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# Evaluation of Fish Productivity of Maidhiya Pond at Birganj (Nepal)

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**Abstract**

The paper deals with the fish productivity of Maidhiya pond of Birganj (Nepal) during the period of 2007—2009. The fish production of this pond was considered as low due to lack of scientific culture and productivity of fish fluctuated year to year. The growth and performance of fishes of this pond were totally governed by physiochemical and biotic parameters. It was found that all abiotic and biotic components were still maintaining in the pond productivity. Several suggestions are made for improvement of fish productivity of the pond which will be helpful in solving the problem of protein deficiency in food of the society.

**Key words : Maidhiya pond, Productivity, Annual production, Fry, Fingerling.**

Birganj is the head-quarter of Parsa district under the Narayani Anchal of Nepal and it is situated near the Raxual boarder of India. Birganj region of Nepal is gifted with myriads of water bodies like ponds, tanks, ditches and river which have great potentiality of fish production in many areas of Birganj. Fish productivity is an important and most reliable parameter for increasing and decreasing output of the water body. Productivity is the ultimate result of multiple physio-chemical and biological interacting factors. Fish productivity depends upon the various factors and the commercial fish productivity is determined by abiotic and biotic parameters of water body and soil conditions. Fish productivity of Nepalese waters has been poorly studied and hence the number of references in the literature to this topic is small. In view of the protein rich fish, the present study was made to evaluate the fish productivity of Maidhiya pond (Birganj, Nepal) where no such work was carried out previously.

*Study Area.* The Maidhiya pond is large, deep, perennial, roughly rectangular in shape and fish producing unit. It has an area of 2.4 hectares (about 6 acres). It is generally rain fed and also receives wastes from nearby restaurant and residential area. The pond is well infested with different types of hydrophytes. Its depth varies from season to season. The deeper zone is muddy whereas soil upto a depth of 0.5 m consists of sand with bricks, stone and gravels.

## Methods

The annual production of fishes (2007—2009) of the Maidhiya pond was obtained from the local fishermen during harvesting seasons. The present worker was also participated during harvesting periods for collection of data of fish productivity. The percentage of composition of different fishes was also taken into account. The percentage composition of different fishes was estimated by the method followed by Ricker (1). All the fishes are consumed by local people of the Birganj (Nepal).

## Results and Discussion

The observation on annual fish production showed that the major population of the pond consisted of carps, live fishes. Other fishes showed meager representation such as catfishes, eels and fishes of low commercial values. The overall production rate cannot be considered satisfactory.

The annual catch composition of fishes (2007—2009) is given in Tables 1—4. During 2007, the total fish catch was 1,665 kg and productivity per acre was

**Table 1.** Annual production of fish in Maidhiya pond (Birganj, Nepal).

| Year | Annual catch (kg) | Productivity acre (kg) | Water extent (acre) |
|---|---|---|---|
| 2007 | 1,665 | 277.5 | 6 |
| 2008 | 2,051 | 341.8 | |
| 2009 | 2,165 | 360.8 | |

277.5 kg but in the subsequent year (2008); the total fish landing increased to 2,051 kg with a productivity of 341.8 kg/acre. In 2009, the total fish catch also showed an increase to 2,165 kg with 360.8 kg/acre (Table 1). This rise in productivity was mainly due to natural stocking of fingerlings or fry or spawn of fishes. The result showed that the fish productivity fluctuated from year to year. Generally, fish productivity does not remain constant in any water body and it varies greatly from one year to another.

### *Groupwise Catch Composition and Yield of Fishes*

*Carps.* It stood first in the total catch as was 47.5 and 51.5% of the total catch each in 2008 and 2009 respectively (Table 2). Among the carp fishes, *Catla catla* dominated and took the first position. It was 20.2 and 23.3% of the total yield in 2008 and 2009 respectively. Its highest catch was recorded during November to March (Tables 3 and 4). *Labeo rohita* took the second position (10.2 and 10.8%) in the both years (2008 and 2009). Its highest catch was done in of April, May and June (Tables 3 and 4). The third position was occupied by *Cirrhinus mrigala* and was 8.0% in 2008 and slightly decreased in 2009 (7.8%).

*Live Fishes.* It consisted of *Channa puntatus*, *Channa striatus, Channa gachua, Anabus testudineus, Heteropneustes fossilis* and *Clarias batrachus.* Among the live fishes, *Channa punctatus* was maximum in catch and took the first position of the total yield in both years (11.7 and 11.0%) respectively. Its highest-peak catch was recorded in October to March. *Heteropneustes fossilis* took the second position among the live fishes. It was 9.0% of the total fish yield in 2008 and 8.5% was in 2009.

The third position was obtained by *Channa striatus* (8.0 in 2008 and 7.5% in 2009). The other live fishes represented by low percentage (e.g. *Channa gachua, Anabus testudinus* and *Clarias batrachus*).

**Table 2.** Total fish catch composition in 2008 and 2009 of Maidhiya pond (Birganj, Nepal).

| | Type of fish | Percentage (%) 2008 | Percentage (%) 2009 | Total yield (kg) 2008 | Total yield (kg) 2009 |
|---|---|---|---|---|---|
| 1 | Carps | 47.5 | 51.5 | 975 | 1115 |
| 2 | Live fishes | 34.3 | 32.3 | 705 | 701 |
| 3 | Eels | 0.9 | 0.8 | 20 | 18 |
| 4 | Catfishes | 1.7 | 1.5 | 35 | 33 |
| 5 | Other fishes | 15.4 | 13.7 | 316 | 298 |

*Eels.* This is represented by only *Amphipnous cuchia.* They were very few in number and their percentages were 0.9 and 0.8% in 2008 and 2009 respectively.

*Catfishes.* Catfishes consisted of *Wallago attu, Mystus vittatus* and *Mystus tengara.* They were less than 1% in both years (2008 and 2009). Their highest catch was recorded in July.

*Other Fishes.* The small and low commercial fishes are included in this group. Among them *Puntius ticto* and *Puntius sophare* were dominant species.

The average production rate of the Maidhiya pond for two years (2008 and 2009) were 2,108 kg as per data collected. The following were the position of the collected fishes :

| | Species | | Position |
|---|---|---|---|
| 1 | *Catla catla* | – | 1 |
| 2 | *Channa punctatus* | – | 2 |
| 3 | *Labeo rohita* | – | 3 |
| 4 | *Heteropneustes fossilis* | – | 4 |
| 5 | *Cirrhinus mrigala* | – | 5 |
| 6 | *Channa striatus* | – | 6 |
| 7 | *Labeo gonius* | – | 7 |
| 8 | *Cirrhinus reba* | – | 8 |
| 9 | *Channa gachua* | – | 9 |
| 10 | *Clarias batrachus* | – | 10 |

The mixed average population of fishes was 14.5%. The fish yield in 2008 and 2009 as per average fluctuated from 341.8 kg to 360.8 kg/acre (Table 1).

Several workers reported on various water bodies of India in relation to fish productivity (2—4). Mathew (2) observed the poor rate of fish production of Govindgarh Rewa (MP). Singit et al. (3) worked on the fish productivity of a farmer pond and reported that total fish production was 6,046.25 kg/ha per year. Judey (5) recorded dissolved organic matter was

**Table 3.** Groupwise catch composition and yield of fishes (kg) of all different fishes in 2008 from Maidhiya pond (Birganj, Nepal). Total yield = 2,051 kg.

| Type of fish | | Name of fish | Yield (kg) | Per-cent | Peak catch months |
|---|---|---|---|---|---|
| Carps | 1 | *Catla catla* | 415 | 20.2 | Nov–Mar |
| | 2 | *Cirrhinus mrigala* | 165 | 8.0 | Apr, May, Jun |
| | 3 | *Cirrhinus reba* | 85 | 4.1 | Apr, May, Jun |
| | 4 | *Labeo gonius* | 105 | 5.1 | Apr, May, Jun |
| | 5 | *Labeo rohita* | 205 | 10.2 | Apr, May, Jun |
| Live fish | 1 | *Channa punctatus* | 241 | 11.7 | Oct–Mar |
| | 2 | *Channa striatus* | 164 | 8.0 | Oct–Mar |
| | 3 | *Channa gachua* | 47 | 2.2 | Oct–Mar |
| | 4 | *Anabus testudineus* | 35 | 1.7 | Feb to Apr |
| | 5 | *Heteropneustes fossilis* | 185 | 9.0 | Apr, May and Jun |
| | 6 | *Clarias batrachus* | 32 | 1.5 | Jun |
| Eels | 1 | *Amphipnous cuchia* | 20 | 0.9 | Oct–Mar |
| Catfish | 1 | *Wallago attu* | 18 | 0.8 | Jun–Aug |
| | 2 | *Mystus vittatus* | 09 | 0.4 | May–Aug |
| | 3 | *Mystus tengara* | 08 | 0.3 | May–Aug |
| Other fishes | 1 | *Notopterus notopterus* | | | |
| | 2 | *Puntius ticto* | | | |
| | 3 | *Puntius sophore* | | | Rainy and winter months |
| | 4 | *Puntius sarana* | 316 | 15.4 | |
| | 5 | *Puntius titus* | | | |
| | 6 | *Oxygaster bacaila* | | | |
| | 7 | *Other fishes* | | | |

**Table 4.** Groupwise catch composition and yield of fishes (kg) of all different fishes in 2009 from Maidhiya pond (Birganj, Nepal). Total yield = 2,165 kg.

| Type of fish | | Name of fish | Yield (kg) | Per-cent | Peak catch month |
|---|---|---|---|---|---|
| Carps | 1 | *Catla catla* | 505 | 23.3 | Nov–Mar |
| | 2 | *Cirrhinus mrigala* | 170 | 7.8 | Apr, May, Jun |
| | 3 | *Cirrhinus reba* | 95 | 4.3 | Apr, May, Jun |
| | 4 | *Labeo gonius* | 115 | 5.3 | Apr, May, Jun |
| | 5 | *Labeo rohita* | 230 | 10.8 | Apr, May, Jun |
| Live fish | 1 | *Channa punctatus* | 239 | 11.0 | Oct–Mar |
| | 2 | *Channa striatus* | 164 | 7.5 | Oct–Mar |
| Live fish | 3 | *Channa gachua* | 45 | 2.0 | Oct–Mar |
| | 4 | *Anabus testudineus* | 36 | 1.6 | Feb to Apr |
| | 5 | *Heteropneustes fossilis* | 186 | 8.5 | Apr, May & Jun |
| | 6 | *Clarias batrachus* | 31 | 1.4 | Jun |
| Eels | 1 | *Amphipnous cuchia* | 18 | 0.8 | Oct–Mar |
| Cat-fish | 1 | *Wallago attu* | 20 | 0.9 | Jun–Aug |
| | 2 | *Mystus vittatus* | 07 | 0.3 | May–Aug |
| | 3 | *Mystus tengara* | 06 | 0.2 | May–Aug |
| Other fishes | 1 | *Notopterus notopterus* | | | |
| | 2 | *Puntius ticto* | | | |
| | 3 | *Puntius sophore* | | | Rainy and winter months |
| | 4 | *Puntius sarana* | 298 | 13.7 | |
| | 5 | *Puntius titus* | | | |
| | 6 | *Oxygaster bacaila* | | | |
| | 7 | *Other fishes* | | | |

responsible for fish productivity in Weber lake. Singh and Singh (4) reported that the rate of fish production was poor and productivity of fish fluctuated from year to year while working on Motipur ox-bow lake of Muzaffarpur, Bihar. Chapman (6) found that plankton was responsible for the productivity of the lake in USA. Klugh (7) found that the submerged vegetation was the key factor for the lake productivity. Thienemann (8) was of opinion that average depth of a lake as a determining factor for the productivity of a lake. Riley (9) stressed on photosynthetic activity of a water body for productivity.

Fish productivity of Maidhiya pond was not fully sufficient and unsatisfactory because this pond was not scientifically managed. On the basis findings it can be suggested that to ensure the highest production of fishes, it is essential to control abiotic and biotic factors which influence the fish stock. The abiotic and biotic factors should be controlled in such a way so as to ensure maximum fish food and optimum abiotic condition for rapid growth.

This pond can be developed as useful and profitable water body for fish yield by adopting the following measures. Regular analysis of abiotic and biotic parameters and soil conditions should be done by the skilled persons for the maintaining the productivity of the pond. A proper and scientific center may be installed. The pond must be cleaned of its aquatic weeds and it may not be spread beyond a desirable limit. The common methods such as manual, chemical and biological should be adopted for the

control of aquatic weeds. Domestic sewage water must be diverted by the construction of separate channels. Washing of dirty cloths and washing of domestic animals should be avoided. Artificial food for growing fishes should be supplemented regularly in the pond. Fishermen must get proper training of fish culture in the light of modern techniques. They should also be provided financial help on easy installments to manage the water body. Nursery and stocking tanks should be constructed around the Maidhiya pond for rearing of fry and fingerlings of commercially important fishes.High earthen or cemented embankments on the all sides of pond be constructed so that during the rainy season water with fishes may not leave the pond.

On the adoption of these suggestions and guidelines, the Maidhiya pond will be improved the fish yield because the pond has all potentialities for better aquaculture management and this pond is still safe for fish culture.

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