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DOCUMENTATION OF SOME RARE SPECIES OF MACROPHYTES ASSOCIATED WITH WETLANDS IN PURULIA DISTRICT, WEST BENGAL

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ABSTRACT

While studying the diversity of macrophytesin wetlands of Purulia District, West Bengal, the present author could identify as many as 36 rare species of angiosperms from 38 wetlands of which 16 species are of 13 genera belonging to 12 dicotyledonous families and 20 species are of 14 genera belonging to 7 monocotyledonous families. The mode of propagation and growth-form of each species have also been recorded since these aspects have bearing on their survival. The wetlands, thus studied, have enormous scope for augmenting ecological as well as economic welfare of the area provided they have an optimum macrophyte composition.

KEYWORDS**:** Biodiversity Conservation, Wetlands, Threatened species, Purulia district

Wetlands are perhaps the most important landscapes in the world to have earned global attention during the last few decades (Mitsch *et al.,* 2015). They are being discussed all over the world in issues of environmental protection, pollution control, eco-restoration, biodiversity conservation etc (Ham *et al.,* 2010; Scholz, 2015; Zhang *et al.,* 2012). Wetland have been drawing considerable attention of agriculturists, natural and social scientists, urban planners, land managers, landscape designers and many others (Gupta *et al.,* 2013; Palitand Mukherjee ,2012).

Wetlands are geologically very young and ecologically very fragile. They occur in all climates and change peripherally with time and season. Although wetlands are among the most productive and restorative or optimizing ecosystems, they are destroyed all over the world irrationally (Cai *et al.,* 2016; Wu *et al.,* 2016).

Macrophytes are the one of the key components of wetland ecosystem (Means *et al.,* 2016; Palit and Gupta, 2012). They provide the vital force upon which other wetland biota thrive (Batzer and Boix, 2016). Wetland habitats sustain diverse macrophytes and take care of environmental health as well as resource based economics of surrounding region. This documentary work on the rarespecies of macrophytesmay prove its worth in conservation of the species and preservation of wetlands for health, economy and environment in Purulia District, West Bengal,a drought prone region of Eastern India.

MATERIALS AND METHODS

Study Area

Purulia is the western most district of West Bengal, located between 23º 19’ 50.23 “ North latitude and 86º 21’ 46.91 “East longitude. The total area of the district is 6259.00 sq Km, which has hardly any natural boundary demarcated by streams or hills. Purulia has its boundaries on the east with the Midnapur and Bankura district of West Bengal, On the north with the Burdwan district of West Bengal and Dhanbad district of Bihar, on the North west, and South west with the Hazaribag, Ranchi and Singhbhum district of Jharkhand. The present study is in conformity with earlier work of the authors (Mandal and Mukherjee, 2016d).

RESULTS AND DISCUSSION

From Purulia District of West Bengal 38 wetlands (Table 1) have been put in an inventory from where as many as 36 macrophytescould be recordedthat arevery rare (Table 2).

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Table1: An inventory of wetlands occurring in different parts of Purulia District, West Bengal

Sl.No	Name of the wetland	Mouza	Block	Area in hactre	Latitude	Longitude
1	AdraSahebbundh	Manpura	Kashipur	4.45	23º 28’ 57” ’N	86º42’35”E
2	Angarkhuri	Chharra	Purulia II	4.04	23º 21’N	86º 47’E
3	Babirbundh (Sabirbundh)	Babiddi	Kashipur	7.28	23º37’N	86º75’E
4	Barikbundh	Raghunathpur	Raghunathpur I	1.61	23º 55’N	86º 67’E
5	Benabundh	Manbazar	Manbazar I	1.21	23º 27’N	86º 37’E
6	Benagora	Sankra	Para	1.21	23º 50’N	86 º49’E
7	BuroSayar	Mangalda	Raghunathpur II	5.66	23º 56’N	86º 68’E
8	Deshbundh	Kharbar	Santuri	4.45	23º 51’N	86º 85’E
9	Dewanbundh	Kalidaha	Kashipur	1.21	23º 37’N	86º 75’E
10	Dhanarbundh	Akunja	Raghunathpur	2.02	23º 55’N	86º 67’E
11	Ganakbundh	Damda	Purulia I	2.83	23 º 34’N	86º 36’E
12	Gayerbundh	Tiyashi	Santuri	6.07	23 º 51’N	86 º85’E
13	Gaylabundh	Lalpur	Hura	6.07	23º 30’N	86º 65’E
14	GhosalPukur	Puncha	Puncha	2.42	23 º15’N	86 º65’E
15	GobindaSayar	Patharmura	Manbazar I	3.64	23 º 27’N	86º 37’E
16	Gorsaibundh / Namobundh	Barabazar	Barabazar	2.02	23º 30’N	86º 36’E
17	Guniyara Bara bundh	Guniyara	Neturiya	4.45	23º 58’N	86º 71’E
18	Hanumata dam	Mudidi, Dumari, Khairadi	Balarampur	80.93	23º 12’N	86º 26’E
19	JoypurRanibundh	Joypur	Joypur	48.56	23º 26’ 00” N	86º 08’ 00” E
20	Kalidaha (jore)	Kalidaha	Kashipur	3.64	23 º37’N	86º 75’E
21	Kamalabundh	Baghmundi	Baghmundi	1.61	23 º19’N	86º 06’E
22	Ketankiyari (Jore)	Ketankiyari	Kashipur	3.64	23 º38’N	86º 76’E
23	Khagerbundh	Puncha	Puncha	4.45	23 º15’N	86º 65’E
24	Kumaridam	Baraurma, Dubrajpur.	Balarampur	8.49	23 º16’N	86º 29’E
25	Lihirbundh	Jhalda	Jhalda I	2.42	23º 37’N	85º 97’E
26	Mahatobundh	Kantadi, Pithati	Arsha	4.45	23º 32’N	86º 36’E
27	Maidhara	Patharmura	Manbazar I	2.02	23 º27’N	86º 37’E
28	Nutanbundh	Purulia	Purulia I	6.57	23 º34’N	86º 36’E
29	Pokabundh	Banduan	Banduan	1.61	22º 88’N	86º 50’E
30	PuranoSayar	Chharra	Purulia II	12.14	23º 21’N	86º 47’E
31	Rajabundh	Purulia	Purulia I	8.49	23º 19’ 23”N	86º 22’ 17”E
32	Rampur Barabundh	Rampur	Kashipur	10.92	23º 38’N	86º 76’E

33	Ranibundh	Baghmundi	Baghmundi	2.42	23º 12' 00"N	86º 03' 00"E
34	Ruknibundh	Guniyara	Neturiya	2.02	23º 58'N	86º 71'E
35	Sahebbundh	Purulia	Purulia I	28.32	23 º 20'N	86º 21'E
36	SankraBarabundh	Sankra	Para	7.28	23º 50'N	86º 49'E
37	Sayarbundh	Khariduara	Manbazar 11	2.83	23º 24'N	86º 39'E
38	Sindripathar	Karangberiya	Kashipur	5.66	23º 38'N	86º 76'E

Table 2: Enumeration of rare species of macrophytes associated with the wetlands in Purulia District, West Bengal

Sl. No.	Name of the plant	Family	Sl. No. of wetlands in which the species occurs	Mode of Propagation	Growth-form	Life-form	Species Count data
1	*Ammannia senegalensis* Lamk.	Lythraceae	1	Seeds	Herbids	Perennial	2
2	*Aponogeton appendiculatus* H. Bruggen	Aponogetonaceae	1	Seeds	Vallisneriids.	Perennial	**1**
3	*Aponogeton natans* (L.) Engler et Krause	Aponogetonaceae	1	Seeds	Vallisneriids.	Perennial	**1**
4	*Aponogeton undulatus* Roxb.	Aponogetonaceae	22	Seeds	Vallisneriids.	Perennial	**1**
5	*Alysicarpus monilifer*(L. Dc.	Fabaceae	22	Seeds	Herbids.	Annual	1
6	*Brachiaria Eruciformis* (J. E. Smith) Griseb.	Poaceae	1	Seeds	Graminids	Annual	1
7	*Ceratophyllum Demersum* L.	Ceratophyllaceae	3	Bulbil	Myriophyllids.	Annual/Perennial	5
8	*Cyperus difformis* L.	Cyperaceae	24	Seeds and tuber.	Graminids	Annual	1
9	*Cyperus Haspan* L.	Cyperaceae	9	Seeds and tuber.	Graminids	Perennial	1
10	*Cyperus iria* L.	Cyperaceae	9	Seeds and tuber.	Graminids	Annual/ Perennial	1

11	*Cyperus platystylis*(Poir.) Urb.	Cyperaceae	19	Seeds and tuber.	Graminids	Perennial	1
12	*Drosera burmanni*Vahl,	Droseraceae	9	Seeds	Herbids	Perennial	4
13	*Drosera indica* L.	Droseraceae	9, 20	Seeds	Herbids	Perennial	2
14	*Echinochloa crus– galli*(L.) P. Beauv.	Poaceae	35	Seeds	Graminids	Annual	2
15	*Eleocharis retroflexa* (Poir.) Urb.	Cyperaceae	3	Rhizome	Graminids	Annual	5
16	*Enydra fluctuans*Lour.	Asteraceae	32	Seeds	Herbids.	Annual	1
17	*Fimbristylis polytrichoides*(Retz.) Vahl	Cyperaceae	22	Seeds and tuber.	Graminids	Perennial	3
18	*Fuirena ciliaris*(L.) Roxb.	Cyperaceae	32	Seeds	Graminids	Annual	5
19	*Hygrophila difformis* (L. f.) Sreem. &Bennet	Acanthaceae	32	Lateral shoot	Herbids	Perennial	3
20	*Hygrorhiza aristata* (Retz.) Nees ex Wright et Arnott	Cyperaceae	1	Seeds	Graminids	Perennial	1
21	*Limnophila indica* (L.)*Dru*ce	Scrophulariaceae	32	Lateral shoot	Herbids	Annual/ Perennial	5
22	*Limnophila rugosa*(Roth.) Merr.	Scrophulariaceae	24	Seeds &Lateral shoot	Herbids	Annual	0
23	*Lobelia alsinoides* Lamk.	Lobeliaceae	22	Seeds	Herbids	Annual	1

24	*Murdannia spirata*(L.) Bruckner	Commelinaceae	22	Seeds	Graminids	Annual /Perennial	4
25	*Najas malesiana*de wilde	Najadaceae	20	Seeds	Parvopotamids.	Annual	3
26	*Oplismenus Composites*P. Beauv.	Poaceae	1	Seeds	Graminids	Annual	2
27	*Oryza rufipogon*Griff.	Poaceae	19	Seeds	Graminids	Annual	4
28	*Ottelia alismoides* (L.) Pers	Hydrocharitaceae	32	Seeds	Otteliids.	Annual/Perennial	2
29	*Polygonum Hydropiper* L.	Polygonaceae	1	Seeds	Herbids	Annual	4
30	*Sagittaria guyanensis*Humbolt	Alismataceae	1	Seeds	Sagittariids.	Annual	2
31	*Sagittaria sagittifolia* L.	Alismataceae	1	Seeds	Sagittariids.	Perennial	2
32	*Spilanthes Acmella* L.	Asteraceae	1	Seeds	Herbids	Annual	2
33	*Turnera ulmifolia* L.	Turneraceae	35	Seeds	Herbids	Annual	0
34	*Utricularia bifida* L.	Lentibulariaceae	9	Seeds	Utricularids	Annual	4
35	*Utricularia Stellaris* L. f.	Lentibulariaceae	32	Seeds	Utricularids	Perennial/Annual	2
36	*Verbascum chinense*(L.) Sant	Scrophulariaceae	24	Seeds	Herbids	Annual	1

Legend Under Species count data 0 to be treated as single observation, 1 as two-four observations, 2 as five to seven observations, 3 as eight to ten observations ,4 as eleven to thirteen observations, 5 as more than thirteen observations**.**

Rio earth summit held in 1992 emphasized the need to conserve biodiversity of the earth, especially of the tropics. The meaning of conservation of biodiversity involves thorough understanding of theflora and fauna on regional basis including those of wetlands. Since the presence of macrophytes is one of the essentials of wetlands wherethey form the bulk of

wetland flora and have immense functional values (Brix ,1997), the present work records the ones that have become very rare.

The impact of aquatic macrophytes is both positive and negative in nature. In fact, presence of aquatic macrophytes in manageable quantity provides stability to a system and also proves helpful in keeping the environment relatively clean. But they pose many problems when they assume the status of weeds by becoming unwanted by their involvement in such activities in the system as dehydration leading to considerable loss of water through evapo-trasnspiration, nutrient locking, hindrance to fish culture and navigation. Their overcrowding in any wetland is likely to create problems through micro-climatic changes in the system as a whole. Furthermore, deposition of dead and decaying masses shortens the life of wetland, unless properly managed.

Realizing the need to prepare region wise taxonomic census of the macrophytes associated with wetlands (Bala and Mukherjee , 2007b, 2010; Brix ,1997; Cook,1996; Malik and Mohammad, 2014;Mandal*et al.,*2003, 2005; Mandal and Mukherjee, 2007, 2010, 2012a, 2012b, 2014, 2016a, 2016b, 2016c, 2016d, 2016e, 2017, 2003; Mukhopadhyay*et al.,* 2007; Palit*et al.,* 2006; Panda *et al.,* 2009; Raha and Mallick, 2015; Sur and Roy Choudhury, 2015) and others took up the work on wetlands in different inland districts of West Bengal. Some taxonomist also took part in wetland studied in other state of India (Akshay*et al.,* 2014; Kalita , 2016; Malik and Joshi, 2013;Srivastava, 2011; Sujata*et al.,* 2014; Vardhana, 2010). In the present work the rare macrophytes occurring in wetlands of Purulia District have been documented along with their mode of propagation, growth-forms and species count data etc.

During species count data of macrophytes in wetlands of Purulia District present author observed that only two species (*Limnophila rugosa ,Turnera ulmifolia)* are in 0 scale, thirteen species (*Aponogeton appendiculatus,Aponogeton natans , Aponogeto nundulatus , Cyperus difformis , Hygrorhiza aristata, Lobelia alsinoides*,*Verbascum chinenseetc*) are in 1 scale, nine species (*Ammannia senegalensis , Drosera indica, Oplismenus compositus , Sagittaria guyanensis , Sagittaria sagittifoliaetc*) are in 2 scale, only three species (*Fimbristylis polytrichoides , Hygrophil adifformis , Naja smalesiana*) are in 3 scale, only five species (*Drosera burmanni , Murdannia spirata ,Oryza rufipogon , Polygonum hydropiper ,Utricularia bifida*) are in 4 scale and only four species (*Ceratophyllum demersum , Eleocharis retroflexa , Fuirena ciliaris , Limnophila indica*) are in 5 scale after repeated visits to the 38 wetlads of the district.

Status of at least twenty species in the wetlands of Purulia district is very discouraging because of the intense threat perceived by them. Of these species mention must be made of *Ammania senegalensis, Aponogeton appendiculatus, Brachiaria eruciformis, Drosera burmanni, Drosera indica, Eleocharis retroflexa, Limnophila rugosa, Naja smalesiana, Utricularia stellaris*etc.

So far the status of monocot macrophytes is concerned, the species belonging to ‘rare category’ are 20 in number. Prevalence percentage in wetland studied of all these collected species are minimum (2.63%), because each of them was present only in one out of 38 wetlands studied.

Out of 36 species, 26 species are only seed propagated, five species are seed- and tuber-propagated and two are propagated by lateral shoots. Only one species in each case propagates by rhizome(*Eleocharis retroflexa*) and bulbil (*Ceratophyllum demersum*) and by both seeds and lateral shoots (*Limnophila rugosa*)[Fig. 1]. Growth-form of wetland species was also studied. The dominant growth-forms are graminids and herbids. It is followed successively in descending order of dominance by vallisneriids, utricularids, sagittariids, myriophyllids,Otteliids and parvopotamids (Fig. 2).

Life-form of macrophyteswas also noted. Out of 36 species, 18 species were annuals, 12 species perennialsand six annual / perennial (Fig.3).

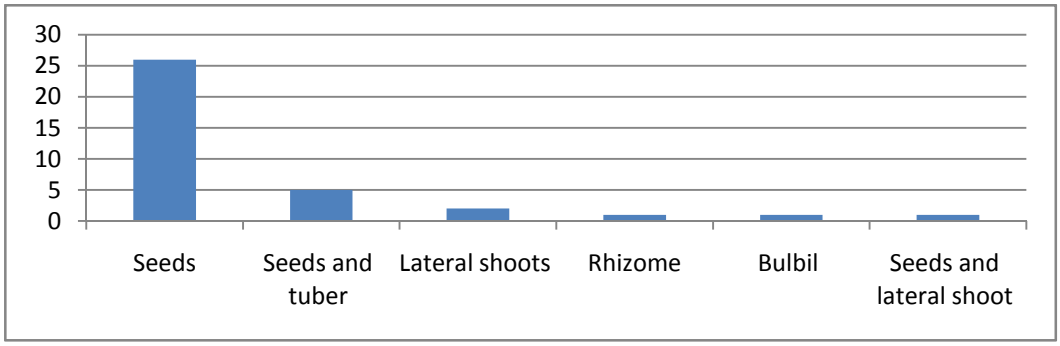

Fig. 1: Mode of propagation of inventoried macrophytes

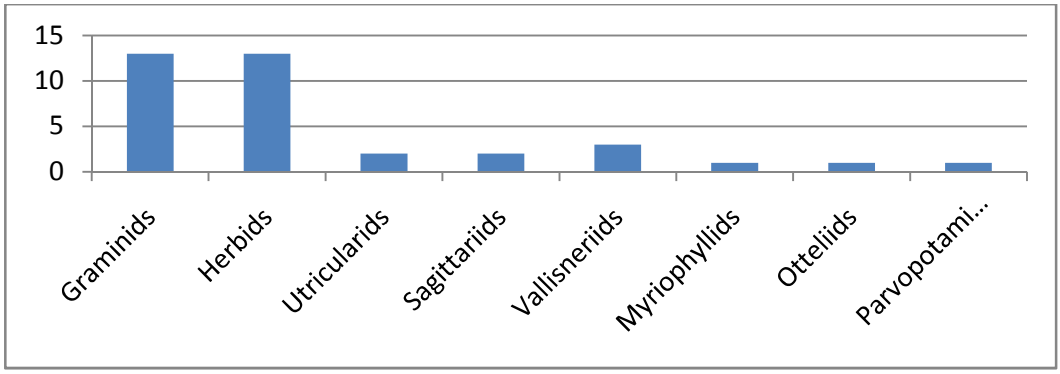

Fig. 2: Growth form categories of observed macrophytes

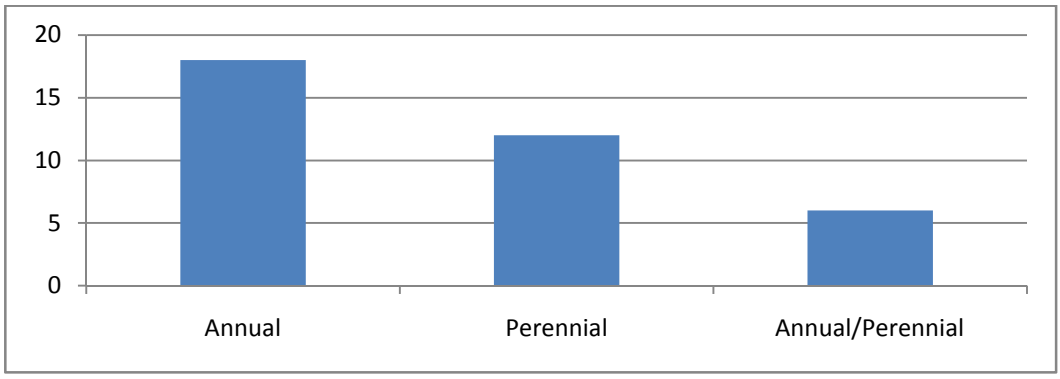

Fig. 3: Life form categories of observed macrophytes

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