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# PROBLEMS AND PERSPECTIVES OF ORCHIDS IN EASTERN GHATS OF ANDHRA PRADESH, INDIA

MADIREDDI V. SUBBA RAO

Department of Environmental Sciences, Andhra University, Visakhapatnam—530 003, India.
Email: radhisunil@yahoo.com

ABSTRACT. The Eastern Ghats run parallel to the East coast of Andhra Pradesh, India, and support a biodiverse flora, including orchids. India has 1400 orchid species in 184 genera. The high rainfall areas of the North Eastern states of India are rich in orchids. At present 128 species in 43 genera are recorded in Eastern Ghats of Andhra Pradesh. The five endemic orchid species in Eastern Ghats are *Bulbophyllum panigrahianum, Eria meghasaniensis, Habinaria panigrahiana, H. panigrahiana* var. *parviloba,* and *Liparis vestita* subsp. *seidenfadensis.* Rare orchids in Eastern Ghats are *Bulbophyllum macraei, Diplopora championi,* and *Goodyera fumata.* A major problem facing orchids today is over-exploitation of wild species for medicinal, ornamental, and scientific purposes. Habitat destruction, macroclimatic changes, and shifting or swidden cultivation deplete orchid populations. Solutions include afforestation, joint forest management, tissue culture techniques for propagation, and habitat protection. Development of orchid societies in each state of India is recommended, as is designation of orchid habitat in Eastern Ghats as sanctuaries or national parks to conserve orchids systematically.

*Key words:* orchids, Eastern Ghats-Andhra Pradesh, India, problems, perspectives

## INTRODUCTION

The Eastern Ghats, a long chain of broken hills and crystalline metamorphic rocks, include a line of mountain ranges running from northeast to southwest in parallel ridges. Elevation ranges from a few meters to 1750 m at Biligirirangan hills, whose southern tip is in Tamil Nadu.

The Eastern Ghats spread mainly through three states in India, namely Orissa (three districts), Andhra Pradesh (14 districts), and Tamil Nadu (seven districts). In Andhra Pradesh, the Eastern Ghats run as a chain with an interruption between Godavari and Krishna Deltas and in parallel ridges in the remaining districts (FIGURE 1). Perennial rivers such as Godavari, Krishna, and Pennar, have their origins in Western Ghats, while the ephemeral rivers, such as Nagavali, Vamsadhara, and Sarada, have their origin in Eastern Ghats.

The Eastern Ghats are not a range of mountains with escarpments, as in Western Ghats, but an assemblage of series of much broken isolated hills representing weathered relics of peninsular India. They include hills of various altitudes, plateaus, escarpments, and intermountain basins, valleys, and gorges.

The Eastern Ghats in Andhra Pradesh (Subba Rao 1997) have been classified into three major regions considering ecological conditions, namely Northern Ghats, Central Ghats, and Southern Ghats (FIGURE 1).

## ORCHID HABITATS

### Northern Ghats

The Northern Ghats consist of foothills, plateaus, and coastal plains. Forests grow in Sileru, Machkund basin, and the basin of the major river Godavari, covering the districts of Srikakulam and Khammam. The coastal areas of foothills and hillocks of Eastern Ghats run parallel to the Bay of Bengal. The Northern Ghats have an average elevation of 1100–1200 m, with Mahendragiri near Orissa state border having the highest elevation at 1501 m.

The semi-evergreen forest of vegetation types are prevalent in moist vegetation, while moist to dry deciduous vegetation constitutes the river and stream borders. The foothills and plateaus are covered by dry deciduous and sporadically a scrub type of vegetation. The vegetation cover is classified into three strata (Logris & Meher-Homji 1982): upper canopy, intermediate stories, and ground covered with scrub. The dominant vegetation is sal, *Shorea robusta*; whereas the general floristic composition of the deciduous type is teak, *Tectona grandis* (Subba Rao 1997).

### Central Ghats

The Nallamalais are formations mostly in the central region of Eastern Ghats in the districts of Guntur, Prakasam, and Kurnool. These continuous ranges have an elevation of 750–1000 m. The river Krishna flows through the Nallamalai, and perennial streams support the forests

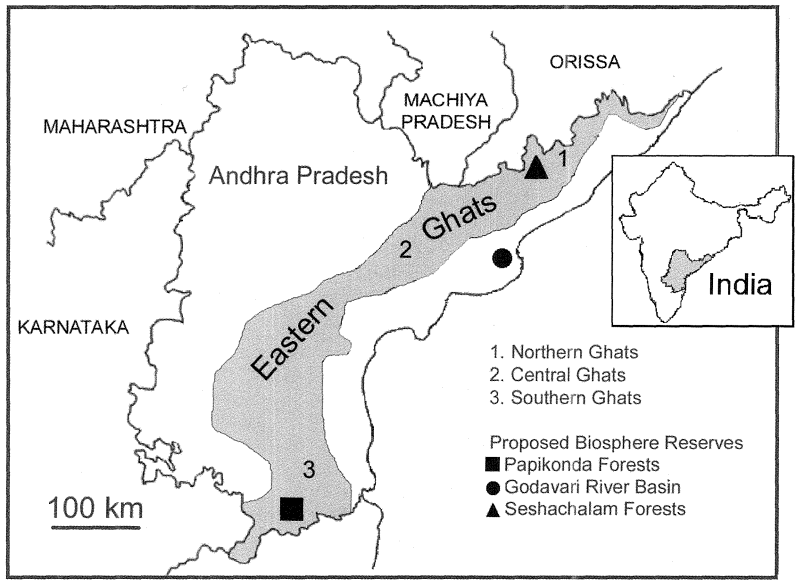


FIGURE 1. The Eastern Ghats region is classified as having three zones: 1. Northern Ghats, 2. Central Ghats, and 3. Southern Ghats. Also shown are the locations of proposed Biosphere Reserves (Subba Rao 2000).

with tropical, semi-evergreen, moist, and dry deciduous types of vegetation. The three major types of Nallamalai forests are upper canopy, dry, and moist deciduous isolated patches, with evergreen vegetation along perennial streams. After the rainy season, the grass cover is often continuous and gradually disappears during summer (TABLE 1).

### Southern Ghats

The Seshachalam and Erramalais are formations of the Southern Ghats in Andhra Pradesh state that extend through the districts of Chittoor, Nellore, and Anantapur. These smaller ranges have dry conditions. The Southern Ghats, which annually receives less rainfall, has higher temperature and less humid conditions. The main vegetation is a dry deciduous and thorny type (TABLE 1).

**Tribal groups.** The state of Andhra Pradesh is inhabited by 33 tribal groups. The Government of India has identified 12 tribes as being primitive tribal groups (PTG). Based on ecological and geographical distribution, these groups are known as Plain tribes and Hill tribes. A total of 30 tribes inhabit the forested hills of Eastern Ghats, with a total population of 3.17 million people (Government of India 2001).

**Ecological significance.** Fifty percent of the Andhra Pradesh state forest areas occurs in the Eastern Ghats, with 1.0 million ha in Northern Ghats and 2.2 million ha in Central and Southern Ghats. When compared to the forests of Central and Southern Ghats, the forests of Northern Ghats are still inferior, despite being extensive in density and quality. The Central and Southern Ghats receive low rainfall with higher temperature when compared to Northern Ghats. The hills of Eastern Ghats have steep slopes studded with a number of peaks.

**Physiography.** In general, the Eastern Ghats are made up of a variety of rocks such as khondalites, charnockites, gneisses, and schists of igneous and sedimentary origin (Krishnan 1958). The sedimentary rocks formed in Eastern Ghats are highly metamorphosed, including quartz, mica schists, manganiferous sediments, and crystalline lime stones. A large amount of these rocks are khondalite, composed of quartz, iron, and bauxite.

**Climate.** The climate of the Eastern Ghats is typically tropical with good thermal potential, sufficient to support the most luxuriant development of forest vegetation. The region has three seasons: Summer (March–May), Rainy Season (June–October), and Winter (November–February). The Northern Eastern Ghats are characterized by low temperature, high humidity, and medium to heavy rainfall. The Southern Ghats have high temperatures and relatively low humidity and rainfall. Temperatures range from 6°C in winter to 41°C in summer. The annual rainfall varies from 1200 to 1500 mm.

TABLE 1. Distribution of forest types and plant species in the Eastern Ghats of Andhra Pradesh, India, 2004.

| Group | Forest type | Plant species | Distribution area |
|---|---|---|---|
| A | Semi-evergreen | *Michelia champaka* | Northern Eastern Ghats |
| | | *Mangifera indica* | |
| | | *Artocarpus lakoocha* | |
| | | *Dellenia pentagyna* | |
| | | *Bridelia tomentosa* | |
| | | *Xylia xylocarpa* | |
| | | *Polyalthia cerasoides* | |
| | | *Macaranga peltata* | |
| | | *Pittosporum napaulense* | |
| B | Moist deciduous | *Terminalia tomentosa* | Northern and Central Ghats |
| | | *Xylia xylocarpa* | |
| | | *Anogeissus latifolia* | |
| | | *Adina cordifolia* | |
| | | *Pterocarpus marsupium* | |
| | | *Schleichera trijuga* | |
| | | *Bridelia retusa* | |
| | | *Careya arborea* | |
| | | *Polyalthia cerasoides* | |
| | | *Kydia calycina* | |
| | | *Dendrocalamus strictus* | |
| C | Dry deciduous | *Terminalia alata* | Central and Southern Ghats |
| | | *Terminalia chebula* | |
| | | *Pterocarpus marsupium* | |
| | | *Madhuca longifolia* | |
| | | *Cassia fistula* | |
| | | *Sterculia urens* | |
| D | Scrub type | *Lantana camera* | Southern Ghats |
| | | *Albizia amara* | |
| | | *Acacia chundra* | |
| | | *Anogeissus latifolia* | |
| | | *Xerophis spinesa* | |
| | | *Euphorbia tirucalli* | |
| | | *Euphorbia antoguonum* | |
| | | *Hugonia mystex* | |
| | | *Dodonaea viscose* | |
| | | *Cassia auriculata* | |
| | | *Carissa apinarum* | |
| | | *Eupatorium species* | |
| E | Mangroves | *Acanthus ilicifolius* | Coastal plains |
| | | *Avicennia alba* | |
| | | *Avicennia officinalis* | |
| | | *Bruguiera cylindrica* | |
| | | *Bruguiera gymnorrhiza* | |
| | | *Excoecaria agallocha* | |
| | | *Lumnitzera racemosa* | |
| | | *Rhizophora candellaria* | |
| | | *Sesuvium portulacastrum* | |
| | | *Sonneratia apetala* | |

Source: M.V. Subba Rao (unpubl. data from research in Eastern Ghats).

**Forests.** In 1964, the forest cover was 34%, but today it is reduced to only 13%. The forests of the Eastern Ghats, apart from mangrove forests in Andhra Pradesh state, are largely dry with moist deciduous alternately occurring scrub jungles (TABLE 1). Dense forests now are limited to a few pockets, primarily because of deforestation and swidden or shifting cultivation by tribal groups.

## OBSERVATIONS AND DISCUSSION

Although India has 1400 orchid species in 184 genera, Eastern Ghats has 128 species in 43 genera. Sikkim is the natural habitat of 475 orchid species in 100 genera, and Arunachal Pradesh state has 515 species in 110 genera. Some of the uses of orchids in Eastern Ghats of Andhra Pradesh are shown in TABLE 2. The endem-

TABLE 2. Medicinal uses of orchids in Eastern Ghats of Andhra Pradesh, India, 2004.

| Sp. no. | Species | Medicinal uses |
|---|---|---|
| 1 | *Acampe praemorsa* (Roxb) | Setting of fractures |
| 2 | *Bulbophyllum neligherrense* Neil | Good health |
| 3 | *Cymbidium aloifolium* (L) | Fractured bones and foot lesions |
| 4 | *Dendrobium herbaceum* Lindl. | Earache |
| 5 | *Dendrobium macrostachyum* Lindl. | Earache and eardrops |
| 6 | *Eulophia epidendraea* (Koen) | Anorexia |
| 7 | *Geodorum densiflorum* (Lam) | Insect bite and wounds |
| 8 | *Habenaria fuecifera* Lindl. | Poisonous bites, cuts, and wounds |
| 9 | *Habenaria longicormiculata* Graham | Leucoderma |
| 10 | *Habenaria plantaginea* Lindl. | Scorpion bites, cuts, and wounds |
| 11 | *Habenaria roxburghii* Nicolson | Snake bite |
| 12 | *Luisia zeylanica* Lindl. | Setting fractures; pus-forming wounds |
| 13 | *Malaxis acuminata* D. Don | Tonic medicine |
| 14 | *Malaxis rheedei* Sw. | Insect bite and rheumatism |
| 15 | *Nervilia aragoana* Gaud. | Ointment for wounds |
| 16 | *Nervilia plicata* (Andr) | Insect bites |
| 17 | *Oberonia wightiana* Lindl. | External tumors |
| 18 | *Peristylus lawi* Wt. | Insect bites |
| 19 | *Pholidota imbricata* (Roxb) | Rheumatic swellings |
| 20 | *Vanda tessellata* (Roxb) | Rheumatism and dysentery |
| 21 | *Vanda testacea* Lindl. | Bone fractures in cattle |

Source: M.V. Subba Rao (unpubl. data obtained from tribal groups in Eastern Ghats).

ic orchid species are *Bulbophyllum panigrahianum, Eria meghasaniensis, Habenaria panigrahiana, H. panigrahiana* var. *parviloba,* and *Liparis vestita.* Rare orchids found in Eastern Ghats are *Bulbophyllum macraei, Diploprora championi,* and *Goodyera fumata.* Among the orchid species prized as ornamentals and introduced into local gardens are *Aerides adonata, Dendrobium* spp., *Papilionanthe teres,* and *Pecteilis gigantea.*

## Problems

Environmental problems are placing constraints on orchid conservation in Eastern Ghats of Andhra Pradesh. The region is experiencing an over-exploitation of natural resources, beyond the carrying capacity. Human and live stock pressures effect land use. As a result of deforestation, loss of biodiversity, including India's orchids, is common. Swidden or shifting cultivation causes soil erosion. In Eastern Ghats the literacy rate is 10%, and economic conditions for tribal groups are poor. Depletion of groundwater resources increases sedimentation and poor water quality; and many parts of the region have no safe drinking water.

Large-scale deforestation, destruction of native germplasm, and loss of biodiversity are common. Problems include over-exploited grazing lands, lack of improved water management systems, and a high incidence of fire caused by the burns associated with shifting cultivation. Development is encroaching on forest areas, and population pressures on the land cause a loss of productivity, habitat, and genetic diversity. Widespread poverty is accompanied by a loss of indigenous knowledge of native plants.

Among the factors responsible for forest degradation in Eastern Ghats are the following: a human population explosion in Eastern Ghats hills, an increased cattle population, abject poverty, poor socio-economic conditions, pressure on forests for food, small timber harvesting beyond the carrying capacity of the forests, illegal encroachment for cultivation (shifting cultivation), wildfires, soil erosion, land degradation, loss of moisture, and the harmful influence of antisocial elements such as smugglers and poachers.

## Conservation Perspectives

The Eastern Ghats still have some "Ecological Islands" that harbor endemic orchids. Consideration of these areas of at-risk endemic plants for designation as Biosphere Reserves will help preserve orchids. Public participation is needed to implement an integrated forest management plan that will achieve sustainable forest productivity and resource monitoring on a continuing basis. Holistic planning with long-term monitoring of resources will help identify commercially harvestable species. Such a management plan likely will include silvicultural practices and selection of orchid species for reintro-

FIGURE 2. Sustainable orchid uses in India; *Rhyncostylis retusa.*

duction. The plan must also address control of forest fires, fertilizer use, and grazing. Management practices can improve the organic content of forest litter and decrease soil erosion, thus improving soil fertility. Polyculture or mixed forest development, selected to match the topography, will promote conservation of orchid habitats in Eastern Ghats. Introduction of exotic plant species, however, needs to be managed with care, based on economic needs and overall land and forest productivity. Land managers must ensure that exotics do not become weeds or hosts for diseases and pests. Such a conservation action plan waits to be implemented.

Establishment of joint forest management (JFM) projects and forest protection organizations known as Vana Samrakhana Samithi (VSS) are needed to reduce the swidden or shifting cultivation practiced by tribal groups. The land and soil needs to be improved. Water quality also can be improved through watershed management and rainwater harvesting, with construction of holding ponds. Research on tissue culture techniques can promote orchid propagation. Development of orchid societies in each state of India is recommended. Self-help groups can improve environmental education, which is needed to achieve sustainable development of natural resources, including orchids (FIGURE 2). Finally, the existing orchid habitats in Eastern Ghats need to be designated as sanctuaries or national parks to conserve orchids systematically.

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