

## **Biothreats and Biosecurity : Current Issues and Measures- India's perspective with special reference to Eastern Ghats: A Review**

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### **Abstract**

Biodiversity is a key economic, financial, cultural, and strategic asset for developing countries, and is critical for economic and social development as well as poverty reduction. The Earth's biological resources are vital to humanity's economic and social development. As a result, there is a growing recognition that biological diversity is a global asset of tremendous value to present and future generations. At the same time, the threat to species and ecosystems has never been so great as it is today. Species extinction caused by human activities continues at an alarming rate.

### **Introduction:**

India is one of the 17 “megadiverse” countries and is composed of a diversity of ecological habitats like forests, grasslands, wetlands, coastal and marine ecosystems, and desert ecosystems. Almost 70% of the country has been surveyed and around 45,000 plant species (including fungi and lower plants) and 89,492 animal species have been described. Endemism of Indian biodiversity is significant with 4950 species of flowering plants, 16,214 insects, 110 amphibians, 214 reptiles, 69 birds and 38 mammals endemic to the country.

Seshachalam hills, one of the first Biosphere Reserve in Andhra Pradesh, is located in southern Eastern Ghats of Chittoor and Kadapa districts. It is spread over 4755.99 Km<sup>2</sup> (Fig 1). The reserve locates in southern Eastern Ghats and spread over the Seshachalam hills of Kadapa district and Tirumala hills of Chittoor district. Tirumala hills which are popularly known as the seven hills of Lord Sri Venkateswara. The elevation ranges from 150 to 1,130 m, the terrain is

undulating, with deep forest covered valleys. Most of the rainfall is received from the northeast monsoon and a little from the southwest monsoon. The vegetation is a unique mix of the dry deciduous and moist deciduous types. The biosphere reserve is home to six endemic plant species: *Cycas beddomei*, *Pterocarpus santalinus*, *Terminalia pallida*, *Syzygium alternifolium*, *Shorea tambaggia* and *Boswellia ovalifoliolata*. It is the richest floristic hot spot harboring many endemic and rare plants. The entire sanctuary is an uninhabited large chunk of dry deciduous Red Sanders bearing forest, forming catchments to Swarnamukhi and Penna rivers, both in Chittoor and Kadapa districts.

In this century, the Indian cheetah, Lesser Indian rhino, Pink-headed duck, Forest owl and the Himalayan mountain quail are reported to have become extinct and several other species (39 mammals, 72 birds and 1,336 plants) are identified vulnerable or endangered. One of the major causes for the loss of biodiversity in India is the expansion of agriculture in previously wild areas. Other impacts include: unplanned development, opening of roads, overgrazing, fire, pollution, introduction and spread of exotics, excessive siltation, dredging and reclamation of water bodies, mining and industrialization.

The network of protected areas presently covers 4.74% of the country's total land area and includes 94 national parks and 501 wildlife sanctuaries. The main goals identified in India's National Policy and Macrolevel Action Strategy on Biodiversity (1999) include: i) Conservation and sustainable use of biological diversity including regeneration and rehabilitation of threatened species. ii) Securing participation of State Governments, communities, people, NGOs, industry and other stakeholders. iii) Realizing consumptive and non-consumptive values of biodiversity through research and development iv) Ensuring benefits to India as country of origin of biological resources and to local communities and people as conservers of biodiversity, creators and holders of indigenous knowledge systems, innovations and practices. v) Ensuring consideration of biodiversity concerns in other sectoral policies and programmes.

### **India: A glance**

India is one of the oldest civilizations in the world, spanning a period of more than 4,000 years, and witnessing the fusion of several customs and traditions, which are reflective of the rich culture and heritage of the country. It has achieved all-round socio-economic progress during the

last 64 years of its Independence. India has become self-sufficient in agricultural production and is now one of the top industrialized countries in the world and one of the few nations to have gone into outer space to conquer nature for the benefit of the people. It covers an area of 32,87,263 sq. km, extending from the snow-covered Himalayan heights to the tropical rain forests of the south. As the 7th largest country in the world, India stands apart from the rest of Asia, marked off as it is by mountains and the sea, which give the country a distinct geographical entity. Bounded by the Great Himalayas in the north, it stretches southwards and at the Tropic of Cancer, tapers off into the Indian Ocean between the Bay of Bengal on the east and the Arabian Sea on the west.

Lying entirely in the northern hemisphere, the mainland extends between latitudes  $8^{\circ} 4'$  and  $37^{\circ} 6'$  north, longitudes  $68^{\circ} 7'$  and  $97^{\circ} 25'$  east and measures about 3,214 km from north to south between the extreme latitudes and about 2,933 km from east to west between the extreme longitudes. It has a land frontier of about 15,200 km. The total length of the coastline of the mainland, Lakshadweep Islands and Andaman & Nicobar Islands is 7,516.6 km.

### **Biodiversity Profile -India**

With only 2.7% of the land area, 4% of fresh water, 17% of human and 18% of livestock population, India holds 11th rank in club of 16 mega bio-diverse country, accounts for 7 – 8 % of the recorded species of the world.

India is one of the eight recognized Vavilovian centres of origin and diversity of crop plants, having over 300 wild ancestors and close relatives of cultivated plants.

India ranks among the top ten species-rich nations and shows high endemism, with ten biogeographic zones and has four global biodiversity hotspots (Eastern Himalaya, Indo-Burma, Western Ghats and Sundaland).

Varied edaphic, climatic and topographic conditions have resulted in a wide range of ecosystems and habitats such as forests, grasslands, wetlands, deserts, and coastal and marine ecosystem Himalayan ecosystems.

Mangroves in India account for 3% of the global total with rich species diversity. Sunder bans is the largest congregation of mangrove forest in the world.

Wetland ecosystems ranges from high altitude cold desert to hot and humid wetlands in coastal zones with rich flora and fauna. 115 wetlands and 40 lakes identified under national program and 25 wetlands of international importance under Ramsar Convention.

Houses 16 major forest types and 251 subtypes occupying 23.81 % (or 78.37 m ha) of country's geographical area. Deforestation has largely been halted. Decadal (1995 – 2005) gain is 3.15 m ha. India is one of the few countries to have a robust & scientific system of periodic forest related assessments feeding into government policy & management plans.

India's  $\frac{1}{4}$  of the total forest cover is under PA management (102 – national parks, 515 wildlife sanctuaries, 47 tiger reserves and 4 community reserves).

**Desserts :** 200,000 km<sup>2</sup> about 1/3 cultivable

**Forests :** 770,100 km<sup>2</sup> about 23.4% of total area

**Flora :** The Flora of India is one of the richest in the world. 45,000 different plant species (including fungi and lower plants) have been described. It is thought that there are over 15,000 species of flowering plants in India.

### **National Parks, Sanctuaries and Wildlife**

There are 102 National Parks, 515 Wildlife Sanctuaries, 47 Tiger Reserves (Project Tiger), 16 Biosphere Reserves, 4 Community Reserves,

**Fauna of india comprises** 89,492 different Species including Insects: 59,353, Fishes: 2,546; Amphibians: 240; Reptiles: 460; Birds: 1,232; Mammals: 397

## **Status and Trends of Biodiversity**

### **Overview**

India is one of the 17 “megadiverse” countries and is composed of a diversity of ecological habitats like forests, grasslands, wetlands, coastal and marine ecosystems, and desert ecosystems. Almost 70% of the country has been surveyed and around 45,000 plant species (including fungi and lower plants) and 89,492 animal species have been described, including 59,353 insect species, 2,546 fish species, 240 amphibian species, 460 reptile species, 1,232 bird species and 397 mammal species. Endemism of Indian biodiversity is significant with 4950 species of flowering plants, 16,214 insects, 110 amphibians, 214 reptiles, 69 birds and 38 mammals endemic to the country. One of the major causes for the loss of biodiversity in India is the expansion of agriculture in previously wild areas. Other impacts include: unplanned development, opening of roads, overgrazing, fire, pollution, introduction and spread of exotics, excessive siltation, dredging and reclamation of water bodies, mining and industrialization. In this century, the Indian cheetah, Lesser Indian rhino, Pink-headed duck, Forest owlet and the Himalayan mountain quail are reported to have become extinct and several other species (39 mammals, 72 birds and 1,336 plants) are identified vulnerable or endangered.

### **Number and Extent of Protected Areas**

The network of protected areas presently covers 4.74% of the country’s total land area and includes 94 national parks and 501 wildlife sanctuaries. Of these, 100 cover both terrestrial and freshwater ecosystems and 31 are marine protected areas. There are also 14 Biosphere Reserves and several Reserved Forests, which are part of the most strictly protected forests outside the protected areas. India also has areas declared as a part of the International Bird Area Network. 14000 sacred groves have been documented.

### **Percentage of Forest Cover**

As per the latest report of the Forest Survey of India (2003), forests cover 23.68% of India’s total geographic area, which includes 3.04% of the tree cover. Area under grasslands is about 3.9% and deserts cover about 2%. It is estimated that India has about 4.1 million ha of

wetlands (excluding paddy fields and mangroves). The marine ecosystem in India covers 2.1 million sq. km, and the total area covered by mangroves is estimated at about 6,700 sq. km.

### **Easternghats-Hill Ranges Of South East Asia, India**

The hill ranges spread in parts of Chittoor and Kadapa districts of Andhra Pradesh have been designated as Seshachalam Biosphere Reserve in Andhra Pradesh on 20th September, 2010. The decision is based on the proposal submitted by the Government of Andhra Pradesh. This biosphere reserve will cover an area of 4755.997 Km<sup>2</sup>.

The Eastern Ghats are located between 11° 31' and 22° N latitude and 76° 50' and 86° 30' E longitude in a North-East to South-West strike. The Ghats cover an area of about 75,000 Sq. Km with an average width of 200 Km in the North and 100 Km in the South. They are extended over a length of 1750 Km between the rivers Mahanadi and Vaigainal along East Coast. The geographers consider the Simlipal massif lying to the North west of the Khondmal hills in the Phulbani district of Orissa as the Northern starting point of Eastern Ghats. Towards the south, the Eastern Ghats run in a west ward direction meeting the Western Ghats in the Nilgiris of Tamilnadu.

Eastern Ghats are spread over three States of India, namely Orissa, Andhra Pradesh and TamilNadu. Eastern Ghats can be broadly divided into (1) Northern-Eastern Ghats and (2) The SouthernEastern Ghats. Kondapalli (Krishna district) is meeting point between Northern and Southern Eastern Ghats.

The Hilly area from the River Krishna to near about Madras, covering the Andhra Pradesh districts of Krishna (Kondapalli range), Kurnool (Nallamala ranges), Cuddapah (Yerramala, Palakonda ranges), Nellore (Veligonda range), and Chittoor and Cuddapah (Seshachalam-Lankamala-Nagari-Kambakkam ranges), represents the middle Eastern Ghats. The low hilly area runs in a West - South-West direction meeting the high mountain ranges of the Western Ghats in the Nilgiri belt, covering the Tamilnadu districts of North Arcot (Javadi Hills), South Arcot (Gingee hills), Salem (hills of Shevaroy, Kalrayan), Namakkal (Kollimalai, Bodamalai, Nainamalai, Chitramalai), Dharmapuri (Melagiri hills), Tiruchirapalli (Pachamalai hills) represents the

Southern–Eastern Ghats.. The average elevation of the Eastern Ghats is about 750 metres, though individual peaks rise to heights of 1672metres.

The highest peak in Eastern Ghats, Shevaroy hills 1700 m is Deomali Parbat 1673 m (Koraput district). Other notable peaks are Mahendragiri 1501m, Singaraju Parbat 1516m, Devagiri 1382 m, Turiakonda 1598 m, Hatimali 1391 m, Chandragiri 1269 m. Dharakonda 1365 m, Sambari Konda near Gudem village Ca 1670 m, Nallamalias 800 m, Seshachalam hills 850 m, Javadi hills 1275 m and Pachamalais hills 1000 m.

### **Eastern Ghats: Geographical Location :**

Eastern Ghats are discontinuous range of mountains (also known as Malyadri ) set along Eastern coast, is one of the important physiographic units with great environmental, socio-economic, cultural and spiritual significance in the peninsular region of our country. Starting at West Bengal, Eastern Ghats pass through states like Orissa, Andhra Pradesh and Tamil Nadu. These Ghats are ripped through by rivers like Godawari, Mahanadi, Krishna and Kaveri, the four major rivers of South India.

Starting from West Bengal, the hill ranges pass through Orissa, Andhra Pradesh, touches Karnataka and ends in Tamil Nadu. They extend over a length of 1700 Km in a north-east south-west strike in the Indian Peninsula covering an area of about 2, 50,000 Sq. Km., with an average width of 220 Km in the north and 100 Km in the south. The Mahanandi basin marks the northern boundary of the Eastern ghats while the southern boundary is the Nilagiri hills. Major portion of the mountain range falls in the state of Andhra Pradesh.

Epic Mahendra giri range of Orissa and Yarada, Papikondalu forms northern part of the ranges while Nallamalai, Yerramalais, Palakonda, Velikonda, Sheshachalam and Kambakkam forms the Central portion of the hills. North of the river Kaveri in Tamilnadu are Kollamalai, Pachamalai, Shevroy hills, Kalrayan hills, Chitteri, Palamalai and Mettur hills. The southernmost Eastern Ghats are low Sirumalai and Karantha malai hills situated in southern Tamilnadu.

There are five ecological hotspots with endemic and endangered species in India, out of which two of them are in Eastern Ghats. For millions of years the Eastern Ghats have been cradles

of life and civilization. The mountain ranges are rich in biodiversity, forests range from dry deciduous mixed forest to semi evergreen rain forest. Asia's biggest tiger reserve, Nagarjunasagar-Srisailem Tiger Sanctuary is located in the Nallamala range of Eastern Ghats.

Eastern Ghats is home for a rich variety of minerals, rivers, wetlands, and several ancient places of worship like Simhachalam, Annavaram, Bhadrachalam, Srisailem, Mahanandi, Tirumala, and modern temples like Nagarjunasagar dam and Srisailem project. Many primitive tribal groups such as Chenchus, Koya, Savara, Jatapu, Konda dora, Gadaba, Khond, Manne dora, Mukha Dora etc., have been living in a symbiotic relationship with their habitats in the forests and hills. Major rivers of peninsular India i.e. Mahanadi, Godavari, Krishna, Penna and Kaveri pass through the hill ranges. Small local rivers and streams originate and emanate in hills also are the vital source of water in the region.

### **Characteristics of Eastern Ghats :**

Eastern Ghats are older than Western Ghats. The elevation of Eastern ghats is lower than the western ghats. They are located between  $11^{\circ} 30'$  and  $22^{\circ}$  N latitude and  $76^{\circ} 50'$  and  $86^{\circ} 30'$  E longitude in a North-East to South-West strike. It covers an total area of around 75,000 sq. km. Sirumalai and Karanthamalai hills of Tamil Nadu lies in the southern most part of the Eastern Ghats. North of Kaveri river are higher Kollimalai, Pachaimalai, Shevaroy, Kalrayan Hills, Palamalai and mettur hills in north Tamil Nadu.

One of the biggest characteristics of Eastern Ghats lie in its being extremely fertile. In fact, the Ghat is said to be the watershed of many rivers as the Ghat gets higher average waterfall. Due to higher rainfall, the fertile land results into better crops. Often referred as "Estuaries Of India", Eastern Ghats gift its inhabitant the popular profession of fisheries as its coastal area is full of fishing opportunity.

### **VEGETATION**

Vegetation varies considerably with altitudes and shows a distinct zonation of Forest types in all these Eastern Ghats. Practically all these forests are classified under four types as below:

1. Scrub Jungles – to 400m (foot hills)



2. Deciduous forest – 300 to 900m (slopes)
3. Evergreen forest - 800 to 1300m (Plateau)
4. Sholas - 1200 to 1600m

The vegetation of Eastern Ghats is remarkable for the concentration of character species like *Pterocarpus santalinus*, *Shorea robusta*, *Shorea tumbergia*, *Syzygium alternifolium*, *Santalum album*, *Terminalia pallida* etc. in certain well defined areas and for the presence of complex associations of tropical, sub-tropical and temperate species and of evergreens at the elevation of about 1100m above mean sea level. As a whole, the vegetation is typically deciduous type and scrub jungle in most places.

In Eastern Ghats besides natural vegetation, there are numerous exotic species widely spread throughout the Eastern Ghats whose floristic composition differs from the natural vegetation.

On the basis of dryness, Ahmedullah and Nayar (1986) divided Eastern Ghats into two types -(1) Northern Zone of moist deciduous type with *Shorea robusta* and (2) Southern dry deciduous forest region with *Shorea tumbergia*, *Hardwickia binata* type. Mani (1974) recognized 3 major phytogeographical divisions of the Eastern Ghats i.e. (1) The Northern Sal division, (2) The Deccan division and (3) The Southern division.

According to Legris and Meher-Homji (1982, 1984), seven main vegetation types have been recognised in Eastern Ghats i.e., (1) *Albizia amara* Series (A Thorn Forest Community); (2) *Cochlospermum*, *Gyrocarpus*, *Givotia* altitudinal ecotone; (3) *Hardwickia binata* series; (4) Dry deciduous type, *Terminalia*, *Anogeissus latifolia*, *Tectonagrandis* series, (5) The Sal forest types, (6) *Toona-Garuga* series and (7) Miscellaneous deciduous forest types *Terminalia*, *Anogeissus latifolia*, *Cleistanthus* series.

According to the classification of Champion and Seth (1968), vegetation in Eastern Ghats can be broadly classified into (1) Evergreen forests, (2) Tropical semi-evergreen forests, (3) Tropical moist deciduous forests, (4) Southern tropical dry deciduous forests, (5) Northern mixed

dry deciduous forests, (6) Dry Savannah forests, (7) Scrub forests, (8) Tropical dry evergreen forests and (9) Tropical dry evergreen scrub.

### **The flora of eastern ghats**

The flora of eastern ghats include *Clematis roylei*; *Clematis smilacifolia*; *Clematis wightiana*; *Michelia champaca*; *Miliusa montana*; *Polyalthia korinti*; *Cyclea peltata*; *Tinospora sinensis*; *Capparis nilgiriensis*; *Capparis olacifolia*; *Capparis roxburghii*; *Hypericum gaitii*; *Garcinia xanthochymus*; *Mammea suriga*; *Shorea tumbaggaia*; *Abelmoschus moschatus*; *Decaschistia cuddapahensis*; *Decaschistia rufa*; *Eriolaena lushingtonii*; *Hildegardia populifolia*; *Ealeocarpus lanceifolius*; *Sloanea sterculiacea*; *Impatiens diversifolia*; *Citrus medica*; *Clausena anisata*; *Clausena austroindica*; *Melicope lunuankenda*; *Zanthoxylum ovalifolium*; *Boswellia ovalifoliolata*.

### **Fauna of Eastern Ghats**

Faunal records include several species of mammals, reptiles, amphibians and birds, some of which are rare and endangered. Among the predators Leopard is quite common, along with the Wild Dog. Other predators include Hyena, Golden Jackal, Indian Fox, Small Indian Civet and Jungle Cat. Sloth Bear is frequently encountered. Other mammal inhabitants found here are tiger, jungle and leopard cat, wild boar, *nilgai*, *gaur*, spotted deer, *sambhar*, mouse deer, barking deer, Indian blackbuck, four-horned antelope, porcupine, Indian hedgehog, slender loris, tree shrew, black-naped hare, jackal, palm civet, striped hyena, Indian wild dog, Indian fox, rhesus and bonnet macaques, common/Hanuman langur, sloth bear, mongoose as well as several species of bats and rats. The Indian pangolin, fishing cat, Indian smooth-coated otter and wolf are some of the more uncommon/rarely seen mammalian species of the Eastern Ghats. Several species of reptiles and amphibians have been recorded, some rare/endangered species like the golden hill gecko, the Indian monitor lizard, the python and the solitary species of uropeltid snake are recorded, not to mention the burrowing limbless skink. In the Salur Wildlife Sanctuary located in Salur *mandal* of Vizianagaram district, Andhra Pradesh, is found the king cobra. A number of other species of both venomous and non-venomous snakes are also found in the Ghats.

The Eastern Ghats are very rich in avifauna. The ornithological surveys carried out by several experts helped to list over 425 species and sub-species of birds belonging to 57 families. The Jerdons courser, a restricted endemic, once thought to be extinct was rediscovered and is now found only in the Sri Lankamalleshwara Sanctuary, in the Eastern Ghats of Andhra Pradesh. The Blewitts owl another critically endangered, endemic is also reported from the forests of the Eastern Ghats. A large number of insect species, including butterflies are also found in the Eastern Ghats. Several species of fishes and crabs can be found in the streams of the forests as well.

### **Ethnographic Profile And Tribal Wealth In Eastern Ghats**

In India, there are 5 million tribal people of different ethnic groups distributed in different states. Among the states of Indian union, Orissa has got second highest percentage of tribal population (23%). There are 62 different tribes, of which the most numerous ones are, Khonds (Kandho), Gond, Santal, Soara, Kolha, Shabar, Munda, Paroja (Paraja), Bhotada, Bhunya (Bhuiyan), Kissan, Oraon, Bhumija, Bhathudi, Kharia, Binjhal, Koya, Bhumia, Kol, Saunti, Gadabas, Mirdhas and Juang. These tribals have their own culture, customs, religious rites, taboos, legends, food-habitats and a rich knowledge in traditional herbal medicine.

Gonds are a tribal community living in Orissa. Gonds largely depend on their traditional sources (82%), which is not only due to the non-availability, non-affordability and lack of usable knowledge of modern medicine.

The tribal population of Andhra Pradesh is 3,176,001 and the tribes mainly inhabit the plains and the hilly areas along the Eastern Ghats. The hilly areas of Eastern Ghats in Andhra Pradesh are mainly inhabited by 33 aboriginal/tribal communities, who still practise the age old traditional medicines and their application. Many important rivers like Godavari, Krishna, Nagavali, Penna and Vamsadharapass through these Ghats and innumerable streams and rivulets, provide plenty of scope and shows profound influence on the economy and socio-cultural activities of tribes having their own language, heritage, customs, religious practices, customs etc. which are quite unique. They mainly depend on minor forest produce and agriculture for their livelihood.

According to 1981 census, the tribal population of Andhra Pradesh is 3,176,001 of 33 tribal communities. This constitutes 5.93 per cent of the total population of the state. Of these 27 tribal communities are confined to the isolated hills and adjacent plains of Eastern Ghats. The major groups among them are Bagatas, Chenchus, Jatapus, Khonds (Samantas), Kondadoras, Konda Kammaras, Konda reddis, Koyas, Lambadis (Sugali), Nuka doras (Muka doras), Porjas (Gadabas), Savaras and Valmikis, with a total population of 1,412,450. They are mainly distributed in 9 districts, namely East Godavari, Warangal, Khammam, Kurnool, Prakasam, Srikakulam, Visakhapatnam, Vizayanagarum and West Godavari. All the above tribals are aboriginal except Lambadis (Sugalis), who have migrated from Northwest to Southern India and settled in Khammam, Kurnool and Prakasam districts. In the upper Godavari region the tribes commonly found are Bagatas, Jatapus, Khonds, Konda doras, Konda Kammaras, Nuka doras, Porjas and Savaras. The Godavari valley is inhabited mainly by Konda reddis and Koyas. In Nallamalai region Chenchus are the primitive inhabitants. The Valmikis are found in Godavari valley as well as in the neighbouring district of Eastern Ghats.

Savaras of Srikakulam district are believed to be descendents of the Sabaras referred to in the Aitareya Brahmana and Ramayana. Srikakulam presents a picturesque but varied landscape. The sundrenched sea-coast is followed by a vast expanse of land interspersed with densely populated river-valleys. The lush plains abruptly end with the commencement of the confused hill ranges of the Eastern Ghats running from Mandasa in the North-east through Pathapatnam, Palakonda and Parvathipuram to Saluer in the South-West. The chief rivers that rise in the Eastern Ghats are Vamsadhara, Nagavalli, Mahendratana, Champavathi, Vegavathi, Gomukhi and Gosthani. It is this hilly and wooded tract transversed by these perennial and seasonal streams that constitutes the habitat of about 2 lakh aboriginals who sought refuge in this hitherto inaccessible tract from time immemorial. Major tribes inhabiting this belt are Savara, Jatapu, Konda Dora, Gadaba, Khand, Manne Dora and Mukha Dora of which Savara are the most preponderant. Most of the Savaras of Andhra Pradesh belongs to Kapu Savara (Agriculturists) and Bhima Savaras.

### **Economic activity of tribals in forests of Eastern Ghats**

Various tribal groups of Eastern Ghats are at different stages of economic activity such as (i) food collection, hunting, gathering and fishing; (ii) shifting cultivation (Podu); (iii) pastoralism and (iv) settled cultivation. Due to Podu cultivation, particularly in Northern Eastern Ghats of Srikakulam, Vizayanagaram and Visakhapatnam districts resulting in destruction of forest resources as well as soil erosion.

The native tribal people of Shevaroy are called Malayalis. As per 1981 census, the tribal population was 32,746. They are living in nearly 100 conically shaped huts scattered in various parts of the plateau. They are cultivating different kinds of grains, or fruit trees and breeding cattle. The ethnic group of Pacchamalais is also called Malayalis and their mother tongue is Tamil. As per 1991 census calculation nearly 10,006 tribals are living in this area. Of these, in Thenparanadu revenue village 3024 tribals are living in 998 families, in Vayanadu revenue village 4041 tribals are living in 946 families; in Kombi revenue village 1820 tribals are living in 427 families; in Thalngai 336 tribals are living in 67 families, in Sobanapuram revenue village 292 tribals are living in 56 families; in Sookalampatti revenue village 493 tribals are living in 90 families. Most of them are labourers.

The tribal people of Sirumalai group of hills are either Malayalis or Pariars. In Sirumalai alone there are ten tribal villages mainly working as labourers or collecting minor forest produce like Phoenix gallnut, Indian Gooseberry, leaves, mango fruits and bothai grass.

### **Challenges today**

Today, unfortunately these prominent mountain ranges are under tremendous stress, degradation and damage due to human greed, population pressure, un-sustainable development, apathy by public, negligence by public servants, etc.

Haphazard mining, logging, poaching, forest fires, unsustainable harvest of forest produce, pilferage of rare species, smuggling and export of rare flora and fauna, encroachments of forest land and infrastructure development, myopic industrialization, springing up of habitations with an intention to colonize and devour the forest. The forest area in the Eastern Ghats has shrunk to half

of what it was at the beginning of our republic. Exponential growth and development accelerated the decline of the natural glory of Eastern Ghats has to stop.

## **Biodiversity Vs Human progress**

Now the world's rarest monkey, the golden langur typifies the precarious survival of much of India's megafauna.

According to the 1994 IUCN assessment, India contained 172, or 2.9%, of IUCN-designated threatened species. These include the Asiatic lion, the Bengal tiger, and the Indian white-rumped vulture, which suffered a near-extinction from ingesting the dead bodies of diclofenac-treated cattle.

In recent decades, human encroachment has posed a threat to India's wildlife; in response, the system of national parks and protected areas, first established in 1935, was substantially expanded. In 1972, India enacted the Wildlife Protection Act and Project Tiger to safeguard crucial habitat; further federal protections were promulgated in the 1980s. Along with over 500 wildlife sanctuaries, India now hosts 15 biosphere reserves, four of which are part of the World Network of Biosphere Reserves; 25 wetlands are registered under the Ramsar Convention.

The need for conservation of wildlife in India is often questioned because of the apparently incorrect priority in the face of direct poverty of the people. However Article 48 of the Constitution of India specifies that, "The state shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country" and Article 51-A states that "it shall be the duty of every citizen of India to protect and improve the natural environment"

## **BIOTHRREATS:**

The key threats in these ranges are Construction and Quarrying. The Andhra Pradesh State Highway Project, is undertaking the upgradation of highways in the state of Andhra Pradesh, and this includes construction of Warangal-Pollacolu road which passes close to the western boundary of the national park. Another construction is of the Kapil Teertham Dam inside the Sri Venkateswara national park by the Andhra Pradesh Government and the Tirumala Tirupati

Devasthanam. Both these constructions raise concerns over the potential impact of the road and the dam on the habitat and the wildlife.

Haphazard mining, logging, poaching, forest fires, unsustainable harvest of forest produce, pilferage of rare species, smuggling and export of rare flora and fauna, encroachments of forest land and infrastructure development, myopic industrialization, springing up of habitations with an intention to colonize and devour the forest. The forest area in the Eastern Ghats has shrunk to half of what it was at the beginning of our republic. Exponential growth and development accelerated the decline of the natural glory of Eastern Ghats has to stop.

Though Eastern Ghats is such a rich and diverse eco-geographic unit, it has not caught the attention for conservation and to protect has national heritage. is a prominent eco-geographic unit, for ages the hill ranges were not viewed as one entity since they are dissected by river gaps, wetland and planes. There is a felt and immense need of a concerted and macro level conservation movement by the involvement of all stakeholders especially the public, for Eastern Ghats region. Its is also felt that collectivizing or binding all individuals and civil society groups in to a network will bring much focus and strength to the cause.

### **Reasons for biodiversity loss in hotspots**

There are four main reasons why species are being threatened in these biodiversity hotspots

**1. *Habitat destruction:*** As recently as 30 years ago, most of the regions in these biodiversity hotspots were inaccessible and remote. Now, due to better infrastructure, contact of these areas with humans has increased. Activities such as logging of wood, increased agriculture, increased human habitation has led to destruction of forests and pollution of rivers. These factors are causing species ranges to reduce and habitats to become choppy. The government planned to establish habitat corridors, but these plans have not yet materialized in most areas. Activities such as mining, construction of large dams, highway construction has also caused significant destruction of habitats.

**2. *Resource mismanagement:*** Increased tourism without proper regulation has led to pollution and environmental degradation. Prime example are pilgrimage destinations like Rishikesh and hill stations like Dehradun. These spots, once nestled in the pristine ranges of the Himalayas, are now

dirty commercial destinations. Places like Dehradun are even experiencing a construction boom so large that illegal immigrants from Bangladesh are also flocking there. Religious destinations in the Himalayas, where devotees flock in millions now, are also hot destinations for medicinal plant trade, which has threatened plant life in the area.

**3.Poaching:** Large mammals such as the tiger, rhinoceros and the elephant once faced the distinct possibility of complete extinction due to rampant hunting and poaching. However, efforts by conservationists since the 1970s has helped stabilize and grow these populations. Still, the trade in tiger hide, elephant tusks, tiger teeth, rhinoceros horn remains profitable and rampant.

**4.Climate change:** Although dire IPCC predictions of Himalayan glaciers melting by 2035 have been retracted, there is no doubt that several Himalayan glaciers are melting. Climate change may significantly affect the temperatures, rainfalls and water tables in the Western Ghats, according to an assessment by the Government of India.

## **BIOSECURITY:**

The Government has taken many initiatives to protect biodiversity of the Eastern Ghats. Seshachalam hill ranges of Andhra Pradesh have been designated as Biosphere Reserve. Several Wildlife Sanctuaries established in the Eastern Ghats to preserve its Biodiversity. These include Gundla Brahmeswaram, Kambalakonda, Kaundinya, Nagarjunsagar-Srisailem, Papikonda, Pocharam, Rollapadu, Sri Lankamalleshwaram, Sri Peninsula Narasimha and Sri Venkateswara Wildlife Sanctuaries.

Botanical Survey of India (BSI) has published several floras to document the biodiversity of Eastern Ghats. These are Flora of Tamilnadu (including districts of Eastern Ghats), Flora of Nallamalais, Flora of Visakhapatnam, Flora of Nellore, Flora of Venkateshwara Wildlife Sanctuary, Flora of Araku Valley, Flora of Nagarjuankonda, Flora of Maredumalai, Flora of Medak and Flora of Chittoor District. Zoological Survey of India (ZSI) has taken steps to document the faunal resources in the Eastern Ghats. It has published under State Fauna series the Fauna of Andhra Pradesh in 8 volumes and the Fauna of Tamilnadu (part I published and part II in press), both of which contain the fauna of Eastern Ghats also.



15 wetlands have been identified in Andhra Pradesh, Orissa, Tamil Nadu and West Bengal for the management and conservation. 16 Mangroves sites have been identified in Andhra Pradesh, Orissa, Tamil Nadu and West Bengal for the protection of Mangroves. The Ministry has established National Mangrove Genetic Resources Centre in Orissa.

A National Biodiversity Authority has been set up and as per Biodiversity Act, 2002, seven Biodiversity Management Committees (BMCs) have been formed to document and preserve the biodiversity in the Eastern Ghats. The Model People's Biodiversity register (PBR) has also been issued to the State Biodiversity Boards to facilitate the preparation of PBRs (documenting biodiversity and associated knowledge) by these Biodiversity Management Committees.

Project Elephant was launched in February, 1992 to assist States having free ranging populations of wild elephants to ensure long term survival of identified viable populations of elephants in their natural habitats in the States of Orissa, Andhra Pradesh and West Bengal.

### ***Initiatives Taken for Eastern Ghats***

The Eastern Ghats form a broken chain of mountainous terrain spreading in the states of Orissa, Andhra Pradesh and Tamil Nadu and two districts of Karnataka. The jurisdiction is covered in four sections, namely- Northern-Eastern Ghats which covers the area above Mahanadi to Northern boundary of Orissa- Mayurbhanj district. Other three sections are river Mahanadi to river Godavari, river Krishna to Chennai city and southern ghats i.e. tract between Chennai and Nilgiri hills to river Vaigai.

Seshachalam hill ranges of Andhra Pradesh have been designated as Biosphere Reserve. Several Wildlife Sanctuaries have been established in the Eastern Ghats to preserve its Biodiversity. These include GundlaBrahmeswaram, Kambalakonda, Kaundinya, Nagarjunsagar-Srisailem, Papikonda, Pocharam, Rollapadu, Sri Lankamalleshwaram, Sri Penisula Narasimha and Sri Venkateswara Wild life Sanctuaries.

Botanical Survey of India (BSI) has published several floras to document on the biodiversity of Eastern Ghats. These are Flora of Tamil Nadu (including districts of Eastern Ghats), Flora of Nallamala, Flora of Visakhapatnam, Flora of Nellore, Flora

of Venkateshwara Wildlife Sanctuary, Flora of Araku Valley, Flora of Nagarjuankonda, Flora of Maredumalai, Flora of Medak and Flora of Chittor District.

Zoological Survey of India(ZSI) has also taken steps to document the faunal resources in the Eastern Ghats. It has published under State Fauna series the Fauna of Andhra Pradesh in eight volumes and the Fauna of Tamilnadu in two volumes, both of which contain the fauna of Eastern Ghats also.

Fifteen wetlands have been identified in Andhra Pradesh, Orissa, Tamil Nadu and West Bengal for management and conservation. Sixteen Mangroves sites have been identified in Andhra Pradesh, Orissa, Tamil Nadu and West Bengal for the protection of Mangroves. The Ministry has established National Mangrove Genetic Resources Centre in Orissa.

A National Biodiversity Authority has been set up and as per Biodiversity Act, 2002, seven Biodiversity Management Committees (BMCs) have been formed to document and preserve the biodiversity in the Eastern Ghats. The model People's Biodiversity Register (PBR) has also been issued to the State Biodiversity Boards to facilitate the preparation of PBRs (documenting biodiversity and associated knowledge) by these Biodiversity Management Committees.

### **Environmental Information System Center of Eastern Ghats**

Environment Protection Training and Research Institute (EPTRI), Hyderabad and Ministry of Environment and Forests, signed a Memorandum of Understanding in March 1994 for setting up of Environmental Aspects of Eastern Ghats as its subject.

The jurisdiction of the Eastern Ghats extends in the States of Orissa, Tamil Nadu, Andhra Pradesh and parts of Karnataka. An ENVIS Coordination Committee was set up as per the MoU to guide the development and work of the ENVIS Center. The Committee comprises of experts from various disciplines with representation from the concerned states and including representatives from the Ministry of Environment and Forests.

**National Biodiversity Strategy Action Plan**-Major features of National Biodiversity Strategy and Action Plan:

The main goals identified in India's National Policy and Macrolevel Action Strategy on Biodiversity (1999) include: i) Conservation and sustainable use of biological diversity including regeneration and rehabilitation of threatened species. ii) Securing participation of State Governments, communities, people, NGOs, industry and other stakeholders. iii) Realizing consumptive and non-consumptive values of biodiversity through research and development iv) Ensuring benefits to India as country of origin of biological resources and to local communities and people as conservers of biodiversity, creators and holders of indigenous knowledge systems, innovations and practices. v) Ensuring consideration of biodiversity concerns in other sectoral policies and programs. Numerous and wide ranging policies, programs and projects were initiated which directly or indirectly serve to protect, conserve and sustainably use the country's biological resources. In the National Policy and Macrolevel Action Strategy on Biodiversity (1999), India identifies the current conservation efforts and some significant gaps in these efforts. Various action points are then enumerated including the formulation of policies for protection of wetlands and sacred groves, and the undertaking of surveys on a priority basis of islands, the Himalayan region, and marine and coastal areas. A large-scale participatory exercise has been completed for providing inputs towards preparation of a National Biodiversity Action Plan.

### **Measures Taken to Achieve the 2010 Target**

India's strategies for the conservation of ecosystems, habitats and biomes consist in providing special status and protection to biodiversity rich areas. Examples of efforts that have either been put in place or are in progress are listed here. The mangrove conservation program (1987) has so far identified 35 mangrove areas for intensive conservation and management. Project Tiger, launched in 1973, now incorporates 28 tiger reserves in seventeen states. Project Elephant was launched in 1992 to ensure the long-term survival of identified viable elephant populations in their natural habitats. The National Bureau of Plant Genetic Resources has been engaged in documenting the large number of varieties of crop plants in the country. Holistic community-based sustainable forestry programs such as Joint Forest Management are aimed at meeting the basic needs of local people. The program is now operational on more than 17 million ha of land spread all over the country. India has developed a Traditional Knowledge Digital Library (TKDL), an easily navigable computerized database of documented information available in published texts of Indian systems of medicine, with the objective of preventing the grant of patents on non-original

invention. It is proposed in the National Environment Policy, 2006 to take measures to formulate an appropriate system for Prior Informed Consent and Fair and Equitable Benefit Sharing in respect of biological material and traditional knowledge use of such biological material to enable the country and local communities respectively to derive economic benefits from providing access.

### **Initiatives in Protected Areas**

The National Environmental Policy 2006 provides the basis of an innovative strategy to increase forest cover from 23% to 33% of the national territory by 2012. The country's goal is to establish 163 national parks and 707 wildlife sanctuaries covering 5.74% of the total area of the country ensuring appropriate representation across all ecosystems. The monitoring committee of the National Wildlife Action Plan (2002-2016) periodically monitors the status of establishment and management of protected areas. Several unfragmented natural areas and habitats of threatened/endangered species have been brought within the protected area network. Although several of the marine and inland water ecosystems have been brought under the protected area network, more effort is needed to establish and effectively manage these areas.

### **Initiatives in Access and Benefit Sharing**

India has taken three significant legislative measures related to access and benefit sharing. India has enacted the Biological Diversity Act 2002. This Act primarily aims at regulating access to biological resources and associated traditional knowledge so as to ensure equitable sharing of benefits arising out of their use, in accordance with the provision of Article 15 of the CBD. The Plant Varieties Protection and Farmers' Rights Act (PVPFRA) 2001 and the PVPFR Rules 2003, deal primarily with the protection of plant breeder's rights over the new varieties developed by them and the entitlement of farmers to register new varieties and also to save, breed, use, exchange, share or sell the plant varieties, which the latter have developed, improved and maintained over many generations. The Patent Second Amendment Act 2002 and Patent Third Amendment Act 2005, provide for: exclusion of plants and animals from the purview of patentability (Section 4e); exclusion of an invention which in effect is traditional knowledge from patentability (Section 4p); mandatory disclosure of the source and geographical origin of the biological material in the specification when used in an invention (Section 8D); and provision for

opposition to grant of patent or revocation of patent in case of non-disclosure or wrongful disclosure of the source of biological material and any associated knowledge.

### **Initiatives for Article 8(j)**

India is rich in traditional knowledge associated with biological resources. The traditional knowledge is both coded, as in the texts of Indian systems of medicine; or is non-coded, which is oral and undocumented. Constitutional amendments enshrine democratic decentralization of responsibilities, wherein local bodies are entrusted the responsibility of safeguarding local environmental capital stocks. Several institutions and organizations in the country undertook field studies on the status, trends and threats related to the knowledge, innovations and practices (KIP) of indigenous and local communities. The Traditional Knowledge Digital Library (TKDL) is a value added digital database developed by the Government of India for (i) preservation of traditional knowledge; (ii) prevention of misappropriation of traditional knowledge; and (iii) creation of linkages with modern science to initiate active research projects for new drug discovery and development.

**Conclusion:** Eastern Ghats are identified as depository of environmental wealth having “Incomparable Values” that carry a heap of ecological importance which require special attention for their conservation, preventing the imminent possibility of permanent and irreparable loss of extant life forms from the world, or significant damage to the natural processes of evolution and speciation. After degradation and loss of natural resources, the Ministry of Environment and Forests has identified eco-sensitive areas in the Eastern Ghats and is also taking initiatives to protect biodiversity. In exercise of the powers conferred by sub-section (1) read with clause (v) and clause (xiv) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986) and sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986, the Central Government can notify any area as the Eco-sensitive Zone. This means loss of bio-diversity needs to be measured not only against some measure of the current stock, but also in terms of the potential that must be preserved for future generations.

Measures should be taken to protect endemism, rarity, endangered species; species which are or may become threatened with extinction and centres of evolution of domesticated species are critical for maintaining the range and pace of evolution and speciation. Conservation of their eco-

systems like wildlife Corridors, specialised ecosystems, and special breeding site/area, areas with intrinsically low resilience, sacred groves and frontier forests etc. is also very important. Geo-morphological conditions which are known to have substantial effect on eco-systems at large include uninhabited islands in the sea, steep slopes, origins or rivers which are also to be conserved.

In addition to these primary criteria, there are seven auxiliary criteria viz., species based – areas or centres of less known food plants, eco system based – wetlands and grasslands and geo-morphological features based – upper catchment areas, not so steep slopes, high rainfall areas and other uninhabited islands also plays an important role in protection of the biodiversity of the eastern ghats.

A certain amount of prioritization is given to the areas which are already known to be either ecologically important or under ecological stress. Examples of such areas are National parks and Sanctuaries, Tiger Reserves, Protected and Reserve Forests, Biosphere Reserves and Hill Stations which is appreciable though much effort is needed along with stringent law enforcement.

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