



ENVIS Newsletter

on wetland ecosystems and inland wetlands

Sarovar Saurabh

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Vandalur wetlands, Photo courtesy P. Nehru



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Views expressed in the articles of this newsletter are of the authors only.

Instructions to Contributors

We welcome original research and popular articles, reviews, reports, research highlights, notes, news, snippets, etc., related to the thematic area of the ENVIS centre for publication in 'Sarovar Saurabh the ENVIS Newsletter on Wetland ecosystems and inland wetlands'.

The articles and other information should be neatly typed in double space not exceeding five pages. The figures/graphs/ drawings should be of good quality and clarity. Photographs should be of minimum 300 dpi resolution. References should be limited and cited in the text by name and year. Council of Science editors style may be referred to for listing references at the end.

Email your articles in MS word 2003 or 2007 format to sacon-env@nic.in or salimalicentre@gmail.com

Or send the articles in hard and soft copy by post to

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From the Editors desk.....

Our country has taken serious steps in promoting conservation of its Natural resources as it readies itself for the COP 11 to be held in Hyderabad in 2012; a landmark event. Among the several measures, the Government has promulgated the Wetland rules for the country, furthering its commitment to conserve the natural resource that provides both ecological and economic benefits.

Through this newsletter we bring you the 'Wetland Rules – 2010' brought into effect to protect and conserve its wetlands. Further there are write-ups that document the wetlands that are lesser known but provide crucial ecological benefits. The news article reproduced here speaks of the concerns of the authorities for conserving the country's' Natural heritage.

The ENVIS team at SACON looks forward to your constructive suggestions, write-ups on relevant issues, news and feedbacks in reaching out through this Newsletter to the public and to disseminate information on wetlands and need for the conservation of these invaluable natural resource.

P.A. Azeez.

Wetland Rules – 2010

Ministry of Environment and Forests

Notification

New Delhi, the 4th December, 2010 (G.S.R. 951 (E)) &

New Delhi, the 24th March, 2011 (G.S.R. 952 (E))

The Gazette of India, Extraordinary, Part II- Section 3- Sub section (I).

Published by Authority, Printed by the Manager, Government of India Press New Delhi 110064.

WHEREAS the wetlands, vital parts of the hydrological cycle, are highly productive, support exceptionally large biological diversity and provide a wide range of ecosystem services, such as waste assimilation, water purification, flood mitigation, erosion control, ground water recharge, microclimate regulation, aesthetic enhancement of the landscape while simultaneously supporting many significant recreational, social and cultural activities, besides being a part of the cultural heritage;

AND WHEREAS many wetlands are seriously threatened by reclamation through drainage and landfill, pollution (discharge of domestic and industrial effluents, disposal of solid wastes), hydrological alterations (water withdrawal and inflow changes) and over exploitation of their natural resources resulting in loss of biodiversity and disruption in goods and services provided by wetlands;

AND WHEREAS India is a signatory to the Ramsar Convention for the conservation and wise use of wetlands, which includes in its ambit a wide variety of habitats, such as rivers and lakes, coastal lagoons, mangroves, peatlands, coral reefs and numerous man-made wetlands, such as ponds, farm ponds, irrigated agricultural lands, sacred groves, saltpans, reservoirs, gravel pits, sewage farms and canals;

AND WHEREAS the Central Government has identified certain wetlands for conservation and management under its conservation programme and provides financial and technical assistance to the State Governments and Union territory Administrations for various conservation activities through approval of the Management Action Plans;

AND WHEREAS the National Environment Policy, 2006 recognises the ecological services provided by wetlands and emphasizes the need to set up a regulatory mechanism consistent with the Ramsar Convention to maintain the ecological character of the identified wetlands and develop a national inventory of such wetlands;

NOW, THEREFORE, in exercise of the powers conferred by section 25, read with sub-section (1) and clause (v) of sub-section (2) and sub-section (3) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules for conservation and management of wetlands, namely:-

1. Short title and commencement:-

(1) These rules may be called the Wetlands

(Conservation and Management) Rules, 2010.

(2) They shall come into force on the date of their publication in the official Gazette.

2. Definitions:-

(1) In these rules, unless the context otherwise requires:

(a) "Act" means the Environment (Protection) Act, 1986 (29 of 1986);

(b) "Authority" means the Central Wetlands Regulatory Authority constituted under rule 5;

(c) "dredging" means an excavation activity or operation usually carried out at least partly underwater, in shallow sea or fresh water areas with the purpose of gathering up bottom sediments and disposing them off at a different location;

(d) "National Park" means an area declared, as National Park under section 35 or section 38, or deemed to be declared as a National Park under sub-section (3) of section 66, of the Wild Life (Protection) Act, 1972 (35 of 1972)

(e) "Ramsar Convention" means the Convention on Wetlands signed at Ramsar, Iran in 1971;

(f) "UNESCO" means the United Nations Educational, Scientific and Cultural Organisation;

(g) "wetland" means an area or of marsh, fen, peatland or water; natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six meters and includes all inland waters such as lakes, reservoir, tanks, backwaters, lagoon, creeks, estuaries and manmade wetland and the zone of direct influence on wetlands that is to say the drainage area or catchment region of the wetlands as determined by the authority but does not include main river channels, paddy fields and the coastal wetland covered under the notification of the Government of India in the Ministry of Environment and Forest, S.O. number 114 (E) dated the 19th February, 1991 published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii) of dated the 20th February, 1991;

(h) "wildlife sanctuary" means an area declared as a wildlife sanctuary under the provisions of Chapter IV of the Wildlife (Protection) Act, 1972 (35 of 1972) and shall include an area

deemed to be sanctuary under sub section (4) of section 66 of, the said Act.

- (2) The word and expressions used in these rules and not defined but defined in the Act, shall have the meaning respectively assigned to them in the Act.

3. Protected wetlands:-

Based on the significance of the functions performed by the wetlands for overall well being of the people and for determining the extent and level of regulation, the following wetlands shall be regulated under these rules, namely:-

- (i) wetlands categorized as Ramsar Wetlands of International Importance under the Ramsar Convention as specified in the Schedule.
- (ii) wetlands in areas that are ecologically sensitive and important, such as, national parks, marine parks, sanctuaries, reserved forests, wildlife habitats, mangroves, corals, coral reefs, areas of outstanding natural beauty or historical or heritage areas and the areas rich in genetic diversity;
- (iii) wetlands recognised as or lying within a UNESCO World Heritage Site;
- (iv) high altitude wetlands or high altitude wetland complexes at or above an elevation of two thousand five hundred metres with an area equal to or greater than five hectares;
- (v) wetlands or wetland complexes below an elevation of two thousand five hundred metres with an area equal to or greater than five hectares;
- (vi) any other wetland as so identified by the Authority and thereafter notified by the Central Government under the provisions of the Act for the purposes of these rules.

4. Restrictions on activities within wetlands:-

- (1) The following activities within the wetlands shall be prohibited, namely:-
- (i) reclamation of wetlands;
 - (ii) setting up of new industries and expansion of existing industries;
 - (iii) manufacture or handling or storage or disposal of hazardous substances covered under the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 notified vide S.O. number 966 (E) dated the 27th November, 1989 or the rules for Manufacture, Use, Import, Export and Storage of Hazardous Micro-organisms / Genetically engineered organisms or cells notified vide GSR number 1037 (E) dated 5th December, 1989 or the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 notified vide S.O. number 2265 (E), dated the 24th September, 2008;
 - (iv) solid waste dumping: provided that the existing practices, if any, existed before the

commencement of these rules shall be phased out within a period not exceeding six months from the date of commencement of these rules;

- (v) discharge of untreated wastes and effluents from industries, cities or towns and other human settlements: provided that the practices, if any, existed before the commencement of these rules shall be phased out within a period not exceeding one year from the date of commencement of these rules;
 - (vi) any construction of a permanent nature except for boat jetties within fifty metres from the mean high flood level observed in the past ten years calculated from the date of commencement of these rules.
 - (vii) Any other activity likely to have an adverse impact on the ecosystem of the wetland to be specified in writing by the Authority constituted in accordance with these rules.
- (2) The following activities shall not be undertaken without the prior approval of the State Government within the wetlands, namely:-
- (i) withdrawal of water or the impoundment, diversion or interruption of water sources within the local catchment area of the wetland ecosystems;
 - (ii) harvesting of living and non-living resources;
 - (iii) grazing to the level that the basic nature and character of the biotic community is not adversely affected;
 - (iv) treated effluent discharges from industries, cities or towns, human settlements and agricultural fields falling within the limits laid down by the Central Pollution Control Board or the State Pollution Control Committee, as the case may be;
 - (v) plying of motorized boat, if it is not detrimental to the nature and character of the biotic community;
 - (vi) dredging, only if the wetland is impacted by siltation;
 - (vii) construction of boat jetties;
 - (viii) activities within the zone of influence, as per the definition of wetlands, that may directly affect the ecological character of the wetland;
 - (ix) facilities required for temporary use, such as pontoon bridges, that do not affect the ecological character of the wetland;
 - (x) aquaculture, agriculture and horticulture activities within the wetland;
 - (xi) repair of existing buildings or infrastructure including reconstruction activities.
 - (xii) any other activity to be identified by the Authority.
- (3) Notwithstanding any in sub-rule (1) or sub-rule (2), the Central Government may permit any of the prohibited activities or non-wetland use in the protected wetland on the recommendation of the Authority.
- (4) The State Government shall ensure that a detailed Environment Impact Assessment is carried out in

accordance with the procedures specified in the notification of the Government of India in the Ministry of Environment and Forests S.O. number 1533 (E) dated the September 14th, 2006 as amended from time to time.

- (5) No wetland shall be covered to non-wetland use unless the Central Government is satisfied on the recommendation of the Authority that is expedient in the public interest and reasons justifying the decision are recorded.

5. Constitution of Central Wetlands Regulatory Authority:-

(1) The Central Government, in exercise of the powers conferred by sub-section (3) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986), hereby constitutes Central Wetlands Regulatory Authority constituting of the following Chairpersons and members for the purpose of these rules, namely:-

- (a) Secretary, Ministry of Environment and Forests, Government of India – Chairperson;
- (b) a representative (not below the rank of Joint Secretary) from Ministry of Tourism, Government of India – Member ex-officio;
- (c) a representative (not below the rank of Joint Secretary) from Ministry of Water Resources, Government of India – Member ex-officio;
- (d) a representative (not below the rank of Joint Secretary) from Ministry of Agriculture, Government of India – Member ex-officio;
- (e) a representative (not below the rank of Joint Secretary) from Ministry of Social Justice, Government of India – Member ex-officio;
- (f) Chairman or his nominee, the Central Pollution Control Board – Member ex-officio;
- (g) Joint Secretary or Adviser, dealing with the wetland in the Ministry of Environment and Forests, Government of India, member ex-officio;
- (h) Dr. Asad R. Rahmani, Director, Bombay Natural History Society, Hornbill House, Dr. Salim Ali Chowk, Shaheed Bhagat Singh Road, Mumbai 400 023; Expert Ornithology – member;
- (i) Prof. A.R. Yousuf, Dean, Academic Affairs and Biological Sciences University of Kashmir, Srinagar, Jammu and Kashmir; Expert Limnology – member;
- (j) Dr. C.K. Varshney, 88 Vaishali, Pitampura, New Delhi – 110034; Expert Ecology – member;
- (k) Dr. E.J. James, Director, Water Institute, Karunya University, Coimbatore, Tamil Nadu; Expert Hydrology – member;

(l) Director or Additional Director or Joint Director dealing with the Wetland in the Ministry of Environment and Forests – Member Secretary.

(2) The term of the Authority shall be three years effected from the date of publication of the notification referred to in sub-rule (1).

(3) The Authority shall exercise the following powers and perform the following functions, namely:-

- (i) appraise proposals for identification of new wetlands, projects or activities in consultations with the concerned local authorities;
- (ii) identify and interface with the concerned local authorities to enforce the provisions contained under these rules and other laws for the time being in force;
- (iii) grant clearances or identify in consultation with the local state government, the areas for the grant of clearance for regulated activities in the wetlands within their respective jurisdictions;
- (iv) determine, in consultation with concerned local authority, the zone of direct influence of the wetlands;
- (v) issue whatever directions, necessary for the conservation, preservation and wise use of wetlands to the State Governments.

(4) The Authority shall periodically review the list of wetlands and the details of prohibited and regulated activities under the rules.

(5) The Authority shall specify the threshold levels for activities to be regulated and the mode and methodology for undertaking activities in wetland.

6. Process for identification of wetlands under different categories:-

- (1) Wetlands covered under item (i) of rule 3 specified under Schedule shall be the wetland to be regulated under these rules.
- (2) The States Government shall prepare, within a period of one year from the commencement of these rules, 'Brief Document' identifying and classifying the wetlands within their respective territories in accordance with the criteria specified under Rule 3 and submit the same to Authority.
- (3) The 'Brief Document' of each wetland for identification shall comprise of following information, namely:-
 - I) broad geographic delineation of the wetland;
 - ii) its zone of influence along with a map (accurate and to scale);
 - iii) the size of the wetland;
 - iv) account of pre-existing rights and privileges, consistent or not consistent with the ecological health of the wetland.

- (4) The Authority, shall on receipt of the 'Brief Document' under sub-rule (2), if consider it necessary refer in consultation with the State Government to a research institute or university having relevant multi-disciplinary expertise related to wetlands, to conduct a comprehensive survey of the wetland within a period of thirty days: provided that the institute or university to which the matter has been referred under sub-rule (4) shall submit a report within next ninety days from the date of such reference to Authority, which shall contain information with respect to the criteria specified under rule 3.
- (5) The Authority shall, thereafter, arrive at a decision in consultation with the State Government, on the proposal, within a period of ninety days from the date of receipt of the report under sub-rule (4).
- (6) The Central Government shall on the receipt of the recommendation of the Authority notify the area of wetlands as recommended by the Authority for public information inviting objections and suggestions from the general public likely to be affected to make representation to the Central Government within a period of sixty days;
- (7) The Authority shall consider all the representations which the Central Government may receive under sub-rule (6) and submit its recommendation on the such representations to Central Government within a period of sixty days for final notification;
- (8) The Central Government shall on receipt of the recommendations of the Authority under sub-rule (7) issue a final notification notifying therein the area of the wetland its category or classification to be regulated under these rules and display the said notification in public places in English and vernacular languages.
- (9) The Authority may, suo moto or on application made to it, review any decision under these rules or issue direction for inclusion of wetland under these rule.
7. Overlapping provisions:-
- (1) The wetlands within the protected areas of the National Parks and Wildlife Sanctuaries shall be regulated by the provisions of Wildlife (Protection) Act, 1972 (35 of 1972).
- (2) The wetlands within the protected or notified forest areas shall be regulated by the provisions of the Indian Forest Act, 1927 (16 of 1972); the Forest (Conservation) Act, 1980 (69 of 1980); and the Environment (Protection) Act, 1986 (29 of 1986).
- (3) The gaps in the regulation of wetlands within the protected and notified forest areas, if any, under the provisions of the Indian Forest Act, 1927; Wildlife (Protection) Act 1972; and Forest (Conservation) Act, 1980; shall be plugged by invoking provisions of the Environment (Protection) Act, 1986.
- (4) The wetlands situated outside the protected or notified forest areas referred to in sub-rule (2) shall be regulated by the relevant provisions of the Environment (Protection) Act, 1986 (29 of 1986).

8. Enforcement of regulated activities:-
- (1) The identified activities for management and wise use of wetlands situated within the protected or notified forest areas referred to in sub rule (2) of rule 7 shall be regulated by the Forest Department of the State concerned.
- (2) The identified activities for management and wise use of wetlands situated outside the protected or notified forest areas shall be regulated by the nodal Department or the relevant local state agencies to be designated by the State Government within a period of six months from the date of commencement of these rules.
9. Appeals against the decisions of Authority:-
Any person aggrieved by the decision of the Authority may prefer an appeal to the National Green Tribunal constituted under the National Green Tribunal Act, 2010 (19 of 2010) with in a period of sixty days from the date of such decision: Provided the National Green Tribunal may entertain any appeal after the expiry of the said period of sixty days if it is satisfied that the appellant was prevented by sufficient cause from filing the appeal in time.

THE SCHEDULE

[see-rule 3(I)]

List of wetlands in India identified as Ramsar sites under Ramsar Convention on Wetland

Serial Number	Name of Wetland	State
(1)	(2)	(3)
1.	Ashtamudi Wetland	Kerala
2.	Bhitarkanika Mangroves	Orissa
3.	Bhoj Wetland	Madhya Pradesh
4.	Chilika Lake	Orissa
5.	Deepor Beel	Assam
6.	East Calcutta Wetlands	West Bengal
7.	Harike Lake	Punjab
8.	Kanjli	Punjab
9.	Keoladeo National Park	Rajasthan
10.	Kolleru Lake	Andhra Pradesh
11.	Loktak Lake	Manipur
12.	Point Calimere Wildlife and Bird Sanctuary	Tamil Nadu
13.	Pong Dam Lake	Himachal Pradesh
14.	Ropar	Punjab
15.	Sambhar Lake	Rajasthan
16.	Sasthamkotta Lake	Kerala
17.	Tsomoriri	Jammu and Kashmir
18.	Vembanad-Kol Wetland	Kerala
19.	Wular Lake	Jammu and Kashmir
20.	Chandratal	Himachal Pradesh
21.	Renuka	Himachal Pradesh
22.	Rudrasagar	Tripura
23.	Upper Ganga	Uttar Pradesh
24.	Hokarsar (Hokera)	Jammu and Kashmir
25.	Surinsar and Mansar (complex)	Jammu and Kashmir.

[F. No. J-22012/31/05-CS (W)]

R. Mehta, Adviser

Role of ephemeral plants in wetlands with examples from Tamil Nadu

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Ephemerals are a peculiar plant community that can take the advantage of water resources and temperature conditions in monsoon and post-monsoon seasons to rapidly complete their life-cycle in about two months. They mainly occur in tropical regions such as Central Asia, Mediterranean Coast, West Asia and North Africa. In the wetland ecosystem ephemerals grow gregariously along the edges of receding water spread in lakes, ponds, river margins, seasonally flooding plains and agriculture fields. They complete their lifecycle and perish once the soil substratum is totally devoid of moisture. During their growth and development ephemerals such as *Lindernia spp.*, *Eriocaulon spp.* and *Hydrolea spp.* etc form a green carpet with attractive colored flowers all along the dry parts of wetlands and improves the scenic beauty.

In general ephemeral plants are classified into three categories (i) Spring ephemerals- grow and reproduce in a short period of time when sufficient light is available during spring (ii) Weedy ephemerals- take advantage of open space and good soil moisture for their growth and reproduction and dies off completely leaving behind dormant seeds for the next season (iii) Desert ephemerals - are adapted to take advantage of the short wet periods in arid climates. Ephemeral herbs increase the nutrient stability in wetlands by serving as a temporary sink for nutrients (Muller and Bormann 1976). During their short life span ephemerals take up and accumulate soil nitrogen that would otherwise be lost from the ecosystem by leaching. This accumulated nitrogen replenishes the soil through microbial degradation of the ephemeral plant parts, stabilizes the soil nitrogen make it available for other plants and improves nitrogen content in water during monsoon so that the aquatic micro organisms will grow faster to support the survival of other related wetland flora and fauna (Rothstein 2000). During this process ephemerals compete with other perennial herbs and accumulate more nitrogen within a short life span. In recent times the ephemeral plant communities are used as a model system to study the effects of climate change and rain fall decline which directly influences the ecosystem stability of wetlands (Pyke and Marty 2005). Here we have given an account of some rare and attractive ephemerals such as *Drosera indica*, *D. burmannii*, *Habenaria viridiflora*, *Dopatrium junceum* and *Lindernia crustacea* that are observed in Tamil Nadu.

Drosera burmannii Vahl, Symb. Bot. 3: 50. 1794.

Herbs, leaves forming a flat rosette, subsessile or petiolate, spatulate, 6-10 × 5-7 mm, base attenuate, with glandular trichomes or glabrous, apex fimbriate. Inflorescence scapiform; racemes 1 or 2, c. 10 cm, glabrous or with red to reddish violet glands, 2-19-flowered. Flowers white to light red. Capsule 5 or 6valved. Seeds dark-brown to black.

Flowering and Fruiting: December - February. Habitat: Sea level to 1500 m; Shaded wet places, ridges between rice fields, soggy soils, lowland to mountain areas. Ecology: Plants exposed to full sunlight where the reflection of the sunlight from the dew-like glycosaminoglycan droplets secreted by the glandular trichomes; are visually more attractive to insects, an important source of nutrients for the *Drosera* plants (Saridakis et al 2004).

Distribution: India, South East Asia and Australia. Found in all districts of Tamil Nadu.



Drosera burmannii Photo Courtesy-P. Nehru



Drosera indica, Photo Courtesy - P. Nehru

Drosera indica Linnaeus, Sp. Pl. 1: 282. 1753.

Herbs, 10-20 cm tall. Leaves cauline, alternate, sparse with greenish red glandular hairs, 4-12 cm × 1-3 mm, pubescent or glabrous, apex acute. Racemes axillary, 6-15 cm, 1-20-flowered; flowers white, light red or reddish violet, c. 1 cm across. Capsule globose-obovoid, 3valved, 4-6 mm. Seeds black, small; venation thick and scrobiculate.

Flowering and Fruiting: December - February.

Ecology: Soggy soils; sea level to 600 m.

Distribution: Africa, East and South East Asia, Australia. Found in all districts of Tamilnadu.

Habenaria viridiflora (Rottler ex Swartz) R. Brown, Prodr. 312. 1810. Tuberosous herbs, 10-20 cm tall. Stem erect, slender, rigid, glabrous, base with 4 - 6 leaves. Leaf blade linear, 5-10 × 0.4-0.6 cm, base amplexicaul, apex acuminate or acute. Racemes 10-20 cm, with more than 10-flowers. Flowers yellowish green, c. 2.5 x 1 cm, glabrous; spur pendulous, cylindric, c. 1.6 cm, much longer than ovary, slender; pollinia obovoid; caudicles short; stigmas clavate.

Flowering and Fruiting: December - February.

Habitat: Waterlogged areas, sea level to 500 m ASL.

Distribution: Cambodia, India, Laos, Sri Lanka, Thailand, Vietnam.

Found in Kancheepuram, Namakkal, Pudukkottai, Salem, Tiruchchirappalli districts of Tamil Nadu.



Habenaria viridiflora, Photo Courtesy - P. Nehru



Dopatrium junceum, Photo Courtesy - P. Nehru

Dopatrium junceum (Roxburgh) Buchanan-Hamilton ex Bentham, Scroph. Ind. 31. 1835.

Herbs, 20 - 50 cm tall. Stems succulent, erect, glabrous. Leaves opposite, gradually decreasing in size upward, sessile, lanceolate to subspatulate-lanceolate, to 2 cm. Flowers solitary in leaf axils, white, rose, or pale purple. Capsule globose, ca. 2 mm in diam. Seeds ovoid-oblong.

Flowering and fruiting: January- February

Habitat: Rice fields, wet places; below 1800 m.

Distribution: Bhutan, India, Indonesia, Japan, Malaysia, Philippines, Thailand, Vietnam, Australia. Found in Coimbatore, Cuddalore, Dindigul, Kancheepuram, Kanniyakumari, Theni, Thiruvallur, Tiruchchirappalli, Tirunelveli, Tiruvannamalai, Viluppuram districts of Tamilnadu

Lindernia crustacea (Linnaeus) F. Mueller, Syst. Census Austral. Pl. 1: 97. 1882.

Herbs, 10-20 cm tall. Leaves ovate, 1-2 x 0.5-1.5 cm, base broadly cuneate to rounded, margin shallowly crenate or serrate, apex obtuse to subacute, subglabrous. Flowers axillary and solitary or in short apical racemes, purple, 5-8 mm. Capsule broadly ellipsoid, almost as long as persistent calyx. Seeds pale yellow-brown, subglobose, scrobiculate.

Flowering and Fruiting: January - April

Habitat: Moist areas, rice fields, grassland, trail sides; sea level to 1300 m.

Distribution: widely distributed in tropics and subtropics. Found in all districts of Tamilnadu.



Lindernia crustacea, Photo Courtesy - P. Nehru

Reference:

Muller, R.N. and Bormann, J.H. 1976. Role of *Erythronium americanum* Ker. in energy flow and nutrient dynamics of a northern hardwood forest ecosystem. *Science* 193:1126-1128.

Pyke, C.R. and Marty, J. 2005. Cattle grazing mediates climate change impacts on ephemeral wetlands. *Conservation biology* 19(5): 1619- 1625.

Rothstein, D.E. 2000. Spring ephemeral herbs and nitrogen cycling in a northern hard wood forest: an experimental test of the vernal dam hypothesis. *Oecologia* 124: 446-453.

Saridakis, D.P., Torezan, J.M.D. and Andrade, G. 2004. Microhabitat preferences of six *Drosera* (Droseraceae) from Tibagi River Basin, Parana State, Brasil. *Brazilian Archives of Biology and Technology* 47(4): 495-501.

The birds observed at Kottuli wetlands, Kerala

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Abstract

Birds are considered to be one of the reliable indicator species, and a user friendly means for biological appraisal of a wetland. The present study documents the avian fauna of the Kottuli wetlands, an urban wetland located amidst the Calicut city of Kerala. The study recorded 64 bird species, including 9 winter visitors, from the wetlands.

Introduction

Wetlands are considered as the most productive and biologically rich ecosystems that are now under a serious threat due to a range of anthropogenic pressures (Turner 1991, Verma *et al* 2003). Wetland conservation has received worldwide attention in the recent couple of decades since it is being recognized for several valuable services; help to humankind against various adversities such as water scarcity, flood, environmental pollution, and micro climatic vagaries. In comparison to the other states of India, Kerala stands first having large proportion of area under wetlands (Nayar and Nayar, 1997). The general topography of Kerala with undulating terrain having subdued hills and steep scarps with a wide range of altitude (from below mean sea level to 2,694 meters above mean sea level) make the state have vast area under wetlands. However, wetlands in Kerala face several anthropogenic threats. According to Nair and Sankar (2002), who mapped the wetland systems of Kerala using IRS satellite data, the state has in total 217 wetland units of which 157 units are more than 56.25ha. Most of the wetlands in the state were rice-cultivating areas as in the case of Kole, Pokkali or Kuttanad. Nevertheless, low agriculture returns added by the booming real estate business, most of the wetlands, coastal as well as inland, in the state face rapid conversion (Raj and Azeez, 2009); whereby, the wetlands in the state are one of the most rapidly and insidiously changing habitats.

Like all other types of wetlands, the mangroves of the state are under severe threat from anthropogenic pressures. Studies reveal that the state has almost completely lost its mangrove wetlands. The estimated area of mangroves in the state has reduced from 700 km² (Ramachandran *et al.*, 1985) to about 17 km² (Basha 1992, Kurien, *et al.*, 1994). The FSI using satellite imageries reported 800 ha of mangrove cover in the state that includes 300 ha moderately dense and 500 ha open mangroves. Currently, mangroves are restricted largely to the river mouths along the west coast of the state. The northern districts of Kerala; Kasargode, Kannur, Kozhikode, and Malappuram hold approximately 83% of the total area under mangroves in the state (www.kerenvis.nic.in).

Evaluating economical value or biological value is regarded as the best method of assessment to prioritize an ecosystem for conservation. Biological appraisal of a wetland using birds as indicator species is considered to be one of the most reliable, and user friendly methods (Mistry, 2008). Since birds are easily visible and are easily recognizable, they are valuable indicators of their habitats. They are also key species for education and to develop public awareness.

Kottuli wetland, located in the heart of Kozhikode city of Kerala, is one of the 94 wetlands of national importance identified by the Government of India for conservation action

under National Wetland Conservation Programme (MoEF, 2006-2007). The city is the third developing and populated (2030519 people Census of India 2011) city in Kerala. Recent pressures in the city especially from the real estate sector pose severe threat to the Kottuli wetlands. The Kottuli wetlands, situated (75°80'E, 11°25'N) towards the eastern portion of Calicut city along the National Highway (NH 17), is spread over 101.2 ha (Fig.1). The wetland is bounded by Connolly canal in the south-west, and Nedungottur, Chevayur and Nellikkode panchayaths in the northwest, northeast, and southeast boundaries respectively. This perennial wetland is connected with the Connolly canal, named after Lt Henry Valentine Connolly, which connects the northern Korapuzha River with the southern Kallayipuzha River, both open into the Arabian Sea separately.

Methods

To document the avian fauna of the area survey was conducted from February to June 2008, during early morning (06:00 to 10:00 hrs) and evening hours (17:00 to 19:00 hrs) adopting line transects as well as opportunistic counts (Bibby *et al* 1993). Birds heard or seen were recorded. The checklist was prepared using the common and scientific names from Grimmett *et al* (2000).

Observations

A total of 64 species of birds including 9 winter visitors were observed (Table.1) during the survey. Seedikkoya (2003) and Boby Jose (*Pers. Comm*) during an earlier study had recorded five more species. The family of herons, egrets and bittern constitutes larger number of birds seen here, and among the species observed, 27 species were wetland birds. Migratory birds seen here include Grey Heron (*Ardea cinerea*), Kentish Plover (*Charadrius alexandrinus*), Little Stint (*Calidris minuta*), Common Sandpiper (*Actitis hypoleucos*), Blue-tailed Bee-eater (*Merops philippinus*), Yellow Wagtail (*Motacilla flava*), Eurasian Golden Oriole (*Oriolus oriolus*), Black naped Oriole (*Oriolus chinensis*), and Ashy Drongo (*Dicrurus leucophaeus*). The density of species in the Kottuli wetland was 0.68 species/ha, considerably higher than the



Fig 1: Google map showing location of Kottuli wetlands

Kole wetlands of Kerala (0.0152 species/ha, Sivaperuman and Jayson 2000) or Pallikaranai wetlands of Tamil Nadu (0.0047 species/ha, Azeez *et al.*, 2007). The density of species is a good indicator of the richness of a habitat in terms of resource diversity and resource availability. The high density reflects the potential of the wetland to support larger number of species rather than larger number of individuals of a species. The high species density is also suggestive of the high ecological value of the Kottuli wetland. 240 floral species belonging to 85 families and 198 genera were recorded from the wetland and its close vicinity. The mangrove diversity comprised of five true mangrove species and 29 mangrove associates (Azeez *et al.*, 2009). This patch of mangroves perhaps is the only one that is currently enjoying protection in the vicinity of the city.

The Kottuli wetland is increasingly facing threats from the ongoing developmental changes, which in due course of time transform to decimate its biodiversity and ecological quality / values. It may be noted that the city has grown to its present glory over reclaimed wetlands. Several arterial roads, building complexes, hospitals and residences are raised on locations that were formerly wetlands or paddy fields abandoned to satiate the mounting real estate demands. The low lying wetlands, upon which the city has grown, were inundated throughout or at least for a notable period of the year. With bustling development activity, the city in the coming few years will lose all its low lying areas, wetlands and such natural habitats along with several of the bird and animals species, if appropriate conservation measures are not adopted. Along with the disappearing wetlands the city and its surroundings will also be deprived of the valuable ecological goods and services they offer. Attempts also may be made to protect the neighboring wetlands and prevent filling up, as they offer supplementary habitats for many wetland species. Further, it may be noted that filling adjacent portions diminish the ecological characteristics and quality of this wetland.

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Table1: Birds observed in Kottuli wetland

English name	Scientific name	Status
Little Grebe	<i>Tachybaptus ruficollis</i>	BR
Little Cormorant	<i>Phalacrocorax niger</i>	BR
Darter	<i>Anhinga melanogaster</i>	BR
Black Bittern	<i>Dupetor flavicollis</i>	BR
Cattle Egret	<i>Bubulcus ibis</i>	BR
Great Egret	<i>Casmerodius albus</i>	BR
Grey Heron	<i>Ardea cinerea</i>	WV
Little Egret	<i>Egretta garzetta</i>	BR
Purple Heron	<i>Ardea purpurea</i>	BR
Intermediate Egret	<i>Mesophoyx intermedia</i>	BR
Indian Pond Heron	<i>Ardea grayii</i>	BR
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	BR
Painted Stork	<i>Mycteria leucocephala</i>	BR
Asian Openbill++	<i>Anastomus oscitans</i>	BR
Black-headed Ibis++	<i>Threskiornis melanocephalus</i>	BR
Brahmini Kite	<i>Haliastur Indus</i>	BR
Black Kite	<i>Milvus migrans</i>	BR
Shikra	<i>Accipiter badius</i>	BR
Common Moorhen	<i>Gallinula chloropus</i>	BR
Purple Swamphen	<i>Porphyrio porphyrio</i>	BR
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	BR
Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	BR
Bronze-winged Jacana	<i>Metopidius indicus</i>	BR
Little Ringed Plover	<i>Charadrius dubius</i>	BR
Red-wattled Lapwing	<i>Vanellus indicus</i>	BR
Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	BR
Kentish Plover	<i>Charadrius alexandrinus</i>	WV
Little Stint	<i>Actitis minuta</i>	WV
Common Sandpiper	<i>Actitis hypoleucos</i>	WV
River Tern	<i>Sterna aurantia</i>	BR
Emerald Dove	<i>Chalcophaps indica</i>	BR
Rock Pigeon	<i>Columba livia</i>	BR
Spotted Dove	<i>Streptopelia chinensis</i>	BR
Rose-ringed Parakeet	<i>Psittacula krameri</i>	BR
Asian Koel	<i>Eudynamis scolopacea</i>	BR
Greater Coucal	<i>Centropus sinensis</i>	BR
Asian Palm Swift*	<i>Cypsiurus balaisensis</i>	BR
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	BR
Common Kingfisher	<i>Alcedo atthis</i>	BR
Pied Kingfisher	<i>Ceryle rudis</i>	BR
Green Bee-eater	<i>Merops orientalis</i>	BR
Blue-tailed Bee-eater*	<i>Merops philippinus</i>	WV
Malabar Grey Hornbill	<i>Ocyeros griseus</i>	BR
White-cheeked Barbet	<i>Megalaima lineate</i>	BR
Crimson-fronted Barbet	<i>Megalaima rubricapilla</i>	BR
Black Rumped Flameback Woodpecker	<i>Dinopium benghalense</i>	BR
Yellow Wagtail*	<i>Motacilla flava</i>	WV
White-browed Wagtail	<i>Motacilla maderaspatensis</i>	BR
Red-vented Bulbul	<i>Pycnonotus cafer</i>	BR
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	BR
Oriental Magpie Robin	<i>Copsychus saularis</i>	BR
Jungle Babbler	<i>Turdoides striatus</i>	BR
Yellow-billed Babbler	<i>Turdoides affinis</i>	BR
Ashy Prinia	<i>Prinia socialis</i>	BR
Asian Paradise-flycatcher	<i>Terpsiphone paradise</i>	BR
Purple rumped Sunbird	<i>Nectarinia zeylonica</i>	BR
Thick-billed Flowerpecker	<i>Dicaeum agle</i>	BR
Common Myna	<i>Acridotheres tristis</i>	BR
Jungle Myna	<i>Acridotheres fuscus</i>	BR
Eurasian Golden Oriole	<i>Oriolus oriolus</i>	WV
Black naped Oriole	<i>Oriolus chinensis</i>	WV
Scarlet Minivet	<i>Pericrocotus flammeus</i>	BR
Ashy Drongo	<i>Dicrurus leucophaeus</i>	WV
Black Drongo	<i>Dicrurus macrocercus</i>	BR
Greater Racket-tailed Drongo	<i>Dicrurus paradiseus</i>	BR
Rufous Tree pie	<i>Dendrocitta vagabunda</i>	BR
House Crow	<i>Corvus splendens</i>	BR
Indian Roller	<i>Coracias benghalensis</i>	BR
Large billed Crow	<i>Corvus macrorhynchos</i>	BR

* Reported by Seedikkoya K (2003).

++ Personal communication (Dr Boby Jose, St Joseph's College, Calicut)

BR – Breeding Residents; WV – Winter Visitors

Rise and decline of Garapadu heronry, Guntur District, Andhra Pradesh

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Garapadu, known as Ramachandrapalayam, is located east of Guntur district (16° 17' 11.2"N 80° 29' 44.2"E) in Andhra Pradesh. A private fish farming tank at this village supports birds such as Egrets and Cormorants for roosting. The six hectares tank has a characteristic single mound with vegetation/tree cover of *Acacia nilotica* and *Prosopis juliflora* which act as nesting substrate. Despite the intense aquaculture activities, intrusion caused by fish feeders and boat movements, the birds have established the colony. From 2008 the Spot-billed Pelican *Pelecanus philippensis*, Painted Stork *Mycteria leucocephala*, Asian Openbill *Anastomus oscitans* and Black-headed Ibis *Threskiornis melanocephalus* were observed breeding here. Totally 16 bird species were recorded including Little Cormorant *Phalacrocorax niger* and near threatened Oriental Darter *Anhinga melanogaster*.

We have studied the status and colony size at Garapadu from 2007- 2010 by estimating the nest number. The nest counts were doubled to obtain a breeding bird estimate (Dunbar 1982; King & Anderson 2005). During 2007-

2008 the Spot-billed Pelican arrived late in January. The estimated number of nests was 119.50 ± 30.41 in 2008 and 262 ± 115.97 in 2009. In 2009-2010 the tank was kept empty to avoid nesting of the Spot-billed Pelican as it was believed by the fish farmers to have severe impact on the fish culture. The sites with medium and high use value with high biodiversity would require immediate conservation action (Vijayan *et al.* 2004).

According to Subramanya (1996), the declining trend of suitable breeding sites is a real threat. During the years 2000 to 2003 around 14 breeding colonies were documented in Andhra Pradesh by Kannan & Manakadan (2003). Manakadan and Kannan (2005) reported decline in the number of active pelican sites from seven to three. The earlier seven were two in East and West Godavari districts (Kolleru and Gunaparam) and five in Cuddapah districts (Labaku, Reddipalle, Buchupalle, Pullagurapalle and Short Pelicanry). Now, the active sites are Telineelapuram, Uppalapadu and Nelapattu.



Google map showing location of Garapadu heronry



Garapadu Heronry, Photo courtesy Ms. Sheeba Nanjan

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NEWS ARTICLE

MV Rak oil spill hampers Mumbai marine business

Source: <http://news.oneindia.in/2011/08/08/mv-rak-oil-spill>

The Maharashtra state government gets into huddle after the threat of possible oil spill from the sunken carrier MV Rak at Mumbai coast on Thursday, Aug 4 was confirmed following 1.5 to 2 tonnes of oil leaking per hour after the ship sank .

Though there has been less oil spill in Juhu beach on Monday, Aug 8, MV Rak fuel fears ecological effects. In fact, the Maharashtra government has ordered to put a stop to marine business for sometime. Oil spill has stained the Mumbai coast .

Environmentalists say that of the 340 tons of oil and diesel on the ship, 1/3rd would be evaporated, 1/3rd would be soluble, but 1/3rd would contaminate the sea and the coast. Oil at Juhu will be removed manually. But, the oceanologists and environmentalists fear the negative effects that the marine animals would face which would directly hamper the Mumbai fishermen's business.



Statement issued by Minister I/C Environment & Forests on Mumbai oil spill

Source: http://www.moef.nic.in/downloads/public-information/Pressrelease_MumbaiOilSpill.pdf

1. MoEF have been closely monitoring the situation arising out of the oil spill due to sinking of MV Rak Carrier off Mumbai Harbour.
2. Regular contact has been maintained with the State Government, the Maharashtra Pollution Control Board (MPCB), DG, Shipping and the Indian Coast Guard authorities.
3. According to the State Government, the spill on the Juhu coast is a localized phenomenon due to some other reasons and not due to RAK spill. The RAK had about 290 tonnes of furnace oil and 50 tonnes of fuel oil apart from 60000 tonnes of coal and the incident happened at about 25 nautical miles away from the coast. The MPCB has deputed teams to take water samples and to identify the oil content and the source. The ramifications of the ship Pavit being docked on Juhu beach since the last few days are also being examined. Lab analysis will ascertain the source of the oil, if any, on the beach. As of now the oil content is about 1 to 2 mgs/L which is negligible i.e. 1 to 2 parts per million. Any loss to marine life will be ascertained by the National Institute of Oceanography (NIO), who have been requested by the MPCB to assist them.
4. The MPCB has started monitoring / sea water sampling from 7.8.11 at Mumbai coastal areas such as Gateway of India, Dadar, Juhu, Versova, Gorai, Mahul and in Navi Mumbai areas. The Juhu beach area has found some oil traces, the sea water samples collected and send to MPCB Laboratory.
5. MoEF have asked Chairman Central Pollution Control Board to immediately proceed to Mumbai and coordinate with the State Government, MPCB, DG (Shipping), NIO and other organizations in assessing the threat / damage to environment and to plan and implement immediate remediation measures.
6. The coast Guard being the designated national agency for management of oil spills have stationed their oil pollution response vessel Samudra Prahari at the site to deal with pollution arising from the sunken vessel. Coast Guard have launched Operation Suraksha 02/11 to prevent damage to the fragile marine environment along Maharashtra coast. As reported by the Coast Guard, the oil slick is being neutralised by Samudra Prahari, using oil spill dispersant and the Coast Guard is also using helicopters to monitor the situation and for areal spray of the dispersant to contain the oil spread.

The State Government have kept the Mumbai Municipal Corporation and the district collectors in a state of readiness to clean up the shore in coordination with Coast Guard and MPCB. The MPCB have requested NIO to ascertain loss to marine life if any.