail.com

Author ^σ : Environmental Planner, Unicorn India Pvt Ltd.

E-mail : bsanhita2@yahoo.co.in

economic and ecological integrity paradise towards low carbon tourism.

III. STRATEGY OF CARBON FOOTPRINT

In the above stated background the following three fold approach and strategy need to be adopted:

- 1) Land Use Efficiency: Preservation of forest area, Conservation of ecological diversity Development of landscapes, recreational areas as form of land use.
- 2) Management of Natural Resources in a manner that would lead to optimization of use of natural resources, and reduction/abatement of pollution;
- 3) Conservation and Development of resources and features with a view to enhancing their environmental value.

IV. REGIONAL IMPORTANCE

The geographical diversity of India makes it home to a wealth of ecosystems which are well protected and preserved. These ecosystems have become the major resources for ecotourism. These are as follows:

Biosphere Reserves: multi-purpose protected areas, for preservation of the genetic diversity and the integrity of plants, animals and micro-organism in representative ecosystems.

Mangroves: specialized forest ecosystems of tropical and subtropical regions, bordering sheltered sea coasts and estuaries.

Coral Reefs: Gulf of Mannar, Andaman and Nicobar Islands, Lakshadweep Islands, Gulf of Kutch.

Deserts: Hot & cold deserts in India distinct ecosystems.

Mountains and Forests: The country has an area of about 752.3 lakh hectares designated as forest land and of this about 406.1 lakh hectares are classified as Reserve Forests and 215.1 lakh hectares as Protected Forests.

Flora and Fauna: 45,000 species of plants and more than 65,000 known species of Fauna is protected and preserved through National Parks and 421 Wildlife Sanctuaries.

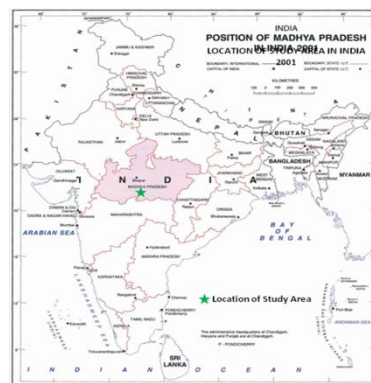
Seas, Lakes and Rivers: The Arabian Sea, the Indian Ocean and the Bay of Bengal brace the sides of the Indian subcontinent. The land mass of India is crossed by several rivers and dotted by lakes at many places.

Caves: natural caves in mountain or sea shore or hilly terrain are also within list.

Panchmarhi BR, falls under the category of Biosphere Reserve as well as Flora–Fauna under major ecosystem, has long conservation history. The scientific management and conservation of the Indian forests started in 1862 by demarcating Bori Reserve Forest, which lies in Bori Sanctuary. This also resulted in

establishment of Forest Department in India which leads the first Indian Forest Act, 1927. The area is virtually a junction of forest with 231.6 Complexity Index covered 65.2% of total land; agriculture covers 27.7%, water bodies 4.2%, wasteland 2.5% and built-up land 0.5% and rest is forest land. The location Map of Panchmarhi BR is shown in Fig 1

Figure 1: Location Map of Study Area



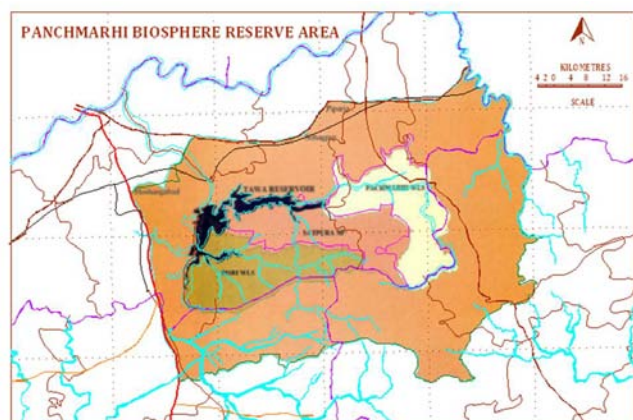
V. BASELINE SET UP

“Queen of the Satpura” Panchmarhi BR comprises of 4987.38 sq. km engulfing three wildlife conservation units viz. Bori Sanctuary (485.72 sq. km), Satpura National Park (524.37 sq. km), and Pachmarhi Sanctuary (417.78 sq km) with high altitudinal variation from 320 to 1352m in three civil districts of Hoshangabad, Betul and Chhindwara of the State of Madhya Pradesh in India (fig 2). Out of that 1427.00 sq km area has also been notified as Project Tiger. Satpura National Park comprises the core zone and the remaining area of 4525.93 sq. km surrounding serves as buffer zone. Core zone is kept absolutely undisturbed famous for trekking paradise and buffer zone uses and activities include restoration, demonstration sites for enhancing value addition to the resources, limited recreation, tourism, fishing, grazing etc (ref fig 3)

a) Physical Attributes

Vast temperature ranges from 260 to 420C in summer and minimum 9.70 to 250 C in winter. There is total 622 villages habitat within Panchmary town as a gateway of the total forest cover, the closed forest constitutes 85.3%, and open forest 8.2%, and degraded forest 4.2% and forest blank 2.3%. The Tawa reservoir is the major constituent of the water bodies. Of the total wasteland the gullied and ravenous lands constitute 1.4% only and the rest (98.6%) comprise land with/without scrub. Of the total areas covered under water bodies 30.2% fall under river/streams and the rest (69.82%) falls under reservoir and tanks. This indicates a

bit of consistency in the effects of human use on the ecosystem.



Satpura hill ranges run east to west with undulating terrain, deep gorges around Mahadev hills, some of the conspicuous hilly areas are Jambudweep, Dhoopgarh, Handikho, Mahadev, Chauragarh and Bee



Fall with variety of geological rock and soil formations from the Archean Phyllites and Schists, the Jurassic, Permian Gondwana sandstone formations of Bagra, Denwa, Pachmarhi series, Cretaceous, Eocene, Deccan trap sills and Dykes and recent Alluvium are found in the area.



b) Floral Attributes

It is a natural junction of two most important timber species viz. teak and Sal. The BR area is rich in plant diversity and 'gene pool' as the combination of different climatic and seraphic factors at various

altitudes gives rise to rich and luxuriant vegetation which is amongst the richest in central India. As many as 37 species of epiphytic mosses and 46 species of terrestrial mosses, 57 species of bryophytes, 7 species of gymnosperms, 1190 species of angiosperms (flowering plants) and 633 genera have been reported in the area. Presence of deep gorges and dark shady gorges has resulted in growth of several moisture loving species. Some of the rare and important species which are observed to be localized may be considered as "gene bank" of rare species. [3]

c) Faunal Attributes

The faunal composition represents the Deccan Peninsular zone of biogeography classification of India. Over 50 species of mammal, 254 species of birds, 30 species of reptiles, 50 species of butterflies and numerous other forms of animals are found in the area. At least 14 species of mammals and reptiles are endangered including Tiger, Gaur or Indian Bison. [4]

d) Archaeological Caves/Centers/Manmade Heritage

In the vicinity of the Pachmarhi plateau there are large numbers of cave shelters of great archaeological interests, contained in them are a number of rock paintings executed by the tribes. Some of these may be around 100 years old while a majority of these paintings belong to historical age, being 2500 to 1500 years old. Among them Mahadeo, Catacomb, Jatashankar, Pandav caves are famous.

e) Cultural Attributes

The area is rich culturally. Mainly tribal inhabited it in the past. The hills around Pachmarhi were supposed to be sacred. The Handi-Khoh, a deep gorge, is said to be the retreat of a monstrous serpent. Jambu-Dweep is also a gorge cut into the soft rock at the bottom of which is a cavern in the rock which has been cut by water action to resemble a giant lock of matted hair and sure enough called 'Jatashankar'. In geological terms they are called Stalactites and Stalagmites. Two important Hindus festivals are observed in this locality with great fan fare in July- August and in March. More than 12,000 pilgrims come to attend these festivals.

f) Aesthetic Attributes

The Pachmarhi plateau is always famous for its beautiful landscape. The hilltops and slopes are fully clothed with vegetation, whereas the level lands on the plateau are vast open grassy glades (meadows), the likes of which are not to be found in any hill station. The area includes Dhupgarh, the highest peak (1352 m above MSL) in Madhya Pradesh followed by Chauragarh and Mahadev caves. The Aligarh Fort (in ruins), hills of Mahadeo sandstone, which is made of soft rock, is cut into deep gullies by water erosion creating spectacular waterfalls all around Pachmarhi plateau, aided by rifts in the geological strata. Patalkot, closely to Tamia in

Chhindwara district, which is small hamlet of tribals approachable by a steep footpath and hence insulated from civilization, is an Anthropologists paradise.

The places of worth seen are Priyadarshani point, Hondi Khoh, Apsara Vihar, Rajat Prapat, Raj Giri, Lanjee Giri, Dutches Fall, Sundar Kund, Jatashankar, Chhota Mahadeo, Manadeo, Chauragarh, Dhupgarh, Pandav cave, Cave Shelters, Churna, Neemghan through Panarpani gate. More than 1.00 lakh tourists, mainly domestic tourists, visit the Pachmarhi area.

g) *Socio-Economic Attribute*

The area comprises 622 villages. Agriculture is the mainstay of the population. Out of total population the scheduled castes account for 14.3% and the scheduled tribes account for 41.5%. The average family holding is only 3-4 ha. The literacy rate is low (21%). The cattle and goats are reared in large numbers in the area. Agriculture is the main source of income. Working in the forest area is the supplementary source of income for the village lying in the vicinity of the area. The village houses are generally constructed with muds and wooden poles. Common Hindu and Muslim festivals are observed in the area.

VI. TOURISM TOWARDS CARBON NEUTRALITY

a) *Land use efficiency planning*

The salient natural values are conservation of soil water-regime, biodiversity and endangered species. The main resource values, on the other hand, are timber, firewood, forest pastures, agriculture, irrigation and fisheries. Ancient rock paintings are an important cultural resource. These resource values are being viewed from different management stand points by different agencies. But overall goal is to make efficient land use management practice.

Pachmarhi BR is a trekking paradise. It is ornamented with table upon table topography, springs, caves, narrow cut deep gorges, deep drained rivers, typical ravines, rapids, waterfalls, isolated dissected hills from all sides and boulders controlled valleys.

Pachmarhi BR is the pleasant hill station and most attractive tourist centre of Central part of India. This hill station is the shelter of peace, affection, ebullience, elation, emancipation, emotion, engagement, enjoyment, entertainment, excursion and excitement. Since long, this place is thought to be as the tourist's place. It is used by the coming generations as the place of providing natural gift, glamour and enjoyment. Change of landform is a common phenomenon in an every state of landforms but it seems that changing panorama of Pachmarhi due to human interferences is increasing gradually.

b) *Management of Natural Resource*

Under Management Action Plan of Pachmarhi Biosphere Reserve programmers, the techno-economic

feasibility study of water pollution problem at Pachmarhi plateau was carried out. The main objective of the study was to assess status of the surface water quality of different water resources, identification, and characterization of pollution causing factors and preparation of mitigation measures by considering techno-economic option for its management.

The study has been envisaged to mainly two problems:

First: Restoring the water quality of (i) Old lake (ii) New lake (iii) Bari Am lake.

Second: Control the water pollution in Banganga and Jata Shankar drains.

The main environmental issues and remedial measures for the individual problems are as follows:

Old Pachmarhi Lake: This Lake is receiving untreated sewage from the neighboring settlements that accumulate round the year and degrading water quality of the lake. The main problems identified are mainly reduction in storage capacity due to sedimentation, eutrophication on account of anthropogenic activities, weed infestation, sewage intrusion. For mitigation desalting & deseeding had been done and Creation of buffer zone in the periphery of the lake and overall removal of sludge through existing sluice gate. [1]

New Pachmarhi Lake: It is a man made reservoir for storing water for recreational purposes for tourism like boating etc. The decreasing depth of water body due to sedimentation of the lake is major concern for the lake. This is due to inflow of silt in the lake & sedimentation, erosion due to deforestation in the catchment area of the lake. The remedial measures are soil erosion treatment, plantation of appropriate plant species for erosion control, desilting of the lake in phase manner as may be necessary **Bari Aam Lake:** It is a small water impoundment formed after construction of road leading to Pachmarhi Plateau. The lake is receiving wastewater from southern end. The main problems identified were inflow of untreated sewage to the lake, accrual of nutrients in the lake accumulated with sewage and solid waste, anthropogenic activities. Remedial measures are the treatment of sewage before it enters the lake, the outflow of the silt trap should be passed through roughening filter, made of boulders and gravels and plantation of appropriate plant species.

Bainganga: The outflow of the Old Pachmarhi Lake forms the Bainganga drain passing the storm water from the plateau but sewage inflow and solid waste dumping in the drain are main cause of pollution. The surrounding area has no organized sewer system. Apart from sewage treatment and disposal it is also essential to clean bed of drain for reducing of contaminants of cascades. Remedial measures are construction of garland drains along both sides for collection of untreated sewage and its treatment, collection of solid

waste and its secured disposal for land fill and awareness campaign.[2]

Jatashankar Sewage Drain: The main problems identified are inflow of untreated sewage in the drain leading to Jatashankar, unplanned settlements in the catchment area of the drain, solid waste disposal in the drain leading to Jatashankar, the joining of sewage and wastewater to the source of water leading to Kund (reservoir) of Jatashankar temple. Remedial measures are the sewage reaching the mainstream should be passed through cascades, boulders and gravel, Land available at both sides of drain should be planted with water loving plant species, sewage drains should be diverted to new pipelines. [2]

c) *Conservation and Development of Resources*

One of the keystones for conservation is education, so it continues to make public presentations which include practical advice on what individuals can do to make constructive contributions to the environmental crisis which faces us all.

The BRs are designated to deal with one of the most important questions of reconciling the conservation of biodiversity, the quest for economic and social development and maintenance of associated cultural values.

Long term conservation must address two principle issues: alternative sources of income and energy for those people who still depend directly on forest resources. Secondly, to protect the remaining forests and their wildlife from the numerous threats posed by criminal and commercial activities. Hence, community-based conservation strategy was adopted. Strategic support of tribal and villagers as part of community-based conservation includes Tube Wells for Kamithi range villages (one project within the eco-development programmed). Irrigation will mean a second (and in some cases a third) crop per year (Life Force from Got part has supplied seeds to initiate these projects). This increases the families' income and welfare making illegal money gained through poaching or timber cutting unnecessary and unattractive. Just as importantly, it provides work during an otherwise quiet and boring period which could otherwise encourage participation in illegal activities. In areas where tube well bores did not find water, stop dams and lakes provided by government agency served the same purpose. Government has also initiated the expansion of eco-development schemes in the eastern region of the BR. This involves meetings, planning sessions and inspections on site - easier said than done when the sites are deep in the forest.

VII. ECOTOURISM DEVELOPMENT

The overall strategy of above stated background the following approach and strategy has needs to be adopted further to strengthen ecotourism:

- Minimizes environmental impacts using benchmarks
- Improves contribution to local sustainable development
- Requires lowest possible consumption of non-renewable resources
- Sustains the well-being of local people
- Stresses local ownership
- Supports efforts to conserve the environment
- Contributes to biodiversity

The key players in the ecotourism business are governments at levels, the local authorities, the developers and the operators, the visitors, and the local community. Each one of them has to be sensitive to the environment and local traditions and follow a set of guidelines for the successful development of ecotourism. In addition, non-governmental organizations and scientific and research institutions also have to play a key role in the development of ecotourism.

A management plan for each ecotourism area should be prepared by professional landscape architects and urban planners, in consultation with the local community as well as others directly concerned. Integrated planning should be adopted to avoid inter-sect oral and cross-sect oral conflict. A first step should prepare for 20-year Master Plans for each state.

In India though no major policy documents have been issued by the Government of India or state governments with regard to promotion of ecotourism, certain guidelines have been issued to tour operators and tourists as part of a campaign to preserve the environment in the tourism zones. The key points in these guidelines are summarized.

- 1) Government Responsibilities: regulation, policy, formulating standards, monitoring, and training
- 2) Ecotourism Developers and Operators: responsibilities implementation of policy, standards and norms.
- 3) The Responsibilities of Eco-tourists: conservation practice of natural resource.
- 4) Host Community Responsibility: realize and respect the value of the environment

VIII. CONCLUSION

Tourism has proved to have negative impacts as well as the positive ones. It is criticized for contaminating indigenous culture. This takes the form of changing values, resulting in social maladies. The movement towards ecotourism is at once a threat and an opportunity to create more sustainable tourism: by diverting tourist traffic to ensure the carrying capacity of any destination is not exceeded; by planning for regeneration of natural resources; and by generating awareness in the host community whereby they are prepared and forearmed to deal with the negative



impact of mass tourism. As in most cases, a middle path is the most creative way to maximize the economic potential of tourism, while at the same time minimizing the negative social influences and threats to the environment. Only ecotourism where the tourists, the service providers, the host community and authorities are well informed and prepared to harness tourism as an engine of growth can yield sustainable results. Panchmarhi Biosphere Reserve is success story of Sustainable Ecotourism which is towards Carbon Neutrality and Resource Productive Economy in India's Map.

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