

Floristic Diversity of Karwapani Wetland of Doon Valley, Uttarakhand, India

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Abstract: Karwapani swamp forest is situated near Manak Sidh temple nearby Shimla road and is about 15 Km north of Dehra Dun occupying an area of about 3-4 Sq Km. It forms the typical habitat, where water oozes out at places known as 'Oogals' which form perennial streams. The floristic diversity study revealed that total 60 plant species belonging to 41 families were recorded in the study area. Out of this, 11 tree, 26 shrub and 23 herb species have been recorded respectively. The present status of Karwapani wetland forest states that it is under threat which needs to be investigated and conserved through proper and sustainable management practices.

(Key words: Karwapani wetland, floristic diversity, Oogals)

I. Introduction

Wetland is a generic term used to define the universe of wet habitats including marshes, swamps, bogs, fens and similar area. Such land has water present at or near the surface for significant period that affect the land use. Wetlands are therefore subject to permanent or periodic inundation or prolonged soil saturation sufficient for the establishment of hydrophytic or the development of hydric soil. Recently, wetland has also been recognized for their role in recharge of aquifers and ground water, reduction in sediments load, control of flood, regulation of water quality, production of organic material, dependence of agriculture, animal husbandry and over water supply for drinking purposes in drought prone areas as well as save on wild habitat and reserved areas for conservation of endangered species. Plants and soils in wetlands play a significant role in purifying water. High levels of nutrients such as phosphorous and nitrogen, commonly associated with agricultural runoff, are effectively removed by wetlands. This is important in preventing eutrophication further downstream, a process that leads to rapid plant and algal growth followed by depleted oxygen levels that affect other species. It can also be important in preventing high concentrations of these nutrients reaching groundwater supplies or other water sources that may be used for drinking water (IUCN, 1971). In India many workers have carried out various works on vegetation of swamps (Kanjilal, 1901; Sen, 1959; Dakshini, 1960a, 1960b, 1961, 1965, 1970, and 1974; Som Deva and Aswal, 1974; Som Deva and Srivastava, 1978; Kaul et al., 1983; Kumar and Nandwani, 2003) but the floristic diversity of Karwapani wetland, which is under serious threats, needs to be studied, as meager work on floristic, ecological and socio-economy of this wetland is available. The present paper deals with the floristic diversity of Karwapani wetland in Doon Valley.

II. Study site

Doon Valley situated between the foot hills of the Himalayas and the Shiwaliks, is one of the most beautiful valleys of North India. There are a number of wetlands in the region, the most common are fresh water swamps of Doon Valley included Doodpani, Golatappar, Gularghati, Laltappar, Manu swamp, Mothronwala, Nakraunda, Ramgrah and Karwapani. Karwapani swamp forest is situated near Manak Sidh temple nearby Shimla road and is about 15 Km north of Dehra Dun occupying an area of about 3-4 Sq Km. The swamp is surrounded by several villages, which include Buddhi, Nayagoan, Ganeshpur, Rattanpur and Pelio. It lies in the latitude 30°2' to 30° 26' (N) and Longitude 77°52' to 78°- 19' (E). Mean maximum temperature is 19.2°C to 36.6°C and Mean minimum temperature is about 6.3°C to 23.2°C. The Annual rainfall is 2015 mm. The climate of the area is more or less like that of Dehra Dun being more temperate and humid than adjoining areas. Karwapani fresh water swamp is selected for the present study. It forms the typical habitat, where water oozes out at places known as 'Oogals' which form perennial streams.

III. Materials and methods

The study was conducted during the year 2010. For this purpose the method of nested quadrats 10m x 10 m for trees, 3 m x 3 m for shrubs and 1 m x 1 m for herbs were laid out using the quadrat method of Mishra (1968) and for this random sampling method were used. The plant species were collected and identified with the help of subject matter specialists and using flora of Kanjilal and Gupta (1969), Babu (1977) and R.D. Gaur (1999) to examine the description of the plants.

IV. Result and Discussion

The study revealed that total 60 plant species belonging to 41 families were recorded (Table 1). The dominant tree in area is *Shorea robusta* associated with a number of other trees and shrubs which are *Syzygium cerasoide*, *Syzygium cumini*, *Mallotus philippensis*, *Clerodendrum viscosum*, *Clerodendrum infortunatum*, *Ardisia solanacea*, *Colebrookia oppositifolia*, *Eupatorium adenophorum*, *Lantana camara*. The herbaceous layer which dominated the area is *Ageratum conyzoides*, *Cynodon dactylon*, *Cyperus rotundus*, *Euphorbia hirta*, *Desmodium microphyllum*, *Ophlismenus composites*, *Smilax glaucaophylla*, and *Cissampelos pareira*. Though *Shorea robusta* belonging to the family *Dipterocarpaceae* dominates the upper storey, the family which has the largest number of species are *Combretaceae* with 2 tree species, *Ehretiaceae* and *Myrtaceae* with two each. In middle storey the family *Verbenaceae* with 3 species dominates the area followed by *Asteraceae*, *Fabaceae*, *Lamiaceae*, *Liliaceae*, *Myrtaceae* and *Solanaceae* with 2 species each whereas in under storey *Fabaceae* and *Euphorbiaceae* with 3 species each dominated the study area.

V. Discussion

Species such as *Cynodon* spp, *Cyperus* spp and *Euphorbia* spp were found abundant in the present study. *Cynodon* and *Cyperus* on account of their abundance in the waterlogged sites in present investigation need to be considered as marshy species adhering to the definition of wetland/marsh (Cowardin et al. 1979). Earlier it was not included in the list of aquatic and marshy plants of Indian habitats (Lavana et al. 1990). Based on the reports of Rai and Sharma (1991) and Sharma et al. (2001) *Euphorbia* sp. was also considered as wetland species in the present study. The plant diversity of Karwapani swamp forest is represented by 53 families, 130 genera and 155 species (Dhyani and Joshi, 2007). A total of 162 plant species were found in Nakraunda swamp forest (Manhas et al., 2009). It is seen that the plant species which have been found from various parts of swamps in Doon Valley are not very uniform. The floristic diversity of Karwapani is very much less as compared to Nakraunda swamp (Manhas et al., 2009) and the previous study made in Karwapani (Dhyani and Joshi, 2007). High percentage of herbs and shrubs dominating the area indicates that the area is being disturbed by anthropogenic activities. According to the study made by Sharma and Joshi (2008) in Mothronwala swamp and Manhas et al. (2009) on fresh water swamp of Doon Valley, it has been reported that the dominance of shrubs and herbs in an area is caused by various high rate of anthropogenic disturbances. The possible reason for less floristic diversity may be due to various anthropogenic activities such as grazing, collection of fuel wood, fodder, food, medicinal plants etc. The present status of Karwapani wetland forest states that it is under threat which needs to be investigated and conserved through proper and sustainable management practices.

Table 1

S.N	Botanical Name	Family
Tree		
1	<i>Cordia obliqua</i> , Willd.	Ehretiaceae
2	<i>Ehretia laevis</i> Roxb.	Ehretiaceae
3	<i>Litsea chinensis</i> , Lamk.	Lauraceae
4	<i>Mallotus philippensis</i> , Muell.	Euphorbiaceae
5	<i>Salix tetrasperma</i> , Roxb.	Salicaceae
6	<i>Sapium sebiferum</i> , Roxb.	Euphorbiaceae
7	<i>Shorea robusta</i> , Gaertn.f.	Dipterocarpaceae
8	<i>Syzygium cerasoide</i> , Roxb.	Myrtaceae
9	<i>Syzygium cumini</i> , (Linn.) Skeels.	Myrtaceae
10	<i>Terminalia alata</i> , Heyne.	Combretaceae
11	<i>Terminalia chebula</i> , Retz.	Combretaceae
Shrubs		
12	<i>Adhatoda vasica</i> , Nees.	Acanthaceae
13	<i>Ardisia solanacea</i> (Poir.) Roxb.	Myrsinaceae
14	<i>Asparagus adsendens</i> , Roxb.	Liliaceae
15	<i>Asparagus racemosus</i> , Willd.	Liliaceae
16	Bamboo spp.	Poaceae
17	<i>Butea monosperma</i> (Lamk.) Taub.	Fabaceae
18	<i>Carissa opaca</i> , stapf ex Haines	Apocynaceae
19	<i>Cissampelos pareira</i> , Linn.	Menispermaceae
20	<i>Cleodendron viscosum</i> , Vent.	Verbenaceae
21	<i>Clerodendrum infortunatum</i> , Gaertn.	Verbenaceae
22	<i>Colebrookia oppositifolia</i> , Smith.	Lamiaceae
23	<i>Cudrenia cochinchinensis</i> (Sapling)	Moraceae
24	<i>Eupatorium adenophorum</i> , Spreng.	Asteraceae
25	<i>Flemingia bracteata</i> , Wight.	Fabaceae
26	<i>Lantana camara</i> , Linn	Verbenaceae
27	<i>Litsea chinensis</i> Lamk.	Lauraceae
28	<i>Litsea umbrosa</i> Nees	Lauraceae

29	<i>Milletia extensa</i> , Benth.	Leguminosaceae
30	<i>Murraya koenigi</i> , Spreng.	Rutaceae
31	<i>Pogostemon benghalense</i> , Kuntze	Lamiaceae
32	<i>Pterospermum acerifolium</i> , Willd.	Sterculiaceae
33	<i>Randia spinosa</i>	Rubiaceae
34	<i>Sida cordifolia</i> , Linn.	Malvaceae
35	<i>Solanum khasianum</i> , Clarke.	Solanaceae
36	<i>Solanum nigrum</i> , Linn	Solanaceae
37	<i>Toona ciliata</i> Roemer. (Sapling)	Tiliaceae
Herbs		
38	<i>Achyranthes aspera</i> , Linn.	Acanthaceae
39	<i>Ageratum conyzoides</i> , Linn.	Asteraceae
40	<i>Phyllanthus ninuri</i> , Linn.	Euphorbiaceae
41	<i>Curculigo orchioides</i> , Gaertn	Hypoxidaceae
42	<i>Cynodon dactylon</i> , Linn.	Poaceae
43	<i>Cyperus rotundus</i> , Linn.	Cyperaceae
44	<i>Desmodium microphyllum</i> , DC.	Fabaceae
45	<i>Desmodium trifolium</i> , DC.	Fabaceae
46	<i>Dioscorea hispida</i> , Dennstaedt.	Dioscoreaceae
47	<i>Equisetum orientale</i>	Equisitaceae
48	<i>Euphorbia hirta</i> , Linn.	Euphorbiaceae
49	<i>Fragaria indica</i> , Andrew.	Rosaceae
50	<i>Ichnocarpus frutescens</i> , (Linn.) R.Br.	Apocynaceae
51	<i>Jasminum arborescens</i> .Roxb	Oleaceae
52	<i>Oplismenus compositus</i> , (Linn.) P. Beauv.	Poaceae
53	<i>Oxalis corniculata</i> , Linn.	Oxalidaceae
54	<i>Phyllanthus ninuri</i> Linn.	Euphorbiaceae
55	<i>Polygonum barbatum</i> , Linn.	Polygonaceae
56	<i>Pteris quadriaurita</i> , Retz	Pteridaceae
57	<i>Pteris villata</i> , Linn.	Pteridaceae
58	<i>Smilax glaucophylla</i> , Klotz	Smilacaceae
59	<i>Smilax zeylanica</i> , Linn.	Smilacaceae
60	<i>Urena lobata</i> , Linn.	Barringtoniaceae

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