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Floristic Inventory and Ecological Role of Aquatic and Wetland Plants of Some Reservoirs of Wardha District, Maharashtra State

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Abstract

In the present Investigation, Wardha District reservoirs (dams, ponds and rivers) were studied and approximately 159 Floristic aquatic and wetland plants were noted and some socio-ecological role and uses were documented. The major contributions of the research are the supply of scientific information able to contribute to the conservation of land and water management. The issue of degradation of wetlands is common with land-use planning and the development policies that underrate the wetlands. The study can show the significance of wetlands in water quality maintenance, sustaining biodiversity and climate change mitigation by giving the data on the ecological functions of the wetland plants. This fact can be cited in advancing more restrictive policies against encroachment of the wetlands, pollution, and overuse of the wetlands. Also, the research paper may contribute to the incorporation of wetland conservation in the wider water resource management solutions, the aims of which will be to develop knowledge and a balanced policy of the development and environmental protection. The result of the study indicates that environmental awareness is needed, as on wetland ecosystem Livelihood dependency is a very crucial factor defining the attitude to conservation. The study is a contribution to the knowledge of the socio-ecological processes that determine the conservation of wetland and the necessary.

Keywords: *Wetlands, Sustaining Biodiversity, Floristic Inventory, Socio-Economic Awareness*

Introduction

Wetlands are also productive and ecologically valuable ecosystems in the world. The need to understand the ecological value of wetland plants is critical to the sustainability and management of these environments. The plants in wetlands are important in sustaining biodiversity and other ecosystem services that support the local community and the general environment directly (Murtada *et al.* 2025). This reduces levels of nutrients and contaminants in the immediate water bodies as the plants play the role of natural filters. They are also resistant to erosion, hold sediments in place, and protect a variety of aquatic life. Wetland plants are central to the survival of most species, starting at the microorganism level and extending to large mammals (Sieben *et al.* 2025). It is particularly important to investigate and discover the role of aquatic and wetland plants in the context of sustaining wetland ecosystems and the services they offer, since in the current scenario, humans place more and more pressure on wetlands, along with climate change.

Wetlands contain hotspots of biodiversity and represent a large variety of species, many of which are either endemic or migratory. Wetlands serve as habitats to a wide variety of birds, amphibians, reptiles and fish in India, breeding, feeding and living on these wetlands. The biodiversity is centered around aquatic plants that serve as habitat and a source of food to most species (Tingfeng *et al.* 2025). Specifically, they are fish and amphibian spawning areas and a refuge for the young species of aquatic animals using their roots. Wetland ecosystems have nutrient-rich plants as their primary producers, which support the food chain in these ecosystems and are, therefore, instrumental to the survival of other organisms (Wang *et al.* 2025). Moreover, plants in the wetland participate in the carbon sequestration ability of these ecosystems, which plays a key role in the reduction of climate change. They consume the carbon dioxide released to the atmosphere and preserve it both in their biomass and soil in a bid to decrease the general carbon footprint of the area. So, it is a need to conserve and take proper action to protect and preserve the wetland areas.

Study area

Wetlands directly or indirectly have an enormous ecological, economic, commercial and socio-economic importance and values. Such lands constitute very rich biodiversity of flora and fauna of important local, natural and regional significance (Anonymous, 2010).

Historically, Wardha places cultural interest in the fact that it was a major seat of Gandhian thought (Sevagram). Mahatma Gandhi himself lived in the village. The wetlands are both ecologically functional and important to the cultural heritage of the district, providing places of reflection and recreation and places in which the community can interact with nature. But most of the wetlands in Wardha district are at risk of being tampered with through agricultural intensification and water withdrawals, and urban sprawling. These wetland ecosystems are important and need to be conserved and managed sustainably in this region through knowledge and documentation of these environments, so that they will continue to give essential ecosystem services to subsequent generations.

Wetlands would not survive without aquatic plants since they are primary in providing ecological balance. They also take part in the processes of water purification because these plants eliminate excess nutrients, stabilize the sediments, and give a home to many other species (Moges & Dibaba, 2024). Moreover, such plants also contribute to the local food chain, stand to provide flood control and assist in the process of carbon sequestration and mitigate the consequences of climate change. But the invasion of wetland areas endangers the existence of the vital plant species and eventually the whole ecosystem.

A big research gap still lies in the studies of the aquatic plant species in Wardha District and their particular ecological role. Wetlands in the area are known, but few studies have been done on the range and ecological contribution of aquatic vegetation.

The major element of the study focuses on the aquatic and wetland plant species in the natural and man-made wetlands within the district. Wardha District includes both types of wetlands, having considerable anthropogenic influence that is developed in the constructed reservoirs and covered irrigation channels. Such man-made wetlands (including the Pothara Lake and Lal Nalla) are also important to the local hydrology, supporting an aquatic plant community and providing important ecosystem services like water purification, flood management and habitat to wildlife. Particularly more prone to degradation, natural wetlands in the district are usually linked with river flood plains and other smaller water bodies, which are left in fairly undisturbed form.

The research will aim at detecting, listing, and publishing the aquatic and wetland plant species that inhabit these environments. It aims at knowing the species diversity, distribution and ecological functions of these plants in the immediate environment. These plants, which are submerged plants, emergent plants and floating plants, play a key role in serving to regulate the quality of the water, as well as harbor food and provide protection for the wildlife, and in the process sequester carbon.

Material and Method

The study involved the collection of primary data that is concentrated in field surveys in different wetland sites around Wardha. Field surveys of profile sampling of aquatic flora species, diversity, abundance, and distribution in various types of wetlands were conducted.

Depending on the type of hydrological dynamics, such as the depths of water, rate of flow, as well as seasonal change, the type of vegetation to develop in these types of ecosystems is fixed, thus rendering the wetlands extremely dynamic and susceptible to fluctuation of water and land uses.

In the current study, the floristic survey incorporates a field study and a community survey. During the field visit, plant species were collected and identified with the help of different floras, and their digital photographs were collected to study plants, and their details were noted.

Result and Discussion

Floristic Diversity of Wardha District

Wardha District, situated in the Vidarbha region of Maharashtra, shows distinct floristic characteristics shaped by its geographical location, topography, and climate. The district lies in a semi-arid zone with seasonal rainfall, which significantly influences plant growth patterns. River systems, dams, lakes, ponds, and seasonal wetlands create diverse habitats that support aquatic and wetland plant communities. The presence of rivers such as Wardha, Vena, Bor, Dham, Yashoda, and Pothara contributes to the formation of floodplains and marshy areas, which enhance floristic diversity.

The present study documented approximately 159 aquatic and wetland plant species from various studied water bodies of Wardha District. These species represent a wide range of angiosperm families and demonstrate considerable ecological adaptability. The diversity includes submerged, free-floating, rooted floating, emergent, and amphibious plant forms. Seasonal availability of water allows both perennial and annual wetland plants to flourish, increasing overall species richness in the district (Central Pollution Control Board (CPCB), 2025).

Wetland habitats of Wardha District support diverse life forms. Submerged plants such as *Hydrilla verticillata*, *Vallisneria spiralis*, and *Potamogeton* species indicate stable aquatic conditions. Amphibious species thrive along seasonally exposed riverbanks and shallow wetlands. Riverine ecosystems associated with the Wardha and its tributaries support rich plant assemblages due to periodic flooding and nutrient deposition. Reservoirs and dams such as Pothara and Lal Nalla provide relatively stable aquatic environments, encouraging the growth of both submerged and emergent vegetation. Seasonal wetlands formed during monsoon periods further enhance plant diversity by supporting short-lived annual species.

Ecological Significance

The floristic diversity of Wardha District plays an essential role in maintaining wetland ecosystem functions such as nutrient cycling, habitat provision, water purification, and soil stabilization. Documentation of this diversity provides a baseline for future ecological monitoring and conservation planning.

Table: List of Aquatic and Wetland Plants Identified from Wardha District

Sr. No.	Botanical Name	Family
1)	*Achyranthes aspera* L.	Amaranthaceae
2)	*Aeschynomene americana* L.	Fabaceae
3)	*Aeschynomene aspera* L.	Papilionaceae
4)	*Aeschynomene indica* L.	Fabaceae
5)	*Ageratum conyzoides* L.	Asteraceae
6)	*Alocasia fornicata* (Roxb.) Schott	Araceae
7)	*Alternanthera philoxeroides* (Mart.) Griseb.	Amaranthaceae
8)	*Alternanthera sessilis* (L.) R.Br.	Amaranthaceae
9)	*Alysicarpus monilifer* (L.) DC.	Fabaceae
10)	*Alysicarpus vaginalis* (L.) DC.	Fabaceae
11)	*Amaranthus viridis* L.	Amaranthaceae
12)	*Amaranthus spinosus* L.	Amaranthaceae
13)	*Ammannia baccifera* L.	Lythraceae
14)	*Anagallis arvensis* L.	Primulaceae
15)	*Aponogeton crispus* Thunb.	Aponogetonaceae
16)	*Aponogeton natans* (L.) Engl. & Krause	Aponogetonaceae
17)	*Arundo donax* L.	Poaceae
18)	*Bacopa monnieri* (L.) Wettst.	Scrophulariaceae
19)	*Bergia ammannioides* Roxb. ex Roth	Elatinaceae
20)	*Bergia capensis* L.	Elatinaceae
21)	*Biophytum sensitivum* (L.) DC.	Oxalidaceae
22)	*Blumea laciniata* (Roxb.) DC.	Asteraceae
23)	*Boerhavia erecta* L.	Nyctaginaceae
24)	*Brachiaria reptans* (L.) Gard.	Poaceae
25)	*Butea monosperma* (Lam.) Taub.	Fabaceae
26)	*Caesulia axillaris* Roxb.	Asteraceae
27)	*Cardiospermum helicacabum* L.	Sapindaceae
28)	*Cassia occidentalis* L.	Caesalpiniaceae
29)	*Centaurium centaurioides* (Roxb.) Rao & Kamathy	Gentianaceae
30)	*Centella asiatica* (L.) Urb.	Apiaceae
31)	*Centipeda minima* (L.) A.Br.	Asteraceae
32)	*Ceratophyllum demersum* L.	Ceratophyllaceae
33)	*Chenopodium album* L.	Chenopodiaceae
34)	*Chenopodium ambrosioides* L.	Chenopodiaceae
35)	*Chloris barbata* Sw.	Poaceae
36)	*Chrozophora rottleri* (Geiseler) Juss.	Euphorbiaceae
37)	*Coix lachryma-jobi* L.	Poaceae
38)	*Coldenia procumbens* L.	Boraginaceae
39)	*Colocasia esculenta* (L.) Schott	Araceae
40)	*Commelina benghalensis* L.	Commelinaceae
41)	*Commelina diffusa* Burm.f.	Commelinaceae
42)	*Corchorus aestuans* L.	Tiliaceae
43)	*Corchorus olitorius* L.	Tiliaceae
44)	*Crinum asiaticum* L.	Amaryllidaceae
45)	*Croton bonplandianum* Baill.	Euphorbiaceae
46)	*Cyanthillium cinereum (L.) H.*	Asteraceae
47)	*Cyperus alopecuroides* Rottb.	Cyperaceae
48)	*Cyperus compressus* L.	Cyperaceae
49)	*Cyperus haspan* L.	Cyperaceae
50)	*Cyperus iria* L.	Cyperaceae
51)	*Cyperus kyllingia* Endl.	Cyperaceae
52)	*Cyperus rotundus* L.	Cyperaceae
53)	*Dactyloctenium aegyptium* (L.) P.Beauv.	Poaceae
54)	*Dentella repens* (L.) J.R.Forst. & G.Forst.	Rubiaceae
55)	*Desmostachya bipinnata* (L.) Stapf	Poaceae
56)	*Digitaria longiflora* (Retz.) Pers.	Poaceae
57)	*Echinochloa colonum* (L.) Link	Poaceae
58)	*Echinochloa crus-galli* (L.) P.Beauv.	Poaceae
59)	*Eclipta alba* (L.) Hassk.	Asteraceae
60)	*Eichhornia crassipes* (Mart.) Solms	Pontederiaceae

61)	*Eleocharis atropurpurea* (Retz.) Kunth	Cyperaceae
62)	*Eleocharis dulcis* (Burm.f.) Trin.	Cyperaceae
63)	*Eragrostis unioloides* (Retz.) Nees	Poaceae
64)	*Eragrostis pilosa* (L.)	Poaceae
65)	*Eriocaulon quinquangulare* L.	Eriocaulaceae
66)	*Eriochloa procera* (Retz.) C.E.Hubb.	Poaceae
67)	*Evolvulus nummularius* (L.) L.	Convolvulaceae
68)	*Ficus heterophylla* L.f.	Moraceae
69)	*Glinus oppositifolius* (L.) DC.	Molluginaceae
70)	*Gnaphalium indicum* L.	Asteraceae
71)	*Gnaphalium polycaulon* Pers.	Asteraceae
72)	*Grangea maderaspatana* (L.) Poir.	Asteraceae
73)	*Heliotropium indicum* L.	Boraginaceae
74)	*Heliotropium ovalifolium* Forssk.	Boraginaceae
75)	*Hoppea dichotoma* Willd	Gentianaceae
76)	*Hydrilla verticillata* (L.f.) Royle	Hydrocharitaceae
77)	*Hygrophila schulli* (Buch.-Ham.) M.R.Almeida	Acanthaceae
78)	*Hygroryza aristata* (Retz.) Nees	Poaceae
79)	*Ipomoea aquatica* Forssk.	Convolvulaceae
80)	*Ipomoea carnea* Jacq. subsp. *fistulosa*	Convolvulaceae
81)	*Justicia diffusa* Willd.	Acanthaceae
82)	*Justicia simplex* D.Don	Acanthaceae
83)	*Lemna perpusilla* Torr.	Lemnaceae
84)	*Limnophila indica* (L.) Druce	Scrophulariaceae
85)	*Lindernia liliate (Colsm.)*	Scrophulariaceae
86)	*Lindernia oppositifolia* (Retz.) Mukerjee	Scrophulariaceae
87)	*Lindernia viscosa* (Hornem.) Bold.	Scrophulariaceae
88)	*Ludwigia adscendens* (L.) Hara	Onagraceae
89)	*Ludwigia prostrata* Roxb.	Onagraceae
90)	*Medicago minima* L.	Fabaceae
91)	*Medicago polymorpha* L.	Fabaceae
92)	*Melilotus indica* (L.) All.	Fabaceae
93)	*Melochia corchorifolia* L.	Malvaceae
94)	*Merremia gangetica (L.)*	Convolvulaceae
95)	*Mollugo pentaphylla* L.	Molluginaceae
96)	*Murdannia nudiflora* (L.) Brenan	Commelinaceae
97)	*Najas graminea* Delile	Najadaceae
98)	*Nechamandra alternifolia (Roxb. ex Wight)*	Hydrocharitaceae
99)	*Nelumbo nucifera* Gaertn.	Nelumbonaceae
100)	*Neptunia natans* (L.f.) Druce	Mimosaceae
101)	*Nymphaea nouchali* Burm.f.	Nymphaeaceae
102)	*Nymphoides hydrophylla* (Lour.) Kuntze	Menyanthaceae
103)	*Nymphoides indica* (L.) Kuntze	Menyanthaceae
104)	*Oldenlandia diffusa* (Willd.) Roxb.	Rubiaceae
105)	*Oryza rufipogon* Griff.	Poaceae
106)	*Ottelia alismoides* (L.) Pers.	Hydrocharitaceae
107)	*Oxalis corniculata* L.	Oxalidaceae
108)	*Oxystelma secamone* (L.) R.Br.	Asclepiadaceae
109)	*Panicum paludosum* Roxb.	Poaceae
110)	*Paspalum scrobiculatum* L.	Poaceae
111)	*Peperomia pellucida* (L.) Kunth	Piperaceae
112)	*Pergularia daemia* (Forssk.) Chiov.	Asclepiadaceae
113)	*Persicaria barbata* (L.) H.Hara	Polygonaceae
114)	*Phyla nodiflora* (L.) Greene	Verbenaceae
115)	*Phyllanthus fraternus* G.L.Webster	Euphorbiaceae
116)	*Phyllanthus urinaria* L.	Euphorbiaceae
117)	*Physalis minima* L.	Solanaceae
118)	*Pistia stratiotes* L.	Araceae
119)	*Pithecellobium dulce* (Roxb.) Benth.	Fabaceae
120)	*Polygonum plebeium* R.Br.	Polygonaceae
121)	*Portulaca oleracea* L.	Portulacaceae

122)	*Potamogeton crispus* L.	Potamogetonaceae
123)	*Potamogeton nodosus* L.	Potamogetonaceae
124)	*Ranunculus sceleratus* L.	Ranunculaceae
125)	*Rorippa indica* (L.) Hiern	Brassicaceae
126)	*Rumex dentatus* L.	Polygonaceae
127)	*Rungia pectinata* (L.) Nees	Acanthaceae
128)	*Saccharum spontaneum* L.	Poaceae
129)	*Sacciolepis indica* (L.) A.Chase	Poaceae
130)	*Scirpus articulatus* L.	Cyperaceae
131)	*Scirpus grossus* L.	Cyperaceae
132)	*Sesbania bispinosa* (Jacq.) Wight	Fabaceae
133)	*Sesbania cannabina* (Retz.) Pers.	Fabaceae
134)	*Solanum surattense* Burm.f.	Solanaceae
135)	*Sopubia delphinifolia* (L.) G.Don	Scrophulariaceae
136)	*Sphaeranthus indicus* L.	Asteraceae
137)	*Spilanthes calva.* L.	Asteraceae
138)	*Spirodela polyrrhiza* (L.) Schleid.	Lemnaceae
139)	*Synedrella nodiflora* (L.) Gaertn.	Asteraceae
140)	*Terminalia cuneata* Roth	Combretaceae
141)	*Trapa bispinosa* Roxb.	Trapaceae
142)	*Trapa natans* L.	Trapaceae
143)	*Trichodesma indicum* (L.) Lehm.	Boraginaceae
144)	*Triumfetta pentandra* A.Rich.	Tiliaceae
145)	*Typha angustifolia* L.	Typhaceae
146)	*Typha domingensis* Pers.	Typhaceae
147)	*Utricularia aurea* Lour.	Lentibulariaceae
148)	*Utricularia gibba* L.	Lentibulariaceae
149)	*Vallisneria spiralis* L. var. *denseserrulata* Makino	Hydrocharitaceae
150)	*Verbascum chinense* (L.) Santapau	Scrophulariaceae
151)	*Vernonia cinerea* (L.) Less.	Asteraceae
152)	*Veronica anagallis-aquatica* L.	Scrophulariaceae
153)	*Vetiveria zizanioides* (L.) Nash	Poaceae
154)	*Withania somnifera* (L.) Dunal	Solanaceae
155)	*Wolffia arrhiza* (L.) Horkel ex Wimmer	Lemnaceae
156)	*Wolffia globosa* (Roxb.) Hartog & Plas	Lemnaceae
157)	*Xanthium strumarium* L.	Asteraceae
158)	*Zornia diphylla* (L.) Pers.	Fabaceae
159)	*Zoysia matrella* (L.) Merr.	Poaceae

Ecological Role

Representative Monocot Families in Wardha Wetlands

Family	Key Species	Ecological Role	Socio-economic Relevance
Hydrocharitaceae	*Hydrilla verticillata, Vallisneria spiralis*	Oxygenation, fish habitat	Aquarium trade, fisheries support
Typhaceae	*Typha angustifolia, Typha elephantina*	Nutrient absorption, wetland biofilter	Mats, thatching, handicrafts
Poaceae	*Echinochloa crus-galli, Saccharum spontaneum*	Forage, bank stabilization	Livestock fodder, erosion control
Cyperaceae	*Cyperus halpan, Scirpus articulates*	Sediment stabilization, marsh colonizer	Basketry, nesting sites for birds

Conclusion

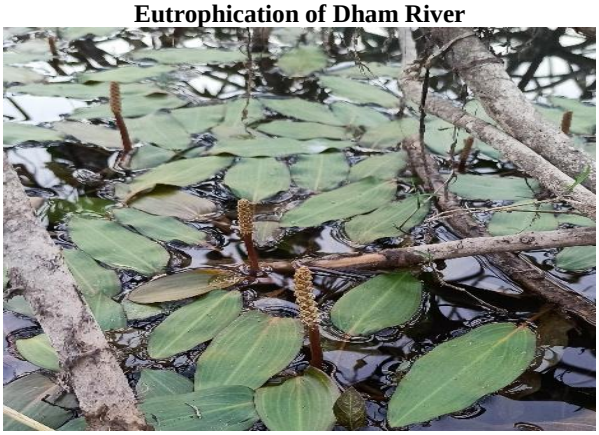
Indian wetlands are ecologically diverse and rich in aquatic flora, ranging from lotus-dominated tanks to sedge-dominated floodplains. Major floristic surveys confirm a wide array of species, many of which are recorded in Wardha District. Wetland plants provide services that range from water purification to cultural symbolism (Jiayi *et al.* 2025). However, unchecked urbanization, agricultural runoff, invasive species, and climate variability are shrinking wetland habitats. Conservation efforts—from national policies to community traditions—are ongoing but require stronger implementation in regions like Wardha. The observation indicates that, to ensure the development of long term ecological responsibility general

literacy or basic environmental learning is not enough. Importantly practical and hands-on ways would also be more appealing to locals (Tarigan *et al.* 2025).

Socio-Ecological Role

Eutrophication of Dham River

Encroachment and flooding in the Vena River



***Potamogeton nodosus* L. in Lal Nalla Dam**

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Conflicts of interest
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