ABSTRACT: Urpod wetland, situated to the south of the Brahmaputra river of Goalpara District, Assam comes under the Asian wetland directory. The present findings reported a total of 60 fish species belonging to 21 family from the wetland. Many riverine species have amalgamated in this wetland due to connection with the Jhinari and Jhimjiram river. Encroachment, agricultural activities, forest cover change in the adjoining reserved forests, and human settlement within the wetland and its buffer zone resulting in an imbalance in the wetland ecosystem. The wetland supports considerable numbers of migratory bird populations which are declining owing to extensive human disturbances.

Keywords: Hydrobiology, Diversity, Wetland

INTRODUCTION

Wetlands are unique ecosystem having rich nutrient status and carrying capacity with immense production potential hence considered as food and fodder resources for human and its related allies. Ecologically wetlands are of great significant for an area as they support different food chain, food webs, regulate hydrological cycle, recharge ground water, trapping of energy and shelter to large numbers of flora and fauna having great ecological and economical value [1,2]. Wetland fishery is an important component of fisheries of Assam [3, 4, 5, 6, 7]. Situated near Agia in Goalpara district of Assam Urpod is a large wetland. The wetland is riverine in origin and covers an area of about 649.38 ha. The wetland surrounded by 10 villages. The wetland not only provides water for cultivation in the nearby agricultural land but also maintain the ecosystem of the area through preservation of many species of aquatic plants, fishes, insects, birds, underwater animals and domestic as well as migratory birds. The wetland has already been included in Asian wetland directory [8]. The present investigation was undertaken to study the ecological parameters and assessment of biotic potential of the wetland with special emphasis on ichthyofaunal diversity.

MATERIALS AND METHODS

The study was conducted from 2010-2011. For diversity study fishes were sampled in five pre-selected sampling sites. Cast net was mostly used to collect the fish, however others were also used. Fish species available at the local market and caught by local fishermen were also purchased. The collected fish species were preserved in 8-10% formaldehyde solution for further study using standard method of Jhingran and Jayaram [9, 10]. Plankton, Benthos and Macrophytes were also collected for diversity study.

Water samples for physico-chemical parameters were collected from five pre-selected sampling sites in each season (i.e. in premonsoon, monsoon, retreating monsoon and winter). Physico-chemical parameters were analysed adopting the method of APHA [11].

**ECO-HYDROBIOLOGY WITH SPECIAL AMPHASIS ON ICHTHYOFANAL DIVERSITY OF URPOD WETLAND OF GOALPARA, ASSAM, INDIA**

B.J.Saud¹ M. Chetia² V.K. Verma¹, D.Kumar¹

¹Central Inland Fishery Research Institute, Regional Centre, Guwahati, Assam
²Department of Zoology, Gauhati University, Assam

bjsaud@gmail.com
DESCRIPTION OF THE WETLAND

Location

Urpod wetland is located between latitudes 26°05’05” N to 26° 06’45” and longitude 90° 34’08” E to 90° 37’45”E 90°36’E to the south of the Brahmaputra river of Goalpara District, Assam (Figure-1). The wetland is surrounded by the NH-37 in the south, west and north. The eastern side of the wetland is surrounded by villages like Maijunga, Garaimari, Khurabhasa etc. Perennially, the wetland is fed by Jhinjiram (outlet of the wetland) and Jinari (inlet of the wetland). The Jinari is originates from the garo hills of Meghalaya in the southern side, passes by the side of the wetland to the north and north-east direction before meeting the Brahmaputra River. And the river Jhinjiram originates from the Urpod wetland at its south and flows westwards towards the Brahmaputra. The Urpod wetland is connected with Patakata wetland by a small drain located in the eastern side of the wetlands.

![Map of Assam](https://www.google.com/maps)

(Source: www.google.com)

Figure-1. Satellite imaginary of Urpod wetland
Geography and geomorphology of the wetland

Geographically the wetland is formed by Archean Gneissic complex consisting of granites, gneisses, schists and amphibilies [12]. The wetland and the valleys in its vicinity are underlined by recent alluvium consisting of clay silt, sand and pebbles. The older Archean basement is concealed under the alluvium. The major part of the wetland is consists of heavy textured soils with pH ranging from 5.5 to 6.8 [12]. The wetland is bounded by the agricultural land of villages like Agia, kalpani, Shyamnagar, Gendera, Garukutia etc. The eastern side of the wetland is surrounded by agricultural land of villages like Maijunga, garamari, Kurabhasa etc. While the wetland and its lowland fringe area underlaid by recent alluvium consisting of clay, silt, sand and pebbles, the highlands immediately to the north and south of the wetland are made up of gneisses and schists of the Archaean age.

Hydrology

The wetland receives water from the river Jinari and Jhinjiram. The wetland also collects part of the water from the plains and isolated undulating areas in the north through a network of drains. The local monsoon run off is also a major source of water to the wetland. The area experiences heavy rainfall during June, July and post monsoon season extend up to the end of October.

Climatic condition

The climate of in and around the wetland more or less moderate with temperature variation between the average minimum of 10º C in winter and average maximum in summer limited to around 33ºC. The monsoon is long extending from May to September. Though most of the rainfall occurs during the monsoon, occasional heavy downpour is often experienced during winter.

LIMNOCHEMISTRY

The wetland is less contaminated and henceforth provides sheltering place for large numbers of aquatic resources. But due to heavy silt coming into the wetland every year the depth of water has reduced which also affect the physico-chemical characteristics of the wetland (Table-1). The wetland water is alkaline in nature through out the year which ranged from 7.2 to 8.6. High dissolve oxygen value was recorded during winter (10.2 mg/l). While less value was observed during monsoon (6.4 mg/l) because of influx of nutrients from the catchments. Total alkalinity was maximum in winter (157.3 mg/l) which may be due to high photosynthetic activity. Dilution of water may be responsible for minimum value (92.2 mg/l) in monsoon. Total hardness usually ranged from 20.2 mg/l to 37.8 mg/l. usually higher values are observed in winter season (Table-1).

<table>
<thead>
<tr>
<th>Water Quality parameters</th>
<th>Pre-monsoon</th>
<th>Monsoon</th>
<th>Post Monsoon</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.2-8.4</td>
<td>7.2-8.5</td>
<td>7.6-8.6</td>
<td>7.9-8.5</td>
</tr>
<tr>
<td>Temperature</td>
<td>7.9-16.7</td>
<td>7.2-19.3</td>
<td>6.8-16.4</td>
<td>6.2-7.2</td>
</tr>
<tr>
<td>Dissolve oxygen</td>
<td>8.5-8.7</td>
<td>6.4-8.0</td>
<td>8.5-10.0</td>
<td>8.6-10.2</td>
</tr>
<tr>
<td>Free carbondioxide</td>
<td>6.2-6.3</td>
<td>6.5-6.7</td>
<td>7.3-7.5</td>
<td>7.7-7.8</td>
</tr>
<tr>
<td>Alkalinity</td>
<td>124.3-143.5</td>
<td>92.2-124.7</td>
<td>127.1-132.3</td>
<td>152.1-157.3</td>
</tr>
<tr>
<td>Hardness</td>
<td>20.2-37.6</td>
<td>27.1-34.5</td>
<td>22.3-42.1</td>
<td>29.6-37.8</td>
</tr>
</tbody>
</table>

BIOLOGICAL RESOURCES

Urpod wetland is endowed with rich floral and faunal diversity. The Urpod ecosystem harbours large numbers of migratory waterfowl each year. It regularly supports substantial numbers of fish fauna indicative of wetland values, productivity and diversity.
PLANKTONS
Rich plankton diversity is noticeable in this wetland of which 15 were phytoplankton and 30 zooplanktons. Pre-
monsoon records of the plankton was 480 nos./litre. The phytoplankton percentage was 54.2% and zooplankton
35.8%. Cyanophyceae was the most dominant group among phytoplankton and copepods among zooplanktons.
Other dominant groups were chlorophyceae and rotifers. The dominance of cyanophyceae and Chlorophyceae
indicated the eutrophic nature of the water body. The dominant species encountered were Anacystic sp.
Hydrodictyon sp. Trichonema sp. Chlorella sp. Navicula sp. Melosira sp. and Synedra sp.

BENTHOS
The important benthic fauna found in Urpod wetland ecosystem includes, Tubifex sp., Naisi sp. Dero sp.,
Limnodrillus sp., Chaoborus sp., Chironomus sp., Bellamya sp. Bortia sp., Chaoborous sp., Culicoids sp.,
Dragonfly larvae, stone fly larvae, Cybister larvae, Pila globosa and Unio sp.

MACROPHYTES
Macrophytes form an important component of the wetland and constitute divers form of free floating submerged
and emerged macrophytes. Important floating macrophytes found in the wetland are Eichhornia crassipes, Pistia
stratiotes, Lemna minor, Azolla pinnata, salvinia natans, Nelumbo lotus, Nymphaea alba, Nelumbo rubra, Euryale
ferox, Marsiela quadrifolia, Spirodela polyrhiza and Trapa bispinosa. The submerged macrophytes include
Potamogeton crispus, Vallisneria spiralis, hydrilla verticellata, Nais spp., Najas sp., Nitella sp. Nechamendra
sp., Chara sp., Ceratophyllum demarsum l and uticularia sp. the emergent species are represented by
Paspalum serobiculatum, Ipomoea reptans, Cyperus sp., Eupatorium sp. Phragmitis sp. Saccharum sp., Accium
sp., imperata sp. Vitez sp., Eleocharis pentagine, Sagittaria sagitifolia and Hygrorhiza sp.

FISH AND FISHERIES
A total of 60 species belonging to 21 family have been recorded (Table-1) from the wetland. Earlier also a wide
array of fishes is recorded in this wetland [13]. Majority of them are resident fauna of this wetland. Some of the
fishes migrate between the wetland and the river Jhinari and Jhinjiram and so many riverine species have
amalgamated in this wetland. Numbers of exotic fish species is also recorded from the wetland. Commonly
encountered exotic carps in this wetland are Cyprinus carpio, Ctenopharyngodon idella, and Hypothalmichthys
molitrix. The wetland is a good breeding ground for almost all fishes except the carps which breed in running
water. The commercially important fish species found in the wetland are, Labeo rohita, Labeo calbasu, Labeo
gonius, Catla catla, Cirrhinus mrigala, Labeo gonius, Notoperus chitala, Aorichthys aor, Wallago attu,
Channa marulius, Channa striatus, Cirrhinus reba, Heteropneustes fossilis, Clarias batrachus, Ompok pabo,
Anabas testudineus, Gadusia chapra, Rasbor a elanga, Mystus cavasius, Monopterus cuchia etc. Three species
of freshwater Prawn belonging to Palinomidae family such as Macrobrauchium dayanum M. assmensis and M.
lamerrie were found in the wetland.

Fishing in this wetland continuous through out the year with a peak during winter (Sep- Feb). Since the wetland
encompasses a huge area it is difficult to estimate the total catch. In Urpod wetland Katal fishing or Bush Park
fishing is an indigenous method practiced by the villagers during winter. These are usually installed using
bamboo/ tree branches, water hyacinth etc. in a circular form during winter. Fishes gradually aggregate in these
areas when fishing is intensified in the wetland. Gill nets locally called Phasi or Lungi jal is widely used and
chaki or chak jal, a conical shaped net 1.5-3.0 m wide is widely used. The shore seines and drag nets are used in
those parts of the wetland where macrophytes are not present or moderately infested. Some groups of fishermen
are completely dependent on fishing activity. They fish round the year in groups and are completely dependent
on fishing for their livelihood. They have no landholdings of their own or marginal land holdings. The other
groups of fishermen are those who take up fishing as subsidiary source of income and fish only for their
domestic consumption. They generally cultivate Boro rice by the side of Urpod wetland. They fish with small
nets like cast net and dip net.
Table 2. Fish species occurring in Urpod wetland with potential food, ornamental and sport value.

<table>
<thead>
<tr>
<th>Fish taxa/ species</th>
<th>Potential value</th>
<th>Conservation status*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FF</td>
<td>OF</td>
</tr>
</tbody>
</table>

**ORDER: I. OSTEOGLOSSIFORMES**  
Family: (1) Notopteridae
1. Chitala chitala (Ham-Buch)  √√  √  √  EN
2. Notopterus notopterus (Pallas)  √√  √  √  LR-nt

**ORDER: II. CLUPEIFORMES**  
Family: (2) Clupeidae
3. Gudusia chapra (Ham- Buch)  √√  LR-lc

**ORDER: III. CYPRINIFORMES**  
Family: (3) Cyprinidae
4. Salmostoma bacaila (Ham-Buch)  √  √  LR-lc
5. Amblypharyngodon mola (Ham-Buch)  √  LR-nt
6. Brachydanio rerio (Ham-Buch)  √  √  LR-nt
7. Danio devario (Ham- Buch)  √  √  LR-nt
8. Esomus danricus (Ham-Buch)  √  √  LR-lc
9. Parlicosoma daniconius (Ham- Buch)  √  √  LR-nt
11. Catla catla (Ham- Buch)  √  LR-nt
12. Cirrhinus mirgala (Ham-Buch)  √  LR-nt
13. C. reba (Ham-Buch)  √  Vu
14. Ctenopharyngodon idella (Valenciennes)  √  LR-nt
15. Cyprinus carpio var. communis (Linnaeus)  √  Vu
16. Labeo calbasu (Ham- Buch )  √  Vu
17. L. gonius (Ham- Buch )  √  LR-lc
18. L. rohita (Ham- Buch )  √  LR-lc
19. Osteobrama cottio cottio (Ham- Buch)  √  √  LR-nt
20. Puntius chola (Ham-Buch)  √  √  Vu
21. P. conchonius (Ham- Buch)  √  √  Vu
22. P. gonorionotus (Bleeker)  √  LR-lc
23. P. phutonio (Ham- Buch)  √  LR-lc
25. P. sophore (Ham- Buch)  √  LR-nt
26. P. ticto (Ham- Buch)  √  √  LR-nt
27. Hypothalmichthys molitrix (Valenciennes)  √  LR-nt
28. Aristichthys nobilis (Richardson)  √  LR-nt
29. Chela laubuca

Family: (4) Balitoridae
30. Acanthocobitis botia (Ham- Buch)  √  √  LR-nt

Family: (5) Cobiidae
31. Lepidocephalus guntea (Ham- Buch)  √

**ORDER: IV. SILURIFORMES**  
Family: (6) Bagridae
32. Sperrata seeaghala (Sykes)  √  √
33. Mystus bleekeri (Day)  √  Vu
34. M. tengara (Ham-Buch)  √  √
35. M. viitatus (Bloch)  √  √

Family: (7) Siluridae
36. O. pabda (Ham-Buch)  √  EN
37. Wallago attu (Scheidner)  √  LR-nt
<table>
<thead>
<tr>
<th>Family: (8) Schilbeidae</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>38. <em>Ailia coila</em> (Ham-Buch)</td>
<td>√</td>
</tr>
<tr>
<td>39. <em>Eutropichthys vacha</em> (Ham-Buch)</td>
<td>√</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Family: (9) Claridae.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>40. <em>Clarius batrachus</em> (Linnaeus)</td>
<td>√</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Family: (10) Heteropneustidae</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>41. <em>Heteropneustes fossilis</em> (Bloch)</td>
<td>√</td>
</tr>
</tbody>
</table>

**ORDER: V. BELONIFORMES**

<table>
<thead>
<tr>
<th>Family: (11) Belonidae</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>42. <em>Xenentodon cancila</em> (Ham-Buch)</td>
<td>√</td>
</tr>
</tbody>
</table>

**ORDER: VI. CYPRINIDONTIFORMES**

<table>
<thead>
<tr>
<th>Family: (12) Aplocheilidae</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>43. <em>Aplocheilus panchax</em> (Ham-Buch)</td>
<td></td>
</tr>
</tbody>
</table>

**ORDER: VII. SYNBRANCHIFORMES**

<table>
<thead>
<tr>
<th>Family: (13) Synbranchidae</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>44. <em>Monoperus cuchia</em> (Ham-Buch)</td>
<td>√</td>
</tr>
</tbody>
</table>

**ORDER: VIII. PERCIFORMES**

<table>
<thead>
<tr>
<th>Family: (14) Ambassidae</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>45. <em>Chanda nama</em> (Ham-Buch)</td>
<td>√</td>
</tr>
<tr>
<td>46. <em>Pseudambassis baculis</em> (Ham-Buch)</td>
<td>√</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family: (15) Nandidae</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>47. <em>Badis badis</em> (Ham-Buch)</td>
<td>x</td>
</tr>
<tr>
<td>48. <em>Nandus nandus</em> (Ham-Buch)</td>
<td>√</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family: (16) Gobiidae</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>49. <em>Glossogobius giuris</em> (Ham-Buch)</td>
<td>√</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family: (17) Anabantidae</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>50. <em>Anabas testudineus</em> (Bloch)</td>
<td>√</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family: (18) Belontidae</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>51. <em>Colisa fasciatus</em> (Schneider)</td>
<td>√</td>
</tr>
<tr>
<td>52. <em>C. lalia</em> (Ham-Buch)</td>
<td>√</td>
</tr>
<tr>
<td>53. <em>C. sota</em> (Ham-Buch)</td>
<td>√</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family: (19) Channidae</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>54. <em>C. marulius</em> (Ham-Buch)</td>
<td>√</td>
</tr>
<tr>
<td>55. <em>C. punctatus</em> (Bloch)</td>
<td>√</td>
</tr>
<tr>
<td>56. <em>C. striatus</em> (Bloch)</td>
<td>√</td>
</tr>
</tbody>
</table>

**ORDER: IX. MASTACEMBELLIFORMES**

<table>
<thead>
<tr>
<th>Family: (20) Mastacembellidae</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>57. <em>Macrognathus aral</em> (Bloch &amp; Schneider)</td>
<td>√</td>
</tr>
<tr>
<td>58. <em>M. pancalus</em> (Ham-Buch)</td>
<td>√</td>
</tr>
<tr>
<td>59. <em>Mastacembelus armatus</em> (LaPède)</td>
<td>√</td>
</tr>
</tbody>
</table>

**ORDER: X. TETRAODONTIFORMES**

<table>
<thead>
<tr>
<th>Family: (21) Tetraodontidae</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>60. <em>Tetraodon catcutia</em> (Ham-Buch)</td>
<td>x</td>
</tr>
</tbody>
</table>

**Note:** FF = Food fish; OF = Ornamental fish; SF = Sport fish; *Based on CAMP report (1998); √√ = Commercially important; x = No food value

#Exotic species introduced in the state; CR = Critically endangered EN = Endangered; Vu = Vulnerable; LR-nt = Lower risk near threatened LR-lc = Lower risk least concern.
CURRENT CONSERVATION THREAT

During the past few decades the Urpod wetland area has undergone rapid changes due to encroachment, agricultural activities, forest cover change in the adjoining reserved forests, and human settlement within the wetland and its buffer zone; resulting in an imbalance in the wetland eco-system. Moreover, the inflow of stormwater from the adjoining settlement area to the wetland is degrading its water quality causing a hazardous environment for the aquatic flora and fauna. The threats to Urpod are typical of wetlands in this region and other developing countries. It is purposed that the following three major anthropogenic threats receive immediate attention:

- Illegal land use and settlement in and around the wetland.
- Siltation in the wetland causing decline of the water depth.
- Lack of a comprehensive management policy with adequate institutional arrangements

CONCLUSION

The wetland offer immense potential for increasing fish production, employment generation and several other additional source of income. The abiotic and biotic condition of the wetland is suitable for fish growth. It is one of the potential wetland within northeastern regions of India, who continuously supports large numbers of wetland biota. The wetland supports considerable numbers of migratory bird populations which are declining owing to extensive human disturbances. This was happened, owing to heavy human disturbances in the shallow parts of the wetland and shoreline area of the wetland.

REFERENCES