

**ABUNDANCE OF FOUR EXOTIC FISH SPECIES CYPRINUS CARPIO,  
CTENOPHARYNGODON IDELLA, HYPOPHTHALMICHTHYS MOLITRIX AND  
ARISTICHTHYS NOBILIS IN THE URPOD BEEL OF GOALPARA DISTRICT OF ASSAM**

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**ABSTRACT:** The present study was carried out to find out the abundance of four exotic fish namely, common carp, grass carp, silver carp and bighead carp in the Urpod beel of Goalpara district of Assam. The Urpod beel has a rich ichthyofaunal diversity and available almost all native fish species of Assam. During last few years the beel become habitat of some exotic fish species and their number has been increasing day by day, causes disturbances to the native fish species. The rate of exotic fish infestation in the beel was determined through field investigation and catch record from January 2011 to December 2011 in the fish landing centres of the beel. Abundance Index was calculated for the four exotic species from each catch data. A marked seasonal variation of the fish catch of native and exotic fishes was noticed. Among the four exotic species common carp recorded highest catch (4.99% of total catch) and bighead recorded lowest (2.84% of total catch).

**Keywords:** Exotic fish, Urpod beel, Assam

**INTRODUCTION**

In India, more than 300 exotic fish species including 28 aquaculture species are available (Singh and Lakra 2011) and have played an important part in the development of aquaculture. Indian freshwater aquaculture is based mainly on polyculture of Indian major carps, such as rohu (*Labeo rohita*), catla (*Catla catla*) and mrigal (*Cirrhinus mrigala*) and three exotic carps, namely, common carp (*Cyprinus carpio*), grass carp (*Ctenopharyngodon idella*) and silver carp (*Hypophthalmichthys molitrix*) which are becoming popular among aqua culturists. There has been an increasing demand for alien fish species in India. Silver carp, grass carp and common carp were brought into the country with the objectives of broadening the species spectrum in aquaculture and increasing the yield through better utilisation of trophic niches. These exotic fishes have established in the natural water bodies of India including rivers and beels of Assam through accidentally escaping from captivity, flood or during transportation. A number of other exotic fish species such as bighead carp (*Aristichthys nobilis*), African catfish (*Clarias gariepinus*), sutchi catfish (*Pangasianodon hypophthalmus*), Nile tilapia (*Oreochromis niloticus*), red-bellied piranha (*Pygocentrus natterei*) and Pacu (*Piaractus brachypomus*) have been introduced illegally in India and are reported from the aquaculture systems in North east India (Goswami, 2000). With the passage of time the exotic species create breeding population in rivers and wetlands of Assam. This becomes a serious issue and every year during floods, or in heavy monsoon rain water or by breaching the banks of the ponds, or 1 or 2 hours of high showers the exotic fishes have been escaping from aquaculture. The Northeastern part of India is considered as one of the hot spots of freshwater fish biodiversity in the world (Kottelat and Whitten, 1996). Assam is blessed with abundant productive and diversified fresh water resources to harbour various fish species and water birds. The Brahmaputra Valley of Assam endowed with large number of fresh water bodies, locally called beels. The role of beel or wetlands in conserving fish diversity has been widely acknowledged as these ecosystems are used by fishes as a refuge for breeding, feeding and nesting purposes at one or the other stage of their life cycle (Wetzel, 2001). Besides these, beels provides quality environment to the region and accelerating the rural economy. In last two decades, the indigenous fish populations in India have been affected by several exotic fish species through niche overlapping in different wild water bodies including beels and rivers. The exotic fishes have high fecundity power and easily adaptable to the environment of Assam. The rapid growth of such exotic fish species may affect the indigenous fish population through competition for food, shelter and breeding sites. The decreasing catch rate of several indigenous fish species in wild water bodies may be due to rapid multiplication of exotic species.

The four exotic fish species viz. *Cyprinus carpio*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *Aristichthys nobilis* are now available in all rivers, tributaries and wetlands in Assam. The fish catch reports shows that their numbers have been increasing in all rivers and wetlands. Considering this, the present study was aimed to find out the infestation rate of these four exotic species in Urpod beel of Goalpara district of Assam.

## MATERIALS AND METHODS

The study was conducted at Urpod beel of Goalpara district of Assam to investigate the abundance of four exotic fish *Cyprinus carpio*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix* and *Aristichthys nobilis* in the beel. The Goalpara district is situated in the south western part of Assam. The Brahmaputra River is flowing along the northern boundary of the district. Total wetland area of the district is 33221 ha that includes 151 small wetlands (<2.25 ha). River or stream occupies 84.77% of wetlands. The other major wetland type is Waterlogged (7.1%) and Lake/pond (7.0%). The average annual rainfall in the district is 1614 mm (National Wetland Atlas, Assam). The Urpod beel covers an area of about 649.38 ha and is located between latitudes 26° 05'05" to 26° 06'45" N and longitude 90° 34'08" to 90° 37'45" E. The wetland is surrounded by the NH-37 in the south, west and north with patches of agricultural land of villages like Agia, Shyamnagar, Gendera, Garukutia etc. The eastern side of the wetland is surrounded by villages like Maijunga, Garaimari, Khurabhasa etc. The beel is connected with another wetland called Patakata beel by a small drain in eastern side. The Jinari river is passes by the side of the Urpod beel before meeting the Brahmaputra river. Another river called Jhinjiram originates from the beel and flows towards Brahmaputra river.

The infestation rates of four exotic fishes in the Urpod beel were examined in two methods. Firstly the total commercially caught fishes in Kg was recorded and percentage was calculated thereof. Secondly, calculation of Abundance Index (Density of fish populations at each study site) of four exotic fishes was done from total catch. In order to collect data on fish field investigation was conducted from January 2011 to December 2011 at Urpod beel on weekly basis and data were compiled as monthly basis. The fisherman used various types of fishing methods such as cast nets, gill nets, drag nets of different mesh size, and other local fishing gears. Data collections were done from all important landing centres and market areas of the beel during 6:00AM to 5:00 PM. Fish species were identified by using the keys given by Jhingran (1975) and Fisher and Bianchi (1984). The abundance index of exotic fish was calculated by using the following formula (Singh *et al.*, 2010):

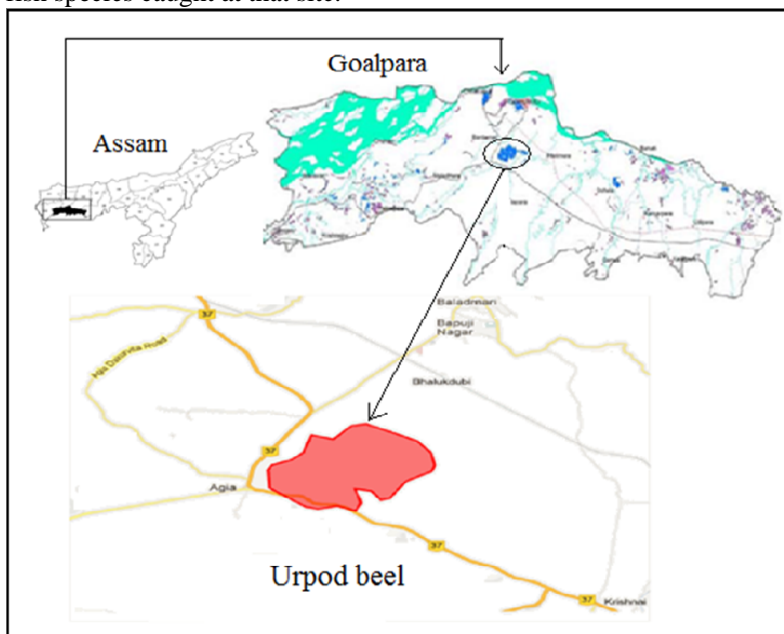
$$AI (\%) = n(k) \times 100/N$$

Where:

AI = abundance index,

$n(k)$  = number of exotic fish caught at each study site,

$N$  = number of all the fish species caught at that site.



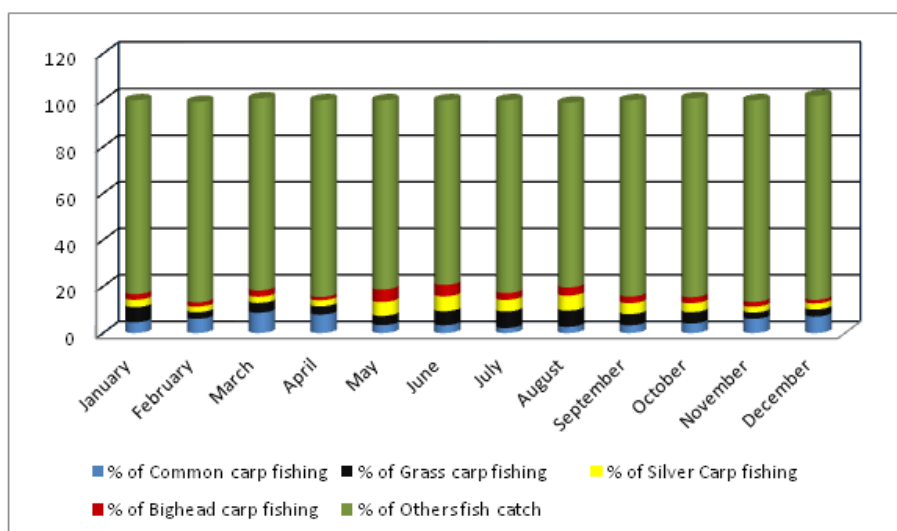
**Figure 1. Map of Urpod beel of Goalpara district of Assam.** (Source- ARSAC ,1997 and Google map)

## RESULTS

In the present investigation, it has been observed that the beel contain a rich fish diversity. The fish-catching intensity is higher in winter. But during monsoon season catching of two exotic fish namely grass carp and silver carp is frequent in comparison to winter season. The commercially important indigenous fish species of the beel are *Labeo rohita*, *Labeo calbasu*, *Labeo gonius*, *Catla catla*, *Cirrihinus mrigala*, *Labeo gonius*, *Notopterus chitala*, *Aorichthys aor*, *Wallago attu*, *Channa marulius*, *C. punctatus*, *Heteropneustes fossilis*, *Clarias batrachus*, *Notopterus notopterus* etc and exotic species are *Cyprinus carpio*, *Ctenopharyngodon idella*, and *Hypothalmichthys molitrix*, *Aristichthys nobilis* and *Clarias gariepinus*. The exotic species are available throughout the year and there has been a considerable increase of catch percent of exotic fish in the beel was recorded. Among the four exotic species common carp recorded 4.99% of total catch and bighead recorded lowest 2.84% of total catch. The common carp have established breeding populations in the beel. The fish catch record showed that grass carp and common carp are more abundant than silver carp and bighead carp. The mean Abundance index of four exotic fish namely common carp, grass carp, silver carp and bighead carp in Urpod beel are 14.85, 10.01, 8.53, and 5.74 respectively. Thus the common carp is more abundant and bighead carp is less abundant fish among the four exotic fish in the beel

**Table 1: Monthwise total fish catch (in percentage) in Urpod beel during 2011**

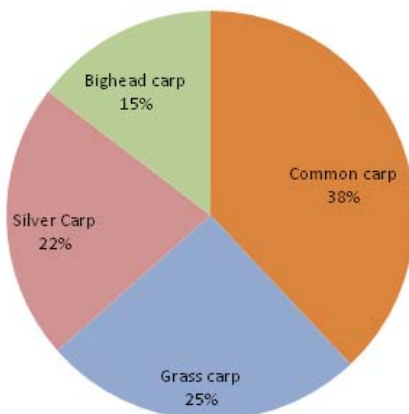
| Month     | % of Common carp fishing | % of Grass carp fishing | % of Silver Carp fishing | % of Bighead of carp fishing | % of Others fish catch |
|-----------|--------------------------|-------------------------|--------------------------|------------------------------|------------------------|
| January   | 4.59                     | 6.53                    | 3.15                     | 2.43                         | 83.29                  |
| February  | 6.08                     | 2.87                    | 2.40                     | 1.83                         | 86.07                  |
| March     | 8.70                     | 4.25                    | 2.67                     | 2.67                         | 82.51                  |
| April     | 7.89                     | 3.58                    | 2.60                     | 1.43                         | 84.50                  |
| May       | 3.40                     | 3.97                    | 5.95                     | 5.38                         | 81.30                  |
| June      | 3.35                     | 6.00                    | 6.40                     | 4.93                         | 79.31                  |
| July      | 2.15                     | 7.11                    | 4.96                     | 2.95                         | 82.83                  |
| August    | 2.68                     | 6.96                    | 6.42                     | 3.53                         | 79.34                  |
| September | 3.30                     | 4.81                    | 4.72                     | 2.85                         | 84.31                  |
| October   | 4.10                     | 4.85                    | 3.90                     | 2.56                         | 85.39                  |
| November  | 6.08                     | 2.72                    | 2.50                     | 2.08                         | 86.62                  |
| December  | 7.07                     | 3.03                    | 2.66                     | 1.47                         | 87.60                  |



**Figure 2: Percentage of month wise catch record of four exotic fish and other fishes in Urpod beel during 2011.**

**Table 2: Abundance index of four exotic fish in Urpod beel**

|              | Jan   | Feb   | March | April | May   | June  | July  | Aug   | Sept  | Oct   | Nov   | Dec   | Mean AI |
|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| Common carp  | 12.12 | 10.26 | 10.00 | 8.62  | 12.15 | 15.20 | 16.65 | 18.17 | 20.52 | 16.78 | 12.34 | 15.45 | 14.85   |
| Grass carp   | 12.10 | 8.16  | 8.26  | 5.20  | 6.44  | 10.00 | 12.67 | 12.25 | 10.81 | 11.72 | 12.15 | 10.38 | 10.01   |
| Silver Carp  | 8.20  | 4.68  | 5.10  | 4.21  | 5.05  | 12.35 | 12.62 | 10.15 | 12.84 | 9.58  | 8.86  | 9.18  | 8.53    |
| Bighead carp | 4.48  | 2.56  | 2.07  | 3.37  | 4.13  | 8.79  | 10.17 | 9.85  | 8.00  | 6.33  | 5.73  | 3.18  | 5.74    |

**Figure 3: Abundance index calculated from catch record of four exotic fish in Urpod beel**

## DISCUSSION

Fishes are the keystone species which is the good indicators of the water quality and the aquatic ecosystem. The introduction of a non-indigenous species may work synergistically with other factors, such as water diversions or pollution, to alter the population and distribution of indigenous species (Nyman, 1991). The breeding population of common carp can negatively impact native species both directly and indirectly by competing for food (Arthington et al., 1991) and habitat. Exotic fish may cause changes in the existing aquatic community through competition with native species or predation on them, as well as through overcrowding or aggressive behavior. Despite possessing some attractive culture characteristics, exotic fish species generally becoming invasive and reduce the availability of local species in natural water bodies and consequently adversely affecting fish biodiversity and aquatic ecosystems (Lakra et al., 2008). The grass carp consume a variety of aquatic plant that may cause damage or imbalance in the beel ecosystem. In Donghu Lake of China, after introduction of grass carp complete elimination of aquatic macrophytes was resulted (Kumar, 2000). The common carp has found to deteriorate the water quality of culture pond and grass carp has found to destroy paddy field during monsoon (Choudhury et al., 2012). Invasion of exotic species is the second most important threat to biodiversity after habitat loss. Alien species after established in new habitat threatens native biodiversity in that habitat by causing changes in ecosystem. The study on the occurrence and distribution of exotic fishes in the Indian River system conducted by the NBFGR (Annual Report 2009-2010) reports that exotic fish species dominate over the local fish catch even in Ganga, particularly in UP. The native fish species has been decline in alarming rates due to invasiveness of exotic fish species. A number of exotic fishes are now available in all major rivers, reservoir and wetland of India. The Yamuna River and Ganges River system harboured several exotic fish species including common carp and Nile tilapia (Singh et al., 2010). The exotics compete with the indigenous species for food, habitat and even prey upon them, introduce new parasites and diseases, result in the production of hybrids and cause genetic 'erosion' of indigenous species (Welcomme 1992). Urpod Beels of Goalpara district of Assam has rich fish diversity and it harbours almost all freshwater species available in the North Eastern region. Sarma et al., (2007) has been reported the existence 60 fish species from the beel. To protect this rich fish diversity of the beel adequate attention should be paid to check the further proliferation of invasive exotic fish species. Continuous monitoring and effective control measures of exotic fish species has to be made for the protection of indigenous fish population in the beel.

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### ACKNOWLEDGEMENTS

We are thankful to people especially fishermen and village people who extend their un-tired help and cooperation during the entire period of study. We are also grateful to Sri Uzzwal Das for helping us during field investigation and data collection.

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