



Atlas of Mangrove Wetlands of India. Part 1 – Tamil Nadu. V. Selvam *et al.* 2001. 99 pp; **Part 2 – Andhra Pradesh.** T. Ravishankar *et al.* 2004. 135 pp. **Part 3 – Orissa.** T. Ravishankar *et al.* 2004. 102 pp. and **Heritage of Mangrove Wetlands of the East Coast of India: Conservation and Sustainable Management** (A summary of the above-mentioned three books). 2004, 39 pp. M. S. Swaminathan Research Foundation, 3rd Cross Street, Taramani, Institutional Area, Chennai 600 113. Price not mentioned.

Mangrove forests are among the world's most productive tropical ecosystems, lying between land and sea. They are endowed with rich living resources that provide forestry and fishery products to a large human population. The mangroves protect coastal zones from erosion and provide food and shelter for a large number of fishes, birds and wild animals. However, mangrove habitats are under serious threat of destruction, mainly due to human interference. With continuing decline in the ecosystem, it is critical to understand better about its conservation and management^{1,2}. In this context, M. S. Swaminathan Research Foundation (MSSRF), Chennai initiated a detailed study of mangrove wetlands management in 1996 in the states of the east coast of India, with financial support from the India-Canada Environment Facility. Based on information collected from 1996 to 2004, MSSRF has published a comprehensive mangrove atlas for Tamil Nadu, Andhra Pradesh and Orissa, which is being reviewed here.

Tamil Nadu has two prominent mangrove wetlands at Pichavaram and Muthupet, located in the Cauvery delta. A total of 13 mangrove species that also include an endemic species of *Rhizophora*, are present in the state. The forest cover increased by about 30% from 20.92 km² in 1985 to 27.28 km² in 2002. This increase is mainly due to restoration activities undertaken jointly by MSSRF, the Forest Department

and the local user community. Regarding land-use pattern, aquaculture farms are a major development around the mangrove wetlands, followed by saltpan. There is a prospect for development of eco-friendly sea-water farming in about 100 km² of hyper-saline mudflat north of the Muthupet Reserve Forest. A large population depends upon the mangrove wetlands for its livelihood – about 3000 fisherfolk on 300 ha of water bodies in Pichavaram and about 4000 on 1700 ha of water bodies in Muthupet. Grazing is one of the reasons for the degradation of mangroves in the peripheral area of Pichavaram. Some 75 families depend on mangrove firewood for their subsistence in Muthupet. Two major management concerns which warrant immediate attention are: (i) preventing further reduction in freshwater flow, and (ii) introducing the Joint Mangrove Management (JMM) System for people's participation. Some valuable suggestions are made in this regard: (i) any activity that would block the flow of freshwater into mangrove wetlands should be prevented; (ii) at least the current level of flow is to be maintained; (iii) the possibility of increasing freshwater flow from the nearby watershed areas needs to be explored, and (iv) JMM System has to be strongly supported for people's participation to protect mangroves against any social pressure such as grazing and firewood collection for subsistence. While revising this atlas for Tamil Nadu, mangrove species can be given along with their names in local language along with their status. In Pichavaram mangrove forest, the presence of *Rhizophora tamarckii* as given in Table 2.2 is doubtful.

Andhra Pradesh has two important mangrove wetlands: the Godavari mangroves located in the northern part of the Godavari delta and the Krishna mangroves in the mouth of River Krishna. A total of 17 mangrove species and 18 associate species are present with an endemic mangrove species, *Scyphiphora hydrophyllacea* and a rare mangrove associate species, *Tamarix troupii*. The forest cover has increased by 23% from 217.27 km² in 1986 to 267.12 km² in 2004. Due to restoration and regeneration, the forest cover has gone up by 39.88 km² in the Godavari wetlands and by 38.23 km² in the Krishna wetlands. However, 31.50 km² cover has been lost in the Godavari area due to land-use activities. About 6.50 km² of mangrove forest in the Godavari and a

large area of paddy field around the Krishna mangroves have been converted for the development of aquaculture. About 143.40 km² mudflat areas within the Reserved Forest of Krishna wetland are a potential site for mangrove restoration. Human populations dependent on the mangrove wetlands for their livelihoods are 31,065 for the Krishna and 77,400 for the Godavari. A serious threat to some parts of the Godavari mangroves is pressure from grazing by stray cattle. Three major management issues have been brought out for the mangroves of Andhra Pradesh: (i) Reduction in freshwater flow in the Krishna mangroves – The river discharge from the barrage at Vijayawada has reduced by 400 m³/s from 1964–65 to 1995–96. This might have resulted in the formation of a sand bar in the mouth region, which prevents free flow of tidal water in and out of the mangroves. No such problem is noticed in the Godavari. However, geomorphological changes in the Nilarevu estuary may reduce inflow into the Coringa mangroves. (ii) Development of prawn farms – The effluent discharged from aquafarms into mangrove waters are not flushed out completely due to the existing water current patterns and this may have an effect on loss of bio-resources in the long run. (iii) Over-exploitation of mangrove resources – Over-exploitation of wood resources by the local community and by cattle imposes heavy pressure on sustenance of mangrove vegetation. Some suggestions made in this regard are: (i) water-based income-generating activities for the fishing community must be explored and tapped, and (ii) providing alternative wood and fodder resources to the local communities in a sustainable way should be given priority in the management of the mangroves. While revising this publication, there should be a clear mention about the month/season and depth of soil profile at which the analysis has been made for the levels of salinity, pH and phosphorus respectively in figures 3.6, 3.7 and 3.8.

Orissa has three important mangrove wetlands at the Mahanadi, Brahamani-Baitarani delta and at the mouth of River Devi. The Bhitarkanika mangroves are located in the area where the rivers, Brahamani and Baitarani meet the sea; they are the richest in biodiversity, including a number of endangered and rare animals such as salt-water crocodile, water monitor and king cobra; and, hence the

Bhitarkanika mangroves were declared as a National Park in 1988 and a Ramsar site in 2002. A total of 32 true mangrove species and 29 associate species are present with an endemic species, *Heritiera kanikensis* and with large numbers of highly valued timber species, *Heritiera fomes* and *H. littoralis*. The forest cover has gone up 63% from 2.58 km² 1985 to 4.21 km² in 2004 in the Devi mouth mangroves, and by 3 km² in the Mahanadi wetland from 1996 to 2004. This is due to restoration and natural regeneration in newly formed mudflats. Regarding land-use pattern, development of aquaculture farms is a major change around the mangrove wetlands between 1985 and 2004. About 9 km² of mangroves was cleared for prawn farms in the Mahanadi mangroves. A total human population of 3.6 lakhs in 100 villages is dependent on mangroves of the Bhitarkanika Wildlife Sanctuary for its livelihood. The local communities use almost all species of mangroves for house construction, fencing and farming implements. They also use mangrove forests as grazing grounds for cattle and mangrove water creeks for fishery resources. Two forest products, honey and grass for basket-weaving and mat-weaving are available in abundance in the Bhitarkanika mangroves. Therefore, grass-roots level institutions have successfully been formed for participatory management of mangroves through a method called 'Thengapalli'. In this, two or three families join together and patrol the mangrove areas by carrying a stick, which is handed over to another batch the next day and thus the entire village protects the area in a true spirit of community participation. Three major management issues have been proposed in this atlas. They are: (i) conversion of mangrove forests, (ii) maintenance of freshwater flow, and (iii) people's participatory approach. Some suggestions made in this regard are: (i) the policy on land use around mangrove wetlands needs to be strengthened and strictly enforced for the long-term conservation of mangroves; (ii) periodical monitoring of the quantity and periodicity of freshwater flowing into the mangrove wetlands is necessary, and (iii) 'Thengapalli' being followed in Orissa can be extended to all other areas to restore and conserve the mangrove wetlands. There are few corrections to be made in the publication: (i) levels of water salinity given as percentage in Map 3.7 are not correct. (ii) Is the density of species in terms of m/ha correct, as given in Table 4?

The booklet entitled *Heritage of Mangrove Wetlands of the East Coast of India* has vividly summarized the major findings reported in the mangrove atlases of Tamil Nadu, Andhra Pradesh and Orissa along with a detailed report of the JMM.

MSSRF and State Forest Departments have successfully demonstrated a pilot project on JMM. This is a breakthrough in restoration and conservation of mangrove wetlands through people's participatory approach in Tamil Nadu, Andhra Pradesh and Orissa. The JMM has brought about 120 km² area of mangroves and 5240 families as members from 28 villages in the three states. About 14.75 km² of mangrove area has been restored through planting of 6.8 million mangrove saplings with 75–80% survival. To ensure empowerment of people, 194 self-help groups have been organized through which poverty alleviation programmes have been implemented, such as alternate income-generating activities for firewood, fodder, fencing and house construction. Based on this pilot project, comprehensive guidelines for promoting JMM in India have been proposed. The success story of MSSRF in providing technical inputs in identifying the causes for degradation, developing restoration techniques, and mobilizing and organizing the local community deserves great appreciation. This model developed for JMM has to be replicated in other fishing and farming hamlets.

The mangrove atlas of India for the above-said three states is a wealth of information on mangrove resources based on scientific principles, which would be of immense help for the user agencies to develop management action plans. The lucid presentation of data in the form of GIS maps along with colourful photographic evidences are highly commendable. The books have filled the knowledge gap between the scientific community and the user agencies. They have to be published further in local languages for the benefit of field staff of the Forest Department, village administration and NGOs. Information pertaining to the months of availability of seeds or propagules of mangrove species and more potential areas for undertaking plantation need to be incorporated in the revised publication. I congratulate MSSRF for accomplishing the arduous task for the cause of mangrove conservation and management.

1. Kathiresan, K., *Hydrobiologia*, 2000, **430**, 185.

2. Kathiresan, K. and Bingham, B. L., *Adv. Mar.*, 2002, **40**, 31.

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Scientific Writing. Easy When You Know How. J. Peat, *et al.* Byword Viva Publishers Private Ltd, A-217 Smdatt Chambers I, Bhikaiji Cama Place, New Delhi 110 066. Indian edition. First published by BMJ Publishing group 1994. ISBN 81-8193-003-7. First Indian edition 2004. 292 pp. Price: Rs 295.

The best part of the book is that it is a reasonable compendium of a whole lot of medical referencing and publication practices, with good internet cross-references. One hopes that it is reasonably current.

Should you read and benefit by this book? Go to Table 1. If your rating exceeds 5, go for the book. Similar scores are available with the reviewer for non-clinicians. I thank the authors of this book for the style of the table, the book being full of them.

Table 1.

Your attributes	Points
A clinician yuppie	1
A clinician without publications, but a new job	2
As in two, but the job requires publications for confirmation	3
There are three others competing for the same job	4
Everybody knows you depend on a statistician to do <i>t</i> test	5
You are an Asian without much knowledge of English	3
You will chuck this anyway and go for that consultancy in Vienna or Gorakhpur(?)	0

Summary of Table 1. If you are a clinician with no formal training in science, and if you are opting for studies and their publication for extrinsic reasons and do not have the energy for acquiring the nitty-