

Variation of tree species in response to biotic stress in a fresh water swamp of Doon valley

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Abstract: The present communication deals with the changes in tree structure at Golatappar 7b block range in DehraDun Forest division, Uttarakhand India in response to biotic pressure. Golatappar Fresh water swamp, lies between 30° 4' 30" to 30° 5' 15" North latitude and 78° 12' 00" to 78° 12' 25" East longitude. In present the Golatappar Fresh water facing a lot of biotic pressure the swamp is encroached by the near by villagers to full fill their daily requirements viz food, fodder, fuel, timber etc. Lopping of trees for fodder, felling of trees for timber and fuel is the main cause of the extinction of important tree species of swampy area. In this paper we try to assess the variation of tree species in Ridge, slope and Swamp proper of Golatappar fresh water swamp. The ridge and slope of Gola tappar fresh water swamp is dominated by the tree species with maximum IVI (110.07), meanwhile the Swamp proper is dominated by tree species *Diospyros peregrine* and *Trewia nudiflora* with highest IVI value (56.91). A comparison of the tree species of Swamp proper were made by the (Somdeva & Srivastava, 1978). From this study a major decline of important value index was recorded in the dominant species of Gola tappar fresh water swamp. The biotic interference has vanished a number of plant species representatives of swampy area. [Journal of American Science 2010;6(8):499-502]. (ISSN: 1545-1003).

Key words: Golatappar; Biotic stress; Doon valley; Swamp

1. Introduction

Swamps are the marshy area where water oozes out in perennial streams at constant level throughout the year. These are transitional ecosystems located at the interface of terrestrial and aquatic ecosystems. Their position makes them recipients of susceptible to losses to downstream. Swamp plays a vital role in landscaping with a wide variety of flora and fauna.

Doon valley has many fresh water swamps due to its unique topography. There was a time when low lying areas of the valley were having a chain of swamps but human interference are started in the name of "malarious climate" (King, 1871) still persists. The trees were cut at that time and the opening created, which result in the extinction the most of the swamps. Most of the swamps have been cleared off their original forests, but a few still remain with virgin vegetation. Golatappar is one of such fresh water swamp forest of Doon valley, where the present study was carried out.

Gola tappar fresh water swamp is the source of the fuel, food, fodder medicine etc and have been exploited by the nearby villagers to full fill their daily requirements. Due to this unscientific exploitation of the swamp by the local people, the swamp is degrading, depleting and reducing day by day. The vegetation structure of tree species of the swamp is also changing as consequences of these disturbances. In present paper we have attempted to assess the Variation in tree species in response to biotic stress of

Golatappar fresh water swamp and compare it with the work of Som deva and Srivastava (1978). Gola tappar swamp had been regularly studied by various workers Srivastava et al 2000, Chauhan 2001, & Kandwal et al 2007).

2. Material and Methods

The present study has been carried out in Golatappar (7b block of Barkot range) near village Khiri in DehraDun forest division, Uttarakhand, India. It is a typical, tropical valley fresh water swamp. It lies at an altitude of 30°6' North latitude and 78°19' East longitudes at an altitude of 370m and is located 35 km. east of DehraDun. It occupies an area of approximately 2 km². The Tawa river flows along its southern limit which is one of the tributaries of Song-Suswa-Jakhan complex that fans out here in innumerable streams over a wide area before it meet the river Ganga at Satyanarayan. The swampy zone lies in a depression and is surrounded on all sides except the south by a clay bed of immense thickness overlying the great mass of the gravel deposit. Physiographically the surrounding area is so constructed that all the water brought down by Himalayan Rivers that they received from the annual rainfall, infiltrates deep in the stable strata and reappears in the form of innumerable springs at various depression, sites of Doon valley.

The study area was surveyed frequently surveyed to assess the tree diversity. Three community were made viz Ridge, Slope and Swamp

proper for study. At each site the presence of all tree species were recorded by quadrat method. The quadrates measuring $1 \times 1 \text{m}^2$ were laid periodically in case of swamp proper and once $10 \times 10 \text{m}^2$ in case of swamp forest (ridge and slope). The quadrates were laid randomly. The data obtained for frequency, density, abundance and basal area were calculated to determine Importance Value Indices (IVI) of each species during the study period. The method employed was followed as given by Misra (1968). The diversity index (H') was computed by using Shannon-Wiener information index (Shannon & Wiener 1963). The concentration of dominance (CD) was computed by Simpson's index (Simpson 1949). Similarity index (Community coefficient) among different sites was calculated as per Jacard (1912). The variation of tree species was studied by compare the present data with Somdeva and Srivastava (1978).

3. RESULTS

The Important Value Index (IVI) of Tree species of Ridge, slope, and Swamp proper of GolaTappar Fresh water swamp revealed that *Shorea robusta* was the dominant tree species of ridge and slope (Table 1). Maximum IVI value (110.07) was recorded for ridge and (79.68) for slope. The swamp proper is dominated by the tree species *Diospyros peregrine* and *Trewia nudiflora* with highest IVI value (56.91).

Table 1: Important value Index of the tree species of GolaTappar Fresh Water Swamp forest

Tree species	Ridge	Slope	Swamp Proper
<i>Diospyros peregrine</i> (Gtn.) Gurke	22.65	55.80	56.91
<i>Trewia nudiflora</i> Linn.	12.84	-	56.91
<i>Pterospermum acerifolium</i> Willd.	22.65	31.92	25.92
<i>Bischofia javanica</i> Bl.	9.45	23.70	29.20
<i>Syzygium cumini</i> (Linn.) Merr.	12.84	6.07	8.04
<i>Shorea robusta</i> Gaertn.	110.07	79.68	53.63
<i>Phoebe lanceolata</i> Nees.	4.73	11.55	-
<i>Mallotus philippinensis</i> Muell.-Arg.	16.23	20.37	14.06
<i>Toona ciliata</i> Roem.	13.20	6.07	-
<i>Xylosma longifolia</i> Clos.	6.42	-	8.04
<i>Alstonia scholaris</i>	9.81	6.07	8.04

Table (2) reveals the variation in important value index (IVI) of Tree species of swamp proper in last three decades. A major decline have been recorded in the Important Value Index of tree species in last three decades. During the study it reveals that the Important value index of the dominant tree of swamp proper showed decline 76.88 to 56.91 in case of tree species *Diospyros peregrine*, 36.64 to 25.92 in case of *Pterospermum acerifolium*, and 32.02 to 29.20 in case of *Bischofia javanica*.

Table 2 variation in importance values of tree species in last three decade

TREE SPECIES	1978	2006
<i>Diospyros peregrine</i> (Gtn.) Gurke	76.88	56.91
<i>Trewia nudiflora</i> Linn.	51.05	56.91
<i>Pterospermum acerifolium</i> Willd.	36.64	25.92
<i>Bischofia javanica</i> Bl.	32.02	29.20
<i>Carallia brachiata</i> (Lour) Merr.	17.87	-
<i>Syzygium cumini</i> (Linn.) Merr.	13.94	8.04
<i>Shorea robusta</i> Gaertn.	13.73	53.63
<i>Phoebe lanceolata</i> Nees.	10.39	-
<i>Glochidion assamicum</i> Hook.f.	9.40	-
<i>Acronychia pedunculata</i> (Linn.) Miq.	7.81	-
<i>Persea gamblei</i> (King ex Hook.f.) Kosterm.	6.45	-
<i>Ficus lucescens</i> Bl.	6.01	-
<i>Ficus racemosa</i> L.	5.93	-
<i>Mallotus philippinensis</i> Muell.-Arg.	5.05	14.06
<i>Toona ciliata</i> Roem.	3.36	-
<i>Xylosma longifolia</i> Clos.	3.29	8.04
<i>Mangifera indica</i> Linn.	2.75	-
<i>Ficus oligodon</i> Miq.	2.14	-
<i>Anthocephalus indicus</i> A.Rich	1.98	-
<i>Alstonia scholaris</i>	1.88	8.04
<i>Schleichera oleosa</i> (Lour.) Oken.	1.77	-
<i>Cyclostemon assamicus</i> Hook.f.	1.36	-

Various indices for measuring diversity and evenness of the selected community of the tree species of study area are given in (Table 3). A maximum number of tree species (11) were recorded in ridge meanwhile (9) species of trees were recorded in slope and swamp proper. The values Species diversity (H') ranged between (1.83-1.94). Maximum species diversity (1.94) recorded for the tree species of Swamp proper and minimum species diversity (1.83) recorded for the tree species of Slope. The value of evenness of the tree species of selected community ranged between (0.78-0.88). Minimum value of evenness (0.78) recorded for ridge and maximum value of evenness (0.88) was recorded for Swamp Proper.

Table 3 Species richness, Concentration of dominance, Diversity and Evenness of tree species of Gola Tappar Fresh water Swamp.

Diversity indices	Ridge	Slope	Swamp proper
Richness	11	9	9
H'	1.88	1.83	1.94
cd	0.24	0.19	0.16
J	0.78	0.83	0.88

The concentration of dominance (Cd) of all the communities of study area are ranged between (0.16) swamp proper and (0.24) ridge. The values of Cd shows that Ridge was dominated by higher number of tree species (lower Cd). Gosselink and Turner (1978) & Chaneton and Facelli (1991) found that as the flooding increases, the dominance of a very few species increased.

4. Discussion

Doon valley with its unique topographical set up has a large number of swampy areas. Most of them have been cleared off their original forests, but a few still remain with their characteristics vegetation. Golatappar is one of such swamp. Champion and Seth (1968) cited this as an example of the tropical valley fresh water swamp. *Bischofia javanica*, *Trewia nudiflora*, *Ficus racemosa* are the characteristic tree species of swamp proper. These trees have peculiar surface roots and are suited to colonise low-islands, consolidated by successional seral community of herbaceous and bush fern swamp stages. During the present study it was found that swamp proper is dominated by *Diospyros peregrine* and *Trewia nudiflora* with maximum IVI value (56.91) this value is more less the values of Somedeva and Srivastava (1978). A major variation have been recorded in the dominant trees species of

swamp proper. This is resulted due to lot of biotic pressure in swamp proper by their local people. The Golatappar swamp is being converted into agricultural fields and other land use systems whereas the water of the streams is diverted to a watershed from where a network irrigation canals has been drawn which irrigates these agricultural fields. Unscientifically lopping of medicinal plants, lopping of fodder trees and exploitation of trees for timber is another reason for the extinction of tree species. All these consequences are affecting the vegetation structure of the swamp. From the above study it was found that the tree species of the swamp are facing a lot of biotic pressure and loss their status in swampy area. This is a preliminary study and not sufficient to give the real picture of the swamp. The study is suggested that there is need of detailed study. Only then we can ensure the proper management and conservation of this fragile ecosystem.

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