



Studies on Fish Diversity and Need for Their Conservation of Singhiya River, Morang District, Eastern Nepal

Shiva Narayan Yadav

Mahendra Morang Adarsha Multiple Campus, Department of Zoology, Tribhuvan University, Biratnagar, Nepal

Email address:

yadav_s67@yahoo.com

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Abstract: In the present study, twenty six species of fishes were recorded from Singhiya river, Morang district, Nepal during January to August (2016). The population present status of important fish species such as *Gagata cenia* and *Lepidocephalus guntea* was found to be threatened. *Macrornathus pancalus* and *Mystus bleekeri* was to be vulnerable and *Glossogobius giuris* and *Puntius sarana* to be intermediate. The Singhiya river have been found to be influenced by harmful human activities such as deforestation, direct waste disposal, discharge of toxic substances-fertilizers, pesticides through surface run-off from the agricultural field near the river and urbanization, industrialization, use of soaps and detergents, indiscriminate fishing, pollution, waste dumping are destroying the fresh water habitat and have been found to threaten the natural environment of fish diversity of Singhiya river which ultimately lead to their extinction and must be stopped or managed in a proper way for the conservation and sustainable utilization of aquatic-bioresources of the river.

Keywords: Aquatic Bio-resources, Fish Diversity, Conservation of Singhiya River, Morang District, Eastern Nepal

1. Introduction

Nepal is blessed with various water resources having unique aquatic biodiversity. The water resources of Nepal include many rivers, streams, lakes, reservoirs and ponds. Among them Singhiya river is a good source of fish diversity. It is a large and most important river of Morang district. It originates from the foothills of the Chure range and flows from eastern border of Biratnagar municipality and separates from Kathari V.D.Cs (Village development committees) and flows towards South and enters Bihar states of India.

There are different types of fishes which serve as food, entertainment, biological control, animal feed, manure, decoration, sports etc. to human beings from the time immemorial. Though Singhiya river had a rich fish diversity and other aquatic bioresources before three decades (thirty years); which are now rapidly declination and probably at a rate which may endanger (threatening) their existence. The causes for their declination and are lack of proper knowledge and / or ignorance about the fish biology to the fisherman, local people and local authorities. Besides the human population growth, poverty, deforestation, soil erosion, direct disposal of waste from hospitals, industries, households,

hotels into the river; illegal fishing practices, over-fishing, indiscriminate fishing, capture of brood fishes during their breeding season, capture of fish species having declined population, construction of dam without fish-ladders etc. are accelerating the destruction and deterioration of aquatic biodiversity and their habitat which certainly create imbalance on river ecosystem.

So far few works have been done on the fishes by Nepalese in some rivers of Nepal scientific literature, fish diversity of Singhiya river is much scanty and scattered. Various investigators have contributed in field such as those of "Shrestha, J. (1981) 9 species of fishes from Nepal [18]", "Shrestha, J (1994) reported forty eight species from morang district [20]". "Shrestha T. K (1981) 120 species of fishes in his book "wild life of Nepal "[22]", "Pokharel J. (1982) reported 30 species of fishes from Koshi river [11]". "John and Dhewajoo (1989) [9]", "IUCN Nepal (1994) [6]". "Pokharel, K. K. (1998b, 1999b, 2006, 2009, 2010) [12-16]". "Mahato (2004) [10]", "Swar (2005) [27]", "chetry Thapa, D. (2006) [4]", "Shrestha (2008) [24]", "Tamrakar, A. S. (2003) [28]", "Chaudhary (2014) [5]".

2. Materials and Methods

Fishes were collected from three sites of Singhiya river during January to August 2016 and sampling station A (Hanuman mandir) lies on 28°28'01.8" N and 87°17'26.2"E and 73m altitude, station B (Hatkholra) lies 26°N and 87°17'47.9"E and station C (Jatuwa) lies 26°26'13.9"N and 87°18'00.4"E and altitude 71m from sea level of the Morang district, Eastern Nepal, Fish collections were made the assistance of local fisherman using gillnets and other devices. Regular visits were made at the fishing sites. The collected fishes were preserved in 8% formalin solution. Fixed specimen were kept in containers and brought to the zoology laboratory, M.M.A.M. campus, Biratnagar. The threatened species were released immediately into river water.

The identification of fishes has been done upto species with the help of taxonomic work of "Shrestha. J. (1981. 2001) [18, 21]" and "Shrestha. T. K. (2008) [24]". Information of fish diversity, their habit, habitat and conservation issues were collected from fisherman and through field observation. "The criteria laid out by international union for conservation of Nature and Natural resources, "IUCN (1994) [6]" was followed for assessment of

the status of fishes."

3. Result

Fish Diversity

Twenty six species of fishes were collected from Singhiya river in between three sites in the duration of eight months (January-August 2016) comprising 26 species 6 orders 15 families and 20 genera were obtained (presented in Table 1). The species which were widely distributed in the present sites and having more abundance were *Cirrhinus reba*, *Catla catla*, *Puntius sophore*, *P. conchoni*, *Xenentodon cancila*, *Mystus vittatus*. The species which were moderately distributed in B and C sites *Puntius sarana*, *Channa orientalis*, *C. punctatus* but the species which were distributed only A and B sites and have much less abundance were *Puntius sarana*, *Gagata cenia*, *Lepidocephalus guntea* *Macrognathus pancalus* and *Clarias batrachus*. Though the fresh water fishes like *Noemacheilus botia*, *Gagata viridescens*, *Channa striatus* was said to be recorded before 15 years, couldnot be recorded during the present study period, needs further investigation.

Table 1. Fish Species Diversity and distribution in Singhiya River of Morang district.

| S.N. | Systemic position/Scientific name | Local name | Distribution Sites | | | |
|--|-----------------------------------|------------|--------------------|---|---|--------|
| | | | A | B | C | Status |
| 1.Order : Cypriniformes, Family : Cyprinidae, Subfamily : Cyprinae | | | | | | |
| Genus: <i>Cirrhinus</i> | | | | | | |
| 1. | <i>Cirrhinus reba</i> | Rewa | √ | √ | √ | C |
| Genus : <i>Catla</i> | | | | | | |
| 2. | <i>Catla catla</i> | Bhakur | √ | √ | √ | C |
| Genus : <i>Labeo</i> | | | | | | |
| 3. | <i>Labeo rohita</i> | Rohu | √ | √ | √ | C |
| Genus : <i>Esomus</i> | | | | | | |
| 4. | <i>Esomus danricus</i> | Dedhawa | √ | √ | √ | I |
| Genus: <i>Puntius</i> | | | | | | |
| 5. | <i>Puntius sarana</i> | Thub pothi | √ | × | √ | I |
| 6. | <i>P. sophore</i> | Pothi | √ | √ | √ | O |
| 7. | <i>P. conchoni</i> | Sidre | √ | √ | √ | C |
| Family : Cobitidae, Genus : <i>Lepidocephalus</i> | | | | | | |
| 8. | <i>Lepidocephalus guntea</i> | Latta | √ | × | × | T |
| 2. Order : Siluriformes, Family: Bagridae, Genus: <i>Mystus</i> | | | | | | |
| 9. | <i>Mystus cavasius</i> | Tengera | √ | √ | √ | C |
| 10. | <i>M. bleekeri</i> | Tenger | × | × | √ | T |
| 11. | <i>M. vittatus</i> | kanti | √ | √ | √ | C |
| Family : Siluridae(4), Genus: <i>Ompok</i> | | | | | | |
| 12. | <i>Ompok bimaculatus</i> | Papta | √ | √ | × | I |
| Genus : <i>Wallago</i> | | | | | | |
| 13. | <i>Wallago attu</i> | Bohari | √ | √ | √ | C |
| Family: Clariidae(5), Genus: <i>Clarias</i> | | | | | | |
| 14. | <i>Clarias batrachus</i> | Mungri | √ | √ | × | O |
| Family: Sisoridae(6), Genus: <i>Gagata</i> | | | | | | |
| 15.. | <i>Gagata cenia</i> | Ganfak | √ | × | × | T |
| Family: Heteropneustidae(7), Genus: <i>Heteropneustes</i> | | | | | | |
| 16. | <i>Heteropneustes fossilis</i> | Singhi | √ | √ | √ | C |
| 3. Order: Beloniformes, Family: Belonidae(8), Genus: <i>Xenentodon</i> | | | | | | |
| 17. | <i>Xenentodon cancila</i> | Kauwa | √ | √ | √ | C |
| 4. Order: Perciformes, Family: Belontiidae(9), Genus: <i>Colisa</i> | | | | | | |
| 18. | <i>Colisa fasciatus</i> | Kotari | √ | √ | √ | C |
| Family : Anabantidae(10), Genus: <i>Anabas</i> | | | | | | |
| 19. | <i>Anabas testudineus</i> | Kabai | √ | √ | √ | C |
| Family: Gobiidae(11), Genus: <i>Glossogobius</i> | | | | | | |
| 20. | <i>Glossogobius giuris</i> | Bulla | × | √ | × | T |

| S.N. | Systemic position/Scientific name | Local name | Distribution Sites | | | |
|---|-----------------------------------|--------------|--------------------|---|---|--------|
| | | | A | B | C | Status |
| Family: Chandidae(12,)Genus: <i>Chanda</i> | | | | | | |
| 21. | <i>Chanda ranga</i> | Cahnerbijuwā | √ | √ | √ | C |
| 5. Order: Osteoglossiformes, Family: Notopteridae(13), Genus: <i>Notopterus</i> | | | | | | |
| 22. | <i>Notopterus notopterus</i> | Golhai | √ | √ | √ | C |
| Family: Channidae (14), Genus: <i>Channa</i> | | | | | | |
| 23. | <i>Channa punctatus</i> | Gurai | √ | √ | × | 0 |
| 24. | <i>C.orientalis(gachua)</i> | Bhoti(hele) | √ | √ | × | 0 |
| 6. Order: Mastacembeliformes, Family: Mastacembelidae(15), Genus: <i>Macrognathus</i> | | | | | | |
| 25. | <i>Macrognathus pancalus</i> | Kathgainchi | × | × | √ | T |
| 26. | <i>M. aral</i> | Gainehi | √ | √ | × | 0 |

4. Discussion

"Shrestha, J. (1981) collected forty-eight species from Morang district, Nepal [18]", "Bhagat, R. P. (1985) collected sixty-three species of fish and fishery resources of Morang district [1]". "Pokharel, J. (1982) collected 30 species of fishes from Koshi river Nepal [17]". "Jha et. al. (1986) 57 species of fishes reported from Narayani and Rapti river [8]", "Mahato, S. N. (2004) studied on fish diversity of Singhiya river, reported 32 species [10]", "Chaudhary, A. (2014) reported 18 species of fishes from singhiya river [5]".

"Shrestha, T. K. (2008) reported 232 species of fisher, throughout Nepal [24]". By author, during from January to August 2016 the exploration of fish diversity of Singhiya river 26 species of fishes comprising 7 order families 20 genera were recorded. By finding, gradually the declines in population of fresh water fishes is particularly alarming as it indicates the extent of deterioration in Singhiya river, Morang district, Eastern Nepal. As it tells us deterioration of natural characteristics of the water bodies which may also apply to other species in the future.

Soil erosion, floods and increase in turbidity, due to deforestation, direct disposal of domestic wastage, release of toxic substances, use of soap and detergents and other activities such as urbanization, industrialization, use of pesticides, indiscriminate fishing, ill planned, waste dumping which change in physico-chemical and biological properties and also degrade and destroy the fresh water habit, habitat. "Russel, (1993) [17]"; "Shrestha (1981) [18]"; "Shrestha (1994) [20]"; "Pokhrel K. K. (1998b, 1999b, 2006, 2009 and 2010) [12-16]", and "Tamrakar (2003) [28]". The use of organo chlorine pesticide – DDT, BHC, aldrine etc. have been banned in many countries due to resistance in insect pests, Persistence in the environment and harmful health effects are being used continuously in the country due to lack of knowledge or due to ignorance. Section 3 of "Aquatic animals Protection Act (AAPA 1961) renders Punishable any party introducing poisonous, noxious or explosive materials into a water bodies with the intent of catching or killing aquatic life (Belbase 1995) [3]", remains only in paper and not implemented effectively. Therefore, the declines in population of fresh water species is particularly alarming as they indicate of deterioration in the quality of the world's rivers, lakes and other wetlands "W. W. F. (1999) [29]".

5. Conservation

Protection of the habitat is of most importance to protect the natural components of any type of ecosystem in the Earth. For protection of aquatic biodiversity, it is necessary to conserve the natural condition of physico-chemical and physio-graphical characteristics of the water bodies. Singhiya river situated in Biratnagar city have been influenced by land slide, floods, siltation, soil erosion mostly due to deforestation. The hotels, restaurants, shops, residence building, petrol pumps located near the river bank (shores), the agricultural activities near the shores of river; sites where rain floods enter the river water bodies. The sites where washing has been prominent and decomposition of aquatic vegetation. All these activities have accelerated the process of eutrophication of the water bodies of river.

Encroachment on bank areas for waste disposal release of toxic substances in the form of chemical fertilizers and pesticides through surface runoff from the agricultural fields near the river and use of soaps and detergents and some other human activities which have enhanced the deterioration of the physical-chemical characteristics and ultimately affected the biotic components of the river. Likewise, the activities such as, construction of dams without provision of fish ladders preventing the free movement of fishes, which move upstream for breeding purposes and indiscriminate fishing (fry to adult) including brood fishes during their breeding season having depleted population of fishes and also threatened their existence.

Nepal is rich in its water resources, but at the same time it has been realized that there can be steady decline in riverine fisheries in the near future at there is a rapid industrialization and urbanization in the Biratnagar city municipality. The decline in riverine fish production due to indiscriminate fishing by means of dynamiting No attempt has been made so far to protect and conserve fishes. Some rules and regulations in this respect also should be formulated by the government of Nepal and strictly implemented to conserve the fishes.

6. Conclusion

Singhiya river had a rich fish diversity and other aquatic bioresources before thirty years ago which now rapidly decline in riverine fisheries and may threatening their existence. Singhiya river is found to be disturbed due to

urbanization, industrialization, use of pesticide, over-fishing, indiscriminate fishing, pollution, waste dumping, use of soaps and detergents, cutting down of forests, unusual erosion and also the harmful use of toxic substances which effect upon the physico-chemical properties of water and ultimately affected the biotic components of aquatic ecosystem capture of brood fishes during the breeding season having decline population of fishes. Consequently, the upstream and downstream migration of fishes are disturbed which eventually not only reduce the production but also create circumstances of extermination of fish species because of habitat changes. However, it has been observed that some species of fishes can be in threatened position in near future due to the industrial wastage and domestic sewage or toxic substances are being directly discharged. According to the local people the population of these fishes have enormously decreased nowadays.

No strict rules and regulations are yet been formulated to check such pollution and to protect the fish species from different disturb condition. Therefore, need immediate step for their conservation.

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