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Research Article

AN ECOLOGICAL STUDY OF PAGLADIA RIVER AT NALBARI TOWN-A TRIBUTARY OF RIVER BRAHMAPUTRA

Gunajit Kalita

Department of Botany, Nalbari College, Nalbari, Assam.781335

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A B S T R A C T

Pagladia river originates from the Bhutan hills of Himalayan range and flows through the eastern part of the Nalbari town and continues to flow and falls at river Brahmaputra near Sotemari of Nalbari district. Pagladia river during its course shows great seasonal variations in its water content throughout the year. As the river originates from the mountains of Bhutan, during rainy season the river swells up and increases its boundary significantly inundating the nearby shores and has high water current. Pagladia is primarily a rainfeed river, so during winter season when there is no rainfall, the river shrinks and confined to a stream of few metres at breath. The phytogeography of both the banks of the river pagladia is very diverse with a large number of hydrophytic and ecotone flora. Some endemic species are also recorded from the banks of pagladia river. The physico-chemical properties of the water show seasonal variations and the limnology determines the types of plant species. The seasonal variations in the nature of Pagladia river throughout the year makes it an interesting case study in ecology.

INTRODUCTION

Pagladia river, a major tributary of the river Brahmaputra, originates from the foothills of Bhutan is mainly a rainfeed river. Extending between 26.830431^0N latitudes and 91.411608^0E longitudes, the Pagladia river at Nabari town forms an unique ecosystem that provide many resources to the surrounding people and sustains almost a continuous forest from its origin to the place where it merges with river Brahmaputra. Nalbari town is characterised by plain topography and it forms a part of the lower Brahmaputra valley and falls in the sub-tropical belt having south-east Asiatic monsoonal climate. Phytogeographically, North-East India represents a highly transitional region where large scale mingling of the Asiatic and Indian peninsular floristic elements occurs. Biodiversity is the result of a series of turnovers in the rate of evolution and extinction since the geological past The Nalbari district is lacking an exhaustive publication on its flora and so also a comprehensive phytogeographical treatment to its flora.

River bank vegetation, ecologically termed as riparian is highly dynamic vegetation. Rivers riparian zone acts as a bridge between terrestrial and aquatic habitat. These areas are represented by a particular type of vegetation that grows all over the sides of river Pagladia.

Corresponding author:* **Gunajit Kalita
Department of Botany, Nalbari College, Nalbari, Assam.781335

The annual flood submerges these forests by several feet's every year leaving the new alluvium and successive deposits of silts. These are first covered by the seedlings of *Tamarix, Salicornea* which soon establish themselves in a dense form either in pure formation or mixed with different grass species. Moreover, in several places particularly adjoining riverine areas composed of some hydrophilous herbs and sedges viz. *Ranunculus scleratus, Anagallis arvensis, Catula hemispherica, Ammannia baccifera, Grangia maderaspatana, Gnaphalium luteoalbum, Polygonum chinense, Cyperus rotundus, Fimbristylis dichotoma, Fimbristylis ovate, Scirpus articulates*, etc.

MATERIALS AND METHODS

The investigations were carried out by making several field visits during 2013-14 covering all seasons. Tree and other plant species were recorded by visual observation and were identified by comparing with standard book and journals, besides internet was also used for identification and up-to-date nomenclature www.theplantlist.org has been consulted. The plant species were also identified with the help of Flora of Assam (Kanjilal *et al*.1934-1940; 1940, Rajkhowa 1961) and by comparing at GUBH.

The water samples of pagladia river were collected during 2013-14 in monsoon and dry season for limnological study. After collection of the water samples the physico-chemical characteristics of the water samples were analysed by APHA. (1995), Turbidity test was done by Secchi disc and Dissolved oxygen estimation was done by Wrinklers method.

RESULTS AND DISCUSSION

Sl No.	Scientific names	Family	Assamese/Local names
1.	*Alstonia scholaris* L.	Apocynaceae	(Satiana)
2.	*Actinodaphne obovata* Nees.	Lauraceae	(Petarichawa)
3.	*Aesculus hippocastanum* L.	Sapindales	(Ramanbih)
4.	*Anthocephalus cadamba*	Roxb.Rubiaceae	(Kadam)
5.	*Artocarpus heterophyllus*	Lam.Moraceae	(Kathal)
6.	*Altingia excelsa*	Altingiaceae	(Not known)
7.	*Albizia chinensis*	Fabaceae	(Siris, Sam, Koroi)
8.	*Aegle marmelos* L.	Rutacea	(Bel)
9.	*Amoora wallichii* king.	Meliaceae	(Not known)
10.	*Bombax ceiba* L.	Malvaceae	(Simolu)
11.	*Barringtonia nudiflora* L.	Lecythidaceae	(Bhelkol)
12.	*Butea monosperma* Lam.	Fabaceae	(Not known)
13.	*Cassia fistula* L.	Fabaceae	(Sonaru)
14.	*Cassia sophera* L.	Fabaceae	(Not known)
15.	*Cedrela toona* L.	Meliaceae	(Not known)
16.	*Caesalpinia bonduc* L.	Fabaceae	(Not known)
17.	*Caesalpinia cucullata* Roxb.	Fabaceae	(Gulmohar)
18.	*Caesalpinia pulcherrima* L.	Fabaceae	(Not known)
19.	*Dillenia indica* L.	Dilleniaceae	(Ou-tenga)
20.	*Dipterocarpus turbinatus*	Gaertn. Dipterocarpaceae	(Gurjan)
21.	*Duabanga grandiflora* Roxb.	Myrtaceae	(Not known)
22.	*Dipterocarpus macrocarpus*	Vasque. Dipterocarpaceae	(Hollong)
23.	*Ficus variegate* Bl.	Moraceae	(Bor Dimaru, Bot)
24.	*Grewia multiflora*	Juss. Malvaceae	(Not known)
25.	*Keyea assamica*	King & Prain	Calophyllaceae (Sia-Nahar)
26.	*Mallotus philippensis* Lam.	Euphorbiaceae	(Sinduri, Joral, Dudhloti)
27.	*Macaranga denticulata*	Euphorbiaceae	(Not known)
28.	*Melia azedarach* L.	Meliaceae	(Not known)
29.	*Michelia champaka* L.	Magnoliaceae	(Teeta campa)
30.	*Morinda angustifolia* L.	Rubiaceae	(Not known)
31.	*Moringa oleifera* Lam.	Moringaceae	(Sajana)
32.	*Mesua ferra* L.	Calophyllaceae	(Not known)
33.	*Palaquium polyanthum*	Wall. Sapotaceae	(Kathalua)
34.	*Podostemon benghalense*	Kuntze.Lamiaceae	(Not known)
35.	*Phlogacanthus thrysiformis*	Roxb.Acanthaceae	(Nongmangkha)
36.	*Rhus chinensis* mill.	Anacardiaceae	(Not known)
37.	*Shorea assamica* Dyer.	Dipterocarpaceae	(Mekai)
38.	*Schima wallichii* Korth.	Theaceae	(Makria)
39.	*Syzgium* cumini L.	Myrtaceae	(Jam)
40.	*Spondias pinnata* Kurz.	Anacardiaceae	(Not known)
41.	*Syzgium cumini* L.	Myrtaceae	(Paharijam, Mokrajam, Kolajam)
42.	*Stereospermum personatum*	Hassk.Bignoniaceae	(Paruli)
43.	*Tamarix dioica* Roxb.	Tamariaceae	(Not known)
44.	*Terminalia citrina* Gaertn.	Combretaceae	(Not known)
45.	*Terminalia myriocarpa*	Van Mull. Combretaceae	(Not known)
46.	*Terminalia tomentosa*	Willd.Combretaceae	(Not known)
47.	*Ulnus wallichiana* Planch.	Ulmaceae	(Not known)
48.	*Vatica lanceaefolia* Bl.	Dipterocarpaceae	(Not known)
49.	*Wrightia arborea* Mabb.	Apocynaceae	(Not known)
50.	*Zizyphus jujuba* Mill.	Rhamnaceae	(Bogori)

Table 2 Grasses, bamboos and shrubs on both the banks of Pagladia river

Sl No.	Scientific names	Family	Habit
1.	*Actinoscirpus grossus* Goetgh.	Cyperaceae	grass
2.	*Achyranthus aspera* L.	Amaranthaceae	shrub
3.	*Alloteropsis semialata* Hitch.	Poaceae	grass
4.	*Apocopsis paleacea* Hochr.	Poaceae	grass
5.	*Apluda mutica* L.	Poaceae	grass
6.	*Bambusa arundinaria* L.	Poaceae	grass
7.	*Bambusa Bambos* Retz.	Poaceae	grass
8.	*Callicarpa macrophyllas* L.	Lamiaceae	shrub
9.	*Chromolena odorata* Rob.	Asteraceae	shrub
10.	*Clerodendron infortunatum* L.	Lamiaceae	shrub
11.	*Desmostachya bipinnata* L.	Poaceae	grass
12.	*Echinochloa crusgalli* L.	Poaceae	grass
13.	*Echinochloa cruspavonis* L.	Poaceae	grass
14.	*Echinochloa colona* L.	Poaceae	grass
15.	*Eragrostris atrovirens* Steud.	Poaceae	grass
16.	*Eragrostris cilianensis* Hawai	Poaceae	grass
17.	*Equisetum debile* Roxb.	Equisetaceae	shrub
18.	*Imperata cylindrica* L.	Poaceae	grass
19.	*Lantana camara* L.	Verbenaceae	shrub
20.	*Leersia hexandra* Sw.	Poaceae	grass
21.	*Lippa javanica* Spreng.	Verbenaceae	shrub
22.	*Melocanna bambusoides* Trin.	Poaceae	grass
23.	*Mimosa pudica* L.	Fabaceae	shrub
24.	*Mimosa himalayana* Lam.	Fabaceae	shrub
25.	*Oldenlandia auricularia* L.	Rubiaceae	herb
26.	*Panicum auritum* Nees.	Poaceae	grass
27.	*Paspalum conjugatum* L.	Poaceae	grass
28.	*Ricinus communis* L.	Euphorbiaceae	shrub
29.	*Rungia pectinata* Nees.	Acanthaceae	herb
30.	*Saccharum narenga* Hack.	Poaceae	grass
31.	*Saccharum procerum* Roxb.	Poaceae	grass
32.	*Saccharum ravennae* L.	Poaceae	grass
33.	*Saccharum spontaneum* L.	Poaceae	grass
34.	*Sclerostachya fusca* Benth.	Poaceae	grass
35.	*Seteria pumila* Schult.	Poaceae	grass
36.	*Solanum nigram* L.	Solanaceae	shrub
37.	*Themeda villosa* Poiret.	Poaceae	grass
38.	*Tephrosia candida* DC.	Fabaceae	shrub

Table 3 The physico-chemical parameters of water samples of Pagladia river.

Parameters (units)	Monsoon season (July-Sept)	Retreating Monsoon (Nov-Jan)
Temperature (^{o}c)	23.22	9.4
Transparency (cm)	12.6	19.3
P^H	7.2	8.1
Dissolved oxygen (mgl^{-1})	7.62	6.10
Dissolved organic matter (mgl^{-1})	49.54	44.61
Organic carbon (%)	0.52	0.61

50 species of trees and 38 species of major grasses, bamboos and shrubs were recorded from both the banks of Pagladia river in Nalbari town of Assam. The Nalbari district has deciduous forest, often mixed with some evergreen species and due to plenty of rainfall, both the banks of pagladia river has luxuriant growth of trees. The tree line extends over more or less continuous belt ranging from the foot hills of Bhutan to Nalbari district. The large trees form the higher canopy with smaller shrubs, grasses and herbs forming the lower stories and the river banks vegetation. The pagladia river banks showed a variety of phytogeographical areas. The area showed mixed deciduous forest type which predominantly consists of deciduous trees and savannah/grassland and riverine forest. The river banks contain coarse sand, pebbles, grits and little clay during winter season. Occurrence of such a variety of taxa in the banks of pagladia river indicates the rich fertility of the soil (Rowntree 1954).

The water temperature was more (23.22^0c) during summer monsoonal season and it goes down during winter (9.4^0) in the month of December. The transparency of the water was more during winter (19.3 cm), as compared to summer (12.6).This may be due do the silt it carries during monsoonal period when water flows with high current, on the other hand during winter the water was static and less turbulent so visibility was more.P^H (8.1)was more during winter season because of less flow of water, thus water was slightly acidic during winter. Dissolved oxygen (7.62 mgl^{-1}) was more during monsoon because of more turbulence in the river water, moreover water was devoid much impurities during the monsoon season. Dissolved organic matter (49.54 mgl^{-1}) was more during monsoon season. The spatial and temporal variation in the quality of dissolved organic matter of this river might be due to the accumulation of different wastes along with oxidation of different flora and fauna in the lotic water brought by the inflow water. During the study period organic carbon of Pagladia river (0.61 %) during winter season. High organic carbon during winter might be due to deposition and accumulation of dead and decayed organic matter and from runoff of catchment areas.

CONCLUSION

The vegetation pattern of the study site are mainly alluvial plain area, mostly dominated by grasses and deciduous trees in the woodlands. The river shows seasonal variations in riparian vegetation throughout the year. As the Pagladia river is a rainfed river, water flow in the river was very high during monsoon season while the river become almost devoid of water during winter season. The variation in the physico-chemical parameters of water of the river are more or less within the permissible limits. The river is free from industrial effluents pollution. The river harbours a diversity of fishes and vegetation of different plant species on both the river banks.

Pagladia river plays an important ecological role in sustaining riverine biodiversity.

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