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From Summer to Monsoon: Ethnobotanical Observations in the Seasonal Wetlands of Paglachandi Bil, Nadia, West Bengal

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Abstract: Seasonal wetlands in the monsoon-influenced floodplains of West Bengal constitute dynamic habitats of substantial ethnobotanical importance. Unlike terrestrial plants, these creations remain undiscovered in India's ecological literature. This study documents the plant diversity and traditional knowledge associated with Paglachandi Bil, a prominent seasonal wetland in West Bengal's Nadia district, through field visits during summer and monsoon seasons. Twenty-five aquatic and semi-aquatic plant species were recorded and analyzed for their medicinal properties and utilitarian roles in local livelihoods. The findings reveal extensive community use of native macrophytes—for food, fodder, medicine, and cultural practices—underscoring the wetland's biocultural value. However, pressures from agricultural runoff, unregulated jute retting, and land-use change threaten both ecological integrity and the continuity of traditional knowledge. The paper tries to advocate community-led conservation strategies, seasonal zoning of wetland activities, and youth-driven ethnobotanical documentation to safeguard these ephemeral landscapes and the cultural memory they hold.

Keywords: Seasonal wetlands, Medicinal properties, Local livelihood, Paglachandi, Nadia

Introduction

Wetlands are among the planet's most productive ecosystems, delivering vital services such as flood attenuation, water purification, carbon sequestration, and biodiversity support [1-2]. These functions stabilize hydrological regimes and bolster landscape resilience, yet wetlands often remain undervalued in land-use planning, leading to widespread degradation and loss of ecological integrity [2]. India's wetland network comprises over 757,000 distinct water bodies-ranging from high-altitude lakes and floodplain oxbows to coastal mangroves and man-made reservoirs-covering approximately 4.63 percent of the country's land area [3].

Early surveys in West Bengal classified seasonal pools and oxbow lakes into bils (small, shallow depressions) and beels (larger basins), highlighting their dynamic hydrology and key role in regional water management [4]. Seasonal wetlands in West Bengal—locally called bils and beels—form when monsoon rains breach riverbanks and inundate flat floodplains. In the Nadia district, these ephemeral waterbodies appear in June, peak by September, and largely disappear by December, creating pulse-driven habitats for plants and animals [3]. Their fluctuating area and depth challenge conventional wetland mapping and regulation, as these systems undergo rapid ecological succession over just a few months [3].

Ecologically, seasonal wetlands act as natural sponges: they absorb monsoon excess, reduce downstream flooding, and gradually release water to recharge aquifers and sustain baseflows [1]. Native macrophytes such as *Cyperus*, *Marsilea*, and *Colocasia* filter sediments, improve water clarity, and provide shelter for fish and invertebrates, while

ephemeral plankton blooms support juvenile fish populations critical for local fisheries [2]. For rural households, bils and beels are multipurpose commons. After inundation, residual moisture enables Aman paddy cultivation, while harvestable fish species—especially air-breathing *Channa* spp. and *Anabas testudineus*—offer premium market value [5]. Aquatic plants and emergent grasses reduce cattle feed costs and enhance milk yields, and seasonal labor in fishing, jute retting, and boat transport injects cash income into village economies [5].

Seasonal wetlands also harbor rich ethnobotanical knowledge. Local communities document medicinal uses of submerged and emergent flora—*Hydrilla verticillata* for urinary ailments and *Marsilea minuta* for skin conditions-contributing to folk pharmacopoeias that supplement modern medicine [6]. However, younger generations' migration and declining reliance on traditional remedies threaten this biocultural heritage [6].

Despite their value, Nadia's bils and beels face mounting threats. Pesticide runoff from intensified agriculture leads to toxic bioaccumulation in aquatic food webs [7]. Unregulated jute retting accelerates organic loading and creates anoxic "dead zones" [8]. Soil erosion and siltation shrink basin capacity, while land-use change and encroachment fragment habitats, undermining both biodiversity and livelihoods [7-8].

Research on Indian wetlands predominantly targets permanent or Ramsar-listed sites, leaving seasonal systems-despite their critical role in monsoon-driven agrarian economies-understudied [3]. This paper addresses that gap by examining seasonal wetlands near Paglachandi in Nadia district. Using field observations across mainly wet and dry seasons, study literature review, and simple ethnobotanical surveys, we evaluate ecological functions, socio-economic significance, and conservation challenges. We then suggest community-driven management strategies like designated retting zones, wetland-friendly agricultural importance, and youth-led biodiversity mapping-to safeguard these ephemeral landscapes and the rural livelihoods they sustain.

Methodology

Study Area

Nadia district lies in southern West Bengal, bounded by the Bhagirathi and Jalangi rivers. There are several wetlands in Nadia District. Among them, for this study we prefer the most important and biggest seasonal wetland namely Paglachandi Bil (near Paglachandi village, Nadia, West Bengal). (coordinates: 23.733025°N 88.305256°E, Map added) (Figure 1).

Figure 1. Map of study area Paglachandi Bil, Nadia, West Bengal

Seasonal Timing

The seasonal wetlands near Paglachandi, Nadia district, were documented during both wet and dry periods to note the ecological dynamics and species turnover. **Monsoon visit**: August 2024 (peak flooding) & **Dry season visit**: January 2025 (Figure 2).

Study Procedure

A non-quadrant, free-walk observational method was adopted to record plant diversity across bils and beels. Plants were identified through direct observation and photography, with emphasis on dominant macrophytes, submerged species, and emergent flora. Field specimens and photographic records were cross-referenced with regional floras and digital databases (e.g. eFlora India, FRLHT). Ethnobotanical contexts (Traditional uses, medicinal, agricultural, or cultural-were noted based on conversations with local informants and prior literature.

Figure 2. Photographs of the survey sites

Results and Discussion

Field surveys conducted during the summer and monsoon seasons at Paglachandi Bil yielded a diverse assemblage of 25 aquatic and semi-aquatic plant species. Seasonal hydrology played a pivotal role in shaping species composition: submerged and floating forms like *Hydrilla verticillata*, *Marsilea minuta*, and *Lemna minor* were largely absent during the dry season, whereas emergent types such as *Cyperus rotundus*, *Colocasia esculenta*, and *Typha angustifolia* remained consistently present. This seasonal turnover reflects the rapid ecological succession characteristic of ephemeral wetlands in floodplain environments. Table 1 shows the Seasonal occurrence of aquatic and semi-Aquatic Plants in Paglachandi Bil.

Table 1: Seasonal Occurrence of Aquatic and Semi-Aquatic Plants in Paglachandi Bil.

Sl. No.	Scientific Name	Common Name	Habitat Type	Monsoon	Dry
1	*Cyperus rotundus*	Nut grass	Emergent	✓	✓
2	*Colocasia esculenta*	Taro	Emergent	✓	✓
3	*Marsilea minuta*	Water clover	Submerged	✓	X
4	*Hydrilla verticillata*	Hydrilla	Submerged	✓	X
5	*Alternanthera philoxeroides*	Alligator weed	Floating/emergent	✓	✓
6	*Lemna minor*	Duckweed	Floating	✓	X
7	*Eichhornia crassipes*	Water hyacinth	Floating	✓	✓
8	*Pistia stratiotes*	Water lettuce	Floating	✓	X
9	*Typha angustifolia*	Cattail	Emergent	✓	✓
10	*Scirpus articulatus*	Club-rush	Emergent	✓	✓
11	*Nymphaea nouchali*	Blue water lily	Floating	✓	X
12	*Sagittaria sagittifolia*	Arrowhead	Emergent	✓	✓
13	*Ipomoea aquatica*	Water spinach	Emergent	✓	X
14	*Monochoria hastata*	Pickerel weed	Floating/emergent	✓	X
15	*Azolla pinnata*	Mosquito fern	Floating	✓	X
16	*Polygonum glabrum*	Smartweed	Fringe/emergent	✓	✓
17	*Ludwigia adscendens*	Creeping primrose	Floating/emergent	✓	X
18	*Nelumbo nucifera*	Lotus	Floating	✓	✓
19	*Trapa natans*	Water chestnut	Floating	✓	X
20	*Fimbristylis dichotoma*	Fimbry	Emergent	✓	✓
21	*Commelina benghalensis*	Dayflower	Fringe/emergent	✓	✓
22	*Aponogeton natans*	Indian water plantain	Submerged	✓	X
23	*Brachiaria mutica*	Para grass	Emergent	✓	✓
24	*Cynodon dactylon*	Bermuda grass	Fringe	X	✓
25	*Clerodendrum inerme*	Glory bower	Fringe	X	✓

Index: (Present: ✓, Absent: X)

Out of the 25 documented species, over 80% exhibited notable ethnobotanical value. Community uses included medicinal applications (*Marsilea minuta* for skin rashes; *Hydrilla verticillata* for urinary disorders), food (*Ipomoea aquatica, Trapa natans*), fodder (*Brachiaria mutica, Pistia stratiotes*), and cultural practices (*Nelumbo nucifera, Typha angustifolia*). These multi-use species contribute directly to household nutrition, livestock productivity, and informal healthcare systems. The persistence of such knowledge underscores the wetland's role as a biocultural repository. Table 2 shows the medicinal and the utilitarian roles of documented Wetland Plants.Several macrophytes were observed to perform key ecological functions. Floating types such as *Eichhornia crassipes* and *Lemna minor* improved water quality and acted as fish nursery habitats during inundation phases. Emergent plants like Scirpus articulatus and Fimbristylis dichotoma contributed to sediment stabilization and erosion control. These functions collectively support flood attenuation, aquifer recharge, and biodiversity maintenance—services crucial to rural resilience.

Despite these values, the study area faces mounting environmental stress. Agricultural runoff introduces pesticides that bioaccumulate in aquatic food webs, while unregulated jute retting depletes dissolved oxygen and leads to localized anoxic zones. Siltation from upstream erosion has also reduced basin depth and spread invasive species like Alternanthera philoxeroides, threatening native flora.

Table 2. The Medicinal and the Utilitarian Roles of Documented Wetland Plants

Sl. No.	Scientific Name	Family	Parts Used	Medicinal Uses	Other Uses
1	*Cyperus rotundus*	Cyperaceae	Tubers	Digestive aid, anti-inflammatory	Soil binding, erosion control
2	*Colocasia esculenta*	Araceae	Leaves, petioles, corms	None reported	Edible tuber, cattle fodder
3	*Marsilea minuta*	Marsileaceae	Leaves	Skin rash treatment, fever relief	Weed suppression, fodder
4	*Hydrilla verticillata*	Hydrocharitaceae	Whole plant	Urinary disorders	Oxygenates water, aquatic habitat support
5	*Alternanthera philoxeroides*	Amaranthaceae	Leaves	Wound healing, anti-inflammatory	Compost additive, erosion control
6	*Lemna minor*	Araceae/ Lemnaceae	Whole plant	None recorded	Fish feed, water quality indicator
7	*Eichhornia crassipes*	Pontederiaceae	Leaves, petioles	None recorded	Biogas, handicrafts, water purification
8	*Pistia stratiotes*	Araceae	Whole plant	Skin irritation relief (folk usage)	Livestock fodder, ornamental
9	*Typha angustifolia*	Typhaceae	Leaves, pollen	Burns, skin ailments	Thatching, mats, water filtration
10	*Scirpus articulatus*	Cyperaceae	Stems	None reported	Basketry, sediment stabilization
11	*Nymphaea nouchali*	Nymphaeaceae	Rhizomes, flowers	Skin disorders, liver tonic	Cultural/religious symbol, edible roots
12	*Sagittaria sagittifolia*	Alismataceae	Tubers	Diuretic	Edible crop, ornamental
13	*Ipomoea aquatica*	Convolvulaceae	Leaves	Mild laxative, anti-inflammatory	Leafy vegetable, water purifier
14	*Monochoria hastata*	Pontederiaceae	Leaves	Treats boils and skin wounds	Fodder, compost
15	*Azolla pinnata*	Azollaceae	Whole plant	None recorded	Biofertilizer (N-fixer), mosquito control
16	*Polygonum glabrum*	Polygonaceae	Leaves	Anti-inflammatory, ulcers	Aquatic buffer, compost
17	*Ludwigia adscendens*	Onagraceae	Leaves, stems	No specific record	Soil stabilizer, organic manure
18	*Nelumbo nucifera*	Nelumbonaceae	Seeds, roots, flowers	Antioxidants, antidiabetic,	Religious use, food, ornamentals
19	*Trapa natans*	Lythraceae	Nuts, stems	Cooling agent, urinary relief	Edible nuts, cash crop
20	*Fimbristylis dichotoma*	Cyperaceae	Stems	No record	Basketry, erosion control
21	*Commelina benghalensis*	Commelinaceae	Leaves	Anti-inflammatory, wound dressing	Grazing, ephemeral crop
22	*Aponogeton natans*	Aponogetonaceae	Leaves	No medicinal record	Aquarium and ornamental plant
23	*Brachiaria mutica*	Poaceae	Leaves	No record	Livestock fodder, soil binding
24	*Cynodon dactylon*	Poaceae	Whole plant	Fever, cuts, anti-fungal	Turf, erosion control
25	*Clerodendrum inerme*	Lamiaceae	Leaves	Antibacterial skin infections	Hedge plant, fencing

Conclusion

The seasonal wetlands of Paglachandi Bil in Nadia district reveal not only rich ecological dynamics but also a profound repository of ethnobotanical knowledge. Through field observations spanning summer to monsoon, this study documented 25 aquatic and semi-aquatic plant species with notable medicinal, nutritional, and utilitarian

significance. These plants serve essential ecological functions and remain integral to local livelihoods and folk practices. However, the wetland's health and its biocultural legacy face escalating threats from anthropogenic stressors including agricultural runoff, jute retting, and land-use change.

Safeguarding this ephemeral landscape demands more than ecological intervention, it calls for cultural revitalization and community engagement. Conservation strategies must embrace seasonal zoning, promote sustainable agricultural practices, and encourage youth-led documentation of traditional plant uses. By aligning ecological insights with grassroots stewardship, Paglachandi Bil can continue to flourish as a seasonal ecosystem and as a living archive of rural knowledge systems.

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References

1. Mitsch WJ, Gosselink JG. Wetlands (3rd ed.). John Wiley & Sons, 2000.
2. Verhoeven JTA, Arheimer B, Yin C, Hefting MM. Regional and global concerns over wetlands and water quality. Trends in Ecology & Evolution 2006, 21(2):96–103.
3. Subramanian V, Maitra R. Seasonal wetlands of India: Biodiversity, functions, and conservation. Journal of Environmental Biology 2012, 33(3):431–539.
4. Gopal B, Sah M. Survey and classification of wetlands in West Bengal. Vegetatio 1995, 116(2):155–170.
5. Datta D, Ghose MK, Datta P. Livelihood diversification in the Gangetic floodplain wetlands: A case study. Ecosystem Services 2013, 5:123–133.
6. Costa JM, Marques JC, Olesen B. Ethnobotany of aquatic plants: Global patterns with Indian insights. Journal of Ethnobiology and Ethnomedicine 2014, 10:45.
7. Saharan N, Patil A, Kumar R. Agricultural runoff and pesticide impact on wetland ecosystems in West Bengal. Environmental Monitoring and Assessment 2016, 188(5):258.
8. Banerjee A, Sen S. Environmental consequences of jute retting in seasonal wetlands. Journal of Environmental Management 2018, 217:243–250.