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Status of fishery, its management and scope for enhancement in a Terai wetland of Uttar Pradesh, India

K. D. JOSHI* and D. KUMAR
Riverine Division,
Central Inland Fisheries Research Institute (ICAR),
Allahabad-211 002, U.P. (India)

Abstract

Ramiyabehad wetland, situated in terai region of Lakhimpur-Kheri district in Uttar Pradesh, was studied for its piscine diversity, composition of major fishery groups and its management issues during 2005-07. It is located on Ghaghra river basin and receives floodwater from the catchments. It spreads over 248.0 ha water area. 21 fish species were recorded from the wetland. Average fish catch composition comprised Indian major carp (45.50 %), catfishes (22.0 %) and miscellaneous group (32.5 %). The wetland is well known for its *Labeo rohita* because of its special flavour and taste. Besides this, the other commercial species encountered were *Labeo gonius*, *Wallago attu*, *Channa marulius* and *Notopterus notopterus*. Catch sizes of *Labeo rohita*, *Wallago attu* and *Channa marulius* ranged from 2.0-5.0 kg, 0.5-3.0 kg and 0.2-2.5 kg, respectively. The fishing operations were conducted by the society members for 150-200 days in a year. Fish yields from the wetland were 21.0 kg/ha/yr in 2005-06 and 29.62 kg/ha/yr in 2006-07. There is a possibility of significant enhancement in fish yield from the wetland by converting it from capture to culture based capture fishery resource through appropriate management interventions.

Introduction

Wetlands are one of the most productive ecosystems which play a significant role in the ecological sustainability of a region. Various beneficial functions of wetlands like sustaining life processes, water storage, recharge of ground water, water purification, storehouse for nutrients and stabilisation of local climate, help in maintaining the ecological balance. Besides these multi-pronged eco-climatic utilities, the wetlands are also potential resource for enhancing fish production through capture and culture based fishery development. Owing to influx of plenty of nutrients from vast catchments and being comparatively shallow in depth, the wetlands are highly significant from fish production point of view. Though these wetlands are a major source of livelihood for fishermen community residing at the periphery of wetlands, as per utilisation hierarchy,

*Corresponding author:
E-mail address: kdjoshi_nrccwf@rediffmail.com

fishery has been assigned a least priority among long chain of stake holders.

The area under floodplain wetlands in India is estimated at 2.0 million ha. A few states like West Bengal, Bihar, Assam, Andhra Pradesh etc. are rich in area under floodplain wetlands. The state of Uttar Pradesh also possesses plenty of water resources and the available resources are being exploited for fishery development in different magnitudes. In Uttar Pradesh, 90.5 % (0.125 million ha from total of 0.138 million ha) reservoirs and 63.6 % (0.102 million ha from total of 0.161 million ha) available ponds area are utilised for fishery purpose. But, only 3.7 % (0.006 million ha from a total of 0.133 million ha) of wetlands area is utilised for fishery- purpose (Singh, 2006). Therefore there lies the scope for utilisation of these vast resources for fishery development.

Though, information on ecology and fishery aspects of the wetlands of India (Anon, 2000a, b; Sinha and Jha, 1997; Vass 1997) and ecological status and production dynamics of Uttar Pradesh (Anon, 2004; Kumar and Joshi, 2008) is available, there is a dearth of information on fishery management aspects of wetlands in Uttar Pradesh. The present study deals with status of piscine diversity, composition of major fishery groups, yield and management issues along with suggested measures for fishery enhancement in Ramiyabehad wetland.

Materials and methods

Ramiyabehad wetland was studied during 2005-07. The sampling was conducted on quarterly basis (summer, monsoon, post-monsoon and winter seasons) for fish biology and fishery information. Information on piscine diversity, yield and fish composition details is based on the information collected from fishery officials, leaseholders, field observations and analysis of samples. The inference on fishery management in wetlands is also based on similar sources. Fish samples were identified following Talwar and Jhingran (1991).

Results And Discussions

Study area

Ramiyabehad wetland is located on Ganga river basin in Lakhimpur-Kheri district of Uttar Pradesh. The total water spread area of the wetland is 248.0 ha from which 80.0 ha had been leased out to a local fisher's society for their livelihood support. Initially the wetland was connected with the nearby river Ghaghra through a channel by which it received regular floodwater along with fish seed. The channel was later closed by construction of an embankment to divert the water to a canal. Now it is occasionally connected with the river Ghaghra, only during high floods. The wetland is elongated in shape and appears as a low-lying residual channel, it has maximum depth of 5.0 m. The

wetland is located in diverse catchments spread over agricultural fields, human settlements and forestland. It was densely infested with aquatic weeds. Substratum of the wetland was undulating and deep and consists of sand and mud. The wetland is mainly used for fishery purpose. There were moderate variations in wetland water level during the course of this study.

Piscine diversity

In the absence of fish seed stocking and occasional link with the river, the Ramiyabehad wetland basically represents riverine fish diversity along with some resident miscellaneous species. 21 fish species were recorded from the wetland (Table 1).

Table 1. Piscine diversity in Ramiyabehad wetland

Fishery groups	**Representative species**
Indian major/ carp	*Labeo rohita, Labeo calbasu, Labeo gonius, Cirrhinus mrigala*
Large catfish	*Aorichthys seenghala, Wallago attu*
Airbreathing catfishes	*Heteropneustes fossilis, Clarias batrachus*
Featherback	*Notopterus notopterus*
Murrel	*Channa striatus, Channa punctatus, Channa marulius,*
Miscellaneous fishes	*Puntius chola, Cirrhinus reba, Chanda nama, Colisa fasciatus, Nandus nandus, Glossogobius giuris, Xenentodon cancila, Salmostoma bacaila, Ailia coilia*

Labeo rohita forms the principal fishery in the wetland. Due to sizeable catches as well as its special flavour and taste, the Ramiyabehad's rohu is famous in the fish markets of this region. *Wallago attu, Channa marulius, Channa punctatus, Notopterus notopterus, Nandus nandus, Glossogobius giuris, Xenentodon cancila* and *Salmostoma bacaila* were other abundant species. The wetland was still free from invasion of exotic species.

Fish composition and yield

Fish catch composition of Ramiyabehad comprised Indian major carp (30-61.0 %), miscellaneous group (23.0-42.0 %) and catfishes (13.0 -31.0 %) and likewise the average composition comprised Indian major carp (45.50 %), miscellaneous group (32.5.0 %) and catfishes (22.0 %) respectively (Fig. 1). As per biomass, Indian major carp

followed by catfishes and miscellaneous groups dominated the wetland, while based on numerical abundance it was the reverse. The wetland is known for its *Labeo rohita* because of its size, abundance and unique taste. *L. rohita* formed 76-90 % of the total IMC catches. The wetland also holds meagre population of *Cirrhinus mrigala, Labeo calbasu* and *Labeo gonius* amongst carps. *Catla catla*, another important constituent of IMC was completely absent in the wetland. Average size of *Labeo rohita, Wallago attu* and *Channa marulius* from the wetland ranged from 2.0-5.0 kg, 0.5-3.0 kg and 0.2-2.5 kg, respectively.

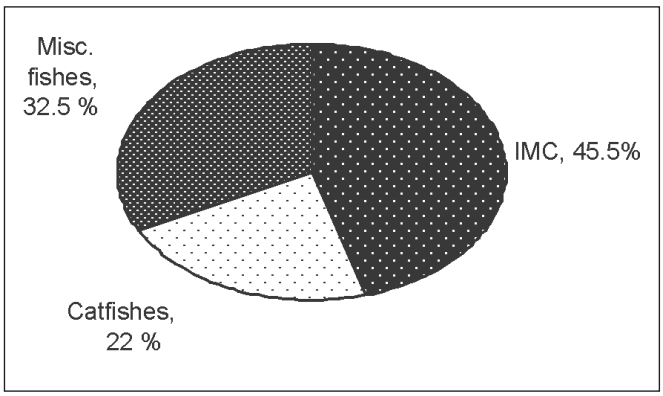

Figure 1. Average fish catch composition in Ramiyabehad wetland

Fish yield from Ramiyabehad wetland was recorded 21.0 kg/ha/yr in the year 2005-06 while 29.62 kg/ha/yr in 2006-07. The enhancement (41.78 %) in fish production from previous year could be attributed to intensive efforts to catch *Wallago attu* with suitable lines and baits. *Wallago attu* forms major fishery after *Labeo rohita*.

Status of fishery management

The wetland is leased out to a local fisher's society of the migrants from East Bengal, for their livelihood support and is used as a capture fishery resource. The society is known as *Man Kali Swayam Sahayata Samuh*, Bengali Colony, Ramiyabehad. Intensive fishing operations were conducted by the society members for 150-200 days in a year. Fishing was generally conducted by deploying plank-built boats and gill nets of 8 different mesh sizes, varying between 80-200mm. The gill nets and some traps were set over-night. The gill nets were mostly set in the evening and harvested early in the morning. Bait and line fishing is also in practice especially to catch murrels and other air breathing fishes during day. A series of baited lines are also fixed to lure and catch smaller carnivores such as *Heteropneustes fossilis, Clarias batrachus,* and *Glossogobius giuris.*

Suggested measures for enhancing fish production

Wetlands are potential resource for fish production enhancement as well as

repository of valuable fish diversity. Therefore there is a need to develop the wetland on sustainable basis. Though, the need of the hour is enhancement of fish production from all available potential resources, side by side development and conservation of potential species are also important (Joshi and Laal, 2007).

The wetland could be brought under maximum utilization by means of intensive culture based practices i.e. weed control, stock enhancement, species enhancement, proper harvesting and use of modern techniques such as pen and cage culture. Greater enhancement in fish yield from the wetland is possible by converting it from capture to culture based capture fishery.

The possible management interventions could be as follows:

1. The wetland highly is infested with submerged, floating and emergent macrophytes. Phumdis (floating islands) like structures were also observed in the wetland. Control on luxuriant growth of these plants is necessary for fish production enhancement.

2. As the wetland is occasionally connected with the river Ghaghra through a channel, there is a shortage in stocking sufficient number of fish. Hence the wetland needs regular seed stocking.

3. Amongst cultured species, the wetland mainly consists of *Labeo rohita* and it formed 76-90 % of the total catches amongst Indian major carp. Therefore, there is a need to enhance the species by incorporating fast growing and compatible species like-*Cirrhinus mrigala* and *Catla catla*. Grass carp (*Ctenopharyngodon idella)* may be incorporated among the stocked species for weed control and fish yield enhancement.

4. Presently the wetland is used as capture fishery resource and the society members thereby conduct intensive fishing operations here for 150-200 days in a year. Once stocking is done, the fishing intensity must be controlled or restricted up to carnivorous or weed fishes, and the stocked seed should be allowed to grow up to table size.

5. The wetland is infested with many carnivorous fishes, which are detrimental for the survival and growth of stocked spawn, fry and early fingerlings. Therefore only advance fingerling (100-150 mm) of the suggested seeding species must be stocked in the wetland.

6. The shallow marginal areas of the wetland are suitable for installation of pens and the central portion of the wetland, which has required depth are suitable for cage culture.

7. Besides seed raising for polyculture of Indian major carp or/ and freshwater giant prawn, the pens and cages could be utilized for culture of lucrative high priced species like murrels and catfishes.

8. The wetland could be harnessed as multifaceted fisheries for practising intensive culture fishery in the pens installed on marginal areas; cages in deep areas and culture based capture, traditional capture fishery or sport fishery in open central portion, for further enhancements in fish yield.

Thus the fish production from the wetlands could be enhanced substantially from the present level through proper implementation of all the above-envisaged management and development measures.

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