

ENVIRONMENT SURVEY 2011



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Cover: A march in support of Forest Rights Act, in New Delhi. PHOTO: V. V. KRISHNAN

The Gundia river basin

A biodiversity hotspot that needs urgent attention

Precariously situated along the narrow belt of unique evergreen and semi-evergreen forests in the Western Ghats, this river basin is a repository of biological wealth of rare kind, both in its aquatic and terrestrial ecosystems, say **T.V. Ramachandra** and his colleagues.



The Gundia river basin has an important elephant corridor which needs to be secured under the national conservation plan for the species. PHOTO: AP

The biodiversity or the biological diversity refers to the different genera and species of organisms present in an area. The degree of species diversity varies from one ecosystem to the other. India is a very rich country in terms of the flora and fauna present in the natural ecosystems. The presence of different kinds of forests, variability in climatic conditions, rainfall, topography are main reasons for the presence of such vast biodiversity in this country.

However, due to various reasons such as climate change, increasing urbanisation, industrialisation, encroachment, etc., the biodiversity is facing a major threat of extinction in many parts of the world. Identifying conservation priorities is

crucial due to the insufficient conservation budgets, given the number of species threatened with extinction. In this context, biogeographic regions with a significant repository of biodiversity and under the threat of anthropogenic activities are tagged as biodiversity hotspots. These regions are with high numbers of endemic species, yet their combined area of remaining habitat covers only 2.3 per cent of the global land surface.

Each hotspot faces extreme threats and has already lost at least 70 per cent of its original natural vegetation. Over 50 per cent of the world's plant species and 42 per cent of all terrestrial vertebrate species are endemic to the 34 biodiversity hotspots.

The Western Ghats form an important watershed for the entire peninsular India, being the source of 37 west-flowing rivers and three major east-flowing rivers and their numerous tributaries.

The Western Ghats is one among the 34 global hotspots of biodiversity and it lies in the western part of peninsular India in a series of hills stretching over a distance of 1,600 km from north to south and covering an area of about 1,60,000 sqkm. It harbours very rich flora and fauna and there are records of over 4,000 species of flowering plants with 38 per cent endemics, 330 butterflies with 11 per cent endemics, 156 reptiles (62 per cent), 508 birds (4 per cent), 120 mammals (12 per cent), 289 fishes (41 per cent) and 135 amphibians (75 per cent)

(http://wgbis.ces.iisc.ernet.in/biodiversity/pubs/ces_tr/TR122/index.htm).

The rich biodiversity coupled with higher endemism is due to the humid tropical climate, topographical and geological characteristics, and geographical isolation (Arabian Sea to the west and the semiarid Deccan Plateau to the east). The Western Ghats form an important watershed for the entire peninsular India, being the source of 37 west-flowing rivers and three major east-flowing rivers and their numerous tributaries.

The stretch of Central Western Ghats of Karnataka, from 12°N to 14°N, from Coorg district to the south of Uttara Kannada district, and covering the Western portions of Hassan, Chikmagalore and Shimoga districts, is exceptionally rich in flora and fauna. Whereas the elevation from 400 m to 800 m is covered with evergreen to semi-evergreen climax forests, their various stages of degradation, especially around human habitations, the higher altitudes, rising up to 1700 m, are covered with evergreen forests especially along stream courses and rich grasslands in between. This portion of Karnataka Western Ghats is extremely important for agriculture and horticultural crops. Whereas the rice fields in valleys are irrigated with numerous perennial streams from forested hill-slopes, the undulating landscape is used to a great extent for growing precious cash crops, especially coffee and cardamom. Black pepper, ginger, arecanut, coconut, rubber are notable crops here, in addition to various fruit trees and vegetables. Some of the higher altitudes are under tea cultivation.

From the point of productivity, revenue generation, employment potential and subsistence the

central Western Ghats are extremely important.

Gundia River is one of the most important tributaries of river Kumaradhara originating at an elevation of about 1400 m in Saklashedpura taluk in Hassan district. Netravathi and Kumaradhara rivers are two west-flowing rivers of the Central Western Ghats in Karnataka. Gundia River is formed by the streams namely Yettinahole and Kemphole to which the streams Kadumanehole and Hongadahalle join in the course. The Gundia catchment region is surrounded by Hemavathi river watershed on its right, Barapole river catchment on its left and Netravathi River on the downstream side.

The Gundia catchment comes under the influence of the south-west monsoon during June to September. This river basin is precariously situated along the narrow belt of unique evergreen and semi-evergreen climax and related forests, which is of two categories: *Dipterocarpus indicus* - *Kingiodendron pinnatum* - *Humboldia brunonis* type of low elevation (0-850 m elevation) and *Mesua ferrea* - *Palacuim ellipticum* type of medium elevation (650-1400 m). This region constitutes one of the prime centres of biodiversity in the Western Ghats as it harbours nearly 36 per cent of plant species, 87 per cent of amphibians, and 41 per cent of fishes, which are endemic to Western Ghats. The presence of four critically endangered and 14 endangered animal species in the region further emphasises the need for conservation of this region on priority as it provides a unique habitat and ecological niche.

Recent field investigations show the presence of a total of 239 plant species in the region out of which 119 are trees belonging to 88 genera and 42 families, 63 are shrubs and climbers belonging to 53 genera and 34 families and 57 are herbs belonging to 49 genera and 28 families. Along with this, 54 pteridophytes belonging to 31 genera and 20 families were also recorded from this area.

Endemic species such as *Holigarna grahmii*, *H.arnottiana*, *Myristica dactyloides*, *Vateria indica*, *Gordonia obtuse*, *Canarium strictum*, *Artocarpus hirsutus* were found in most of the localities.

The river basin is also rich in cardamom and coffee plantations. The cardamom plantations



The lion-tailed macaque is among the endangered species found in the Gundia river basin of Karnataka. PHOTO: S. MAHINSHA

may be considered most eco-friendly among the lot of planting activities by humans. These are virtually evergreen forests with most of the trees preserved to favour the shade and humidity-loving cardamom herbs beneath. This cash crop fetches high returns while also preserving the forests and watershed. Both small and big farmers of Gundia basin are engaged in cardamom cultivation; the dried fruit fetches almost around Rs. 1,500 per kilogram.

Considering the tangible and intangible benefits derived from 50-year old forests, the value of eco-services provided by the forests in Gundia

basin works out to be Rs. 195 billion per year (with food and water security) while aiding the livelihood of ecosystem people. The role of cardamom plantations in preserving native vegetation has seldom been highlighted. The coffee estates, both small and big, like the rest of central Western Ghats, constitute a major activity in the focal region. In preservation of native forest vegetation, coffee is next only to cardamom in importance. In many large private holdings, portions of the property are under wild vegetation. These private forests, in combination with the tree-rich cardamom and coffee estates and State reserved forests, make

Given the seriousness of human-elephant conflict and its extreme gravity in certain areas, there should be a continuing programme for containing and defusing such conflict.

the region rich in wildlife composed of amphibians, reptiles, birds and mammals.

Wild fauna that signifies the ecological sensitivity of the region are:

Lion-tailed macaque, *Macaca silenus*, is categorized as Endangered by the IUCN Red List and is endemic to the rainforests of the Western Ghats. This belongs to the Scheduled I of protected animals according to the Wildlife Protection Act 1972.

Travancore Flying Squirrel, *Petinomys fuscicapillus*, is a small flying squirrel and is expected to be present in some parts of the Western Ghats. This belongs to the Scheduled I of protected animals according to the Wildlife Protection Act 1972.

Land snail, *Indrella ampula*, an endemic species of the Central Western Ghats was sighted in wet forest patches of Yetinhalla dam site, Mallali waterfalls.

Nilgiri marten, *Martes gwatkinsii*, is one of the largest and rarest Indian mustelids and is endemic to the Western Ghats, prefers moist and tropical rainforests with an altitude of 300 - 1200 m as its habitat. The marten is legally protected under the Wildlife Protection Act 1972 (schedule II), is listed on Appendix-III of the Convention on International Trade in Endangered Species (CITES) and is categorised as Vulnerable by IUCN Red List.

Malabar pied Hornbill, *Anthraceros coronatus*, is distributed in the forests of India and Sri Lanka. This species is frugivorous and is found to be occurring in mixed deciduous, riparian and moist deciduous forests. It has been classified as Near Threatened by IUCN Red List of Threatened Species and Scheduled I of protected animals according to the Wildlife Protection Act 1972.

Tiger, *Panthera tigris*, a keystone species belongs to the Scheduled I of protected animals according to the Wildlife Protection Act 1972. It requires a large habitat but due to habitat fragmentation these animals are left with limited resources and often encounter human settlements leading to human-tiger conflicts. The presence of tiger pugmarks in Bisle Reserve forest and cases of cattle attack in nearby areas points to the presence of tiger in this area indicating this area to be

ecologically sensitive and requiring conservation.

Elephant, *Elephas maximus*, occupy very large areas and are referred as 'Umbrella species'. They are also regarded as premier 'Flagship species' and sometimes also called 'Keystone species' because of their important role in ecology and environment. The Asian elephants have been described as endangered by the Wildlife Protection Act, 1972 (Appendix-1) and by Appendix 1 of the Convention on International Trade in Endangered Species of Flora and Fauna (CITES) in 1975. The Mysore Elephant Reserve was notified by the Karnataka Government in November, 2002, spanning an area of 6,724 sqkm, covering Bisle reserve forest of Gundia Basin, (GO, FEE 231 FWL 2000, 25/11/2002). It adjoins Kemphole Reserve Forest in north and Pushpagiri Wildlife Sanctuary in the south. It is an integral and important part of the Mudumalai - Nagarhole - Brahmagiri - Mathodi Corridor and Nagarhole - Malambi - Doda-betta - Hemavati Migratory Path.

The presence of endangered animals like tiger and elephants highlight the importance of these regions. However, in the last three decades large-scale land cover changes have occurred due to mini hydel power project, construction of a reservoir, construction of roads, monoculture plantations of ginger and rubber, etc. leading to largescale disturbance and fragmentation of natural habitats of wild animals. Due to this there have been incidents of conflicts between humans and animals like tiger and elephants in this region. Given the seriousness of human-elephant conflict and its extreme gravity in certain areas, there should be a continuing programme for containing and defusing such conflict. In this regard, it is necessary to implement the following recommendations of the Elephant Task Force (ETF) set up by the Ministry of Environment and Forests (MoEF) for mitigating Human Elephant Conflicts (Gajah, 2010):

- All the elephant corridors listed in Right of Passage: Elephant Corridors of India publication and thereby agreed to by Project Elephant and State governments should be notified as State elephant corridors by respective State Governments and declared as ecologically sensitive areas.

- The corridors should be legally protected



Environmentalist Sundarlal Bahuguna is seen viewing the Gundia project site in Hingadahalla in Sakleshpur Taluk in this file photo. PHOTO: SHAMASUNDER

under various laws appropriate for the State and the local context, such as for example: a) Community or Conservation Reserve. b) Declaring the corridor as high priority Ecologically Sensitive Area under Environment Protection Act (EPA) with maximum regulation of ecologically destructive activity. c) Declaring corridor land as Reserve Forest (RF) or Protected Forest (PF) under Indian Forest Act. d) Community forests under the Forest Rights Act. e) Increase boundary of existing Protected Area and make corridor part of the existing Protected Area (PA).

● Land use policies in elephant habitats especially corridors must be made clear to prevent further fragmentation of habitat or escalation of elephant-human conflict. The policies should be pragmatic enough to allow the corridors to be protected. It is very important for managers to enforce them strictly and with authority.

The Gundia river basin thus is a 'hottest hot-spot' of biodiversity with a repository of biological wealth of rare kind, both in its aquatic and terrestrial ecosystems and indicates strongly the need for adoption of holistic eco-system management for conservation of particularly the rare and endemic fauna of the Western Ghats.

Considering the ecological significance and rich biodiversity, this region is an ideal candidate for Eco-sensitive region as per sub-section (1)

with clause (v) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986) and clause (d) of sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986 in concurrence with the provisions of the Indian Forests Act, 1927 (16 of 1927) and Forest (Conservation) Act, 1980 (69 of 1980), the Wildlife (Protection) Act, 1972 (53 of 1972) and also Biological diversity Act 2002.

This is imperative to prevent the erosion of biodiversity, ecology and associated hydrology. The premium should be on conservation of the remaining evergreen and semi-evergreen forests, which are vital for the water security (perenniality of streams) and food security (sustenance of biodiversity).

There still exists a chance to restore the lost natural evergreen to semi-evergreen forests through appropriate management strategies.

T.V. Ramachandra is Member, Western Ghats Task Force, Government of Karnataka, and is with Centre for Ecological Sciences, Indian Institute of Science;

M.D. Subash Chandran is Member, Karnataka Biodiversity Board, Government of Karnataka, and colleague at CES; **Sumesh Dudani** is Research Scholar, CES; **Harish R Bhat** is Consultant with CES; **G.R. Rao** is Research Scholar, CES, and **Vishnu Mukri** is Field Assistant, CES.