



ISSN : 0973-7057

Int. Database Index: 663 www.mjl.clarivate.com

## The changing consequences of Tilapia invasion in the Jayanti Sarovar of Jamshedpur, India: Control implication.

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Received : 22<sup>h</sup> November, 2017 ; Revised : 29<sup>th</sup> December, 2017

**Abstract:** The tropical freshwater cichlidae fish, Tilapia (*Oreochromis niloticus*, linnaeus) is suitable for any aquatic ecosystems due to its adaptable life history, prolific reproduction, maternal care and ability to tolerate adverse environmental conditions. Tilapia is worldwide fish species and due to its potential and affordability it is considered as aquatic chicken. In the present study population structure of exotic fish Tilapia and its impact on indigenous ichthyofauna of Jayanti sarovar (Jubilee lake) Jamshedpur (India) is described. Results show that fish production and community structure of local fish fauna were adversely affected by high density and abundance of this exotic fish species tilapia. During 2016 fish production was 147 metric tons which was composed by Indian major carps (27%), minor carps (35%), catfishes (9%) and tilapia(29%) but due to invasion of tilapia it was reduced 105 mt till 2017 and fish production composition was changed and it is contributed by Indian major carps (14%), minor carps (3%), catfishes (30%) and tilapia (53%). The aquatic environment of lake was very suitable for tilapia and its growth in terms of length/weight was minimum 25.0cm/400 g and maximum 43.5cm/1620 g during 2016. Study revealed that tilapia is highly invasive due to high abundance and competitive for food and space to Indigenous fish fauna. It is also recommended that there is need of detailed studies on tilapia abundance, recruitment and local environmental conditions to understand the invasion potential and consequences for the endemic aquatic biodiversity.

**Keywords:** Exotic fish, Tilapia, Invasion, Indigenous Fauna, Jayanti Sarovar

### INTRODUCTION

Tilapiine fishes, often collectively called Tilapias, are a group of subtropical to tropical freshwater fish of the family Cichlidae that are native to Africa and the southwestern Middle East. Tilapias are grouped into three genera according to parental care patterns: *Oreochromis* (arena-spawning maternal mouthbrooders), *Sarotherodon* (paternal or biparental mouthbrooders), and Tilapia (substrate spawners). Since the 1930s, many tilapia species have been intentionally dispersed almost worldwide. Tilapias have been introduced primarily for the following reasons: for the biological control of aquatic weeds and insects, as baitfish for certain capture fisheries, as a

foodfish in aquaculture systems, as aquarium species, and to augment capture fisheries. Certain tilapias, such as Nile and Mozambique tilapias (*Oreochromis niloticus* and *Oreochromis mossambicus*, respectively) are well-suited to aquaculture production because they are fast-growing and tolerant of a range of environmental conditions. Some of the predicted direct impacts of tilapia on the Jayanti sarovar include:

#### Impacts on native fish and other biota by:

- ▶ Direct predation by tilapia
- ▶ Competition for resources (food, habitat)
- ▶ Destruction of macrophytes and other aquatic plants used as breeding or nursery habitat by native species
- ▶ Habitat disturbance
- ▶ Transmission of diseases and parasites

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- ▶ Competitive exclusion of native fish from favourable habitat by tilapia's aggressive behaviour
- ▶ **Reduction in water quality, including potable water supplies, through:**
- ▶ Increase of blue-green algal blooms (through resuspension of nutrients)
- ▶ Winter die-offs of tilapia (polluting waterways)
- ▶ Undermining river banks due to destruction of river plants and nesting behaviour.
- ▶ This paper examines the impacts of tilapia introduced through aquaculture or other means on native fish and their habitats. It is not intended as a comprehensive review, but rather as a description of the potential effects of introduced tilapia species on native biodiversity. The target

audience is aquaculturists, natural resource managers, and other groups pursuing or considering the culture or introduction of tilapias

### MATERIALS & METHOD

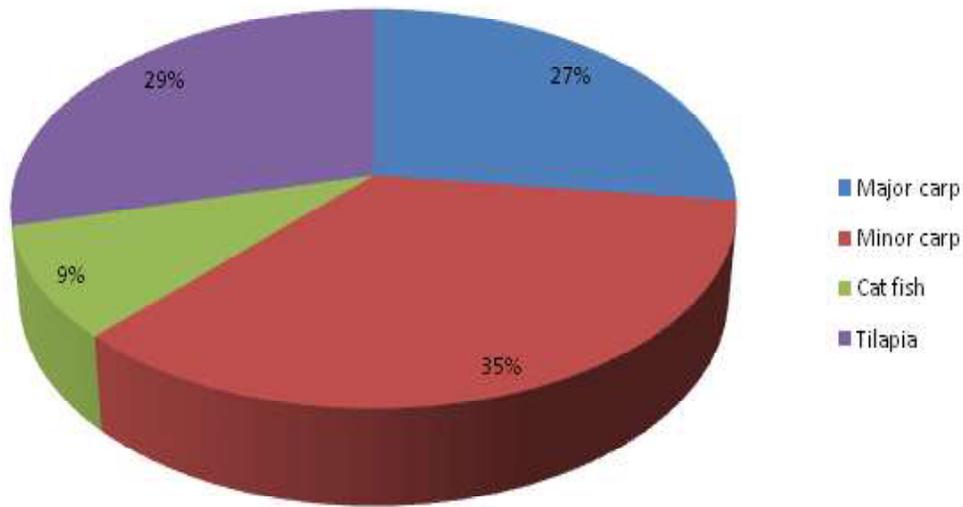
This study was carried out during the 2016 and 2017 in Jayanti sarovar.

For the investigation 550 specimens were used to measure for morphometric data including total length (TL, mouth tip to end of caudal fin), standard length (SL, mouth tip to caudal peduncle) were measured in centimetre with the help of measuring tape precise of  $\pm 0.5$  cm and weight (WT) was taken in grams with help of single pan balance. The annual fish production data of 2016 and 2017 of Jayanti Sarovar was collected from angling club of Tisco.

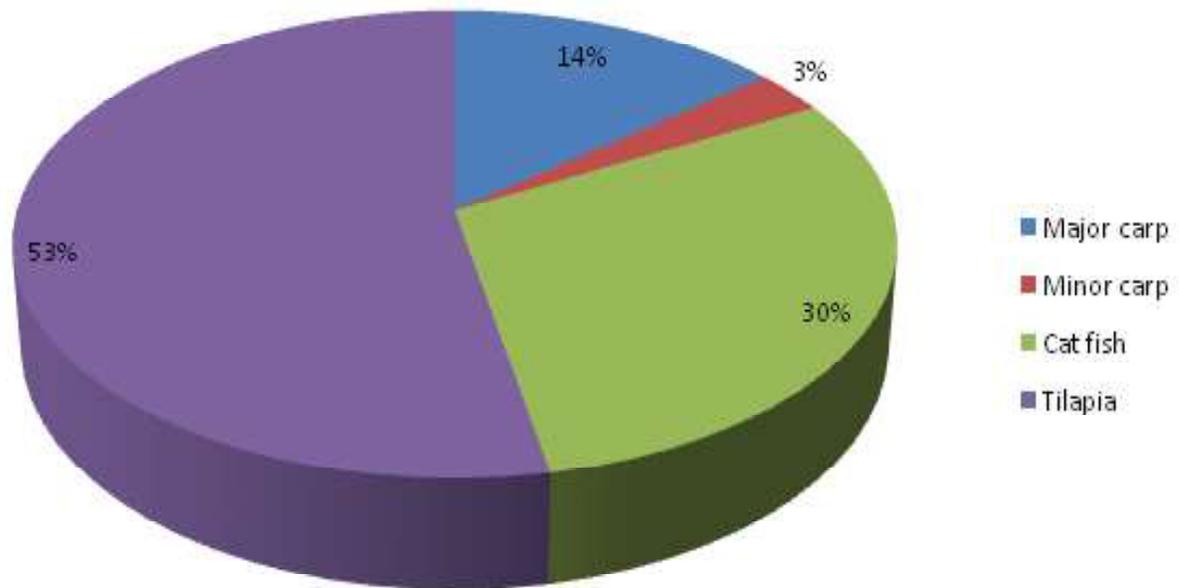
### STUDY AREA



**RESULTS**



**Fig 1. Fish catch composition in Jayanti Sarovar 2016.**



**Fig 2. Fish catch composition in Jayanti Sarovar 2017.**

**DISCUSSION**

The aquatic environment of Jayanti sarovar for Tilapia was favorable because it was observed that the body size of tilapia in the commercial catches of lake was very good. Bio invasion of exotic fish Tilapia (*Oreochromis niloticus* Linn.). It shows continuously fall in size due to high abundance of tilapia population.

The fish landings of Jubilee Lake was composed by Indian major carps (*Labeo rohita*, *Catla catla*, *Cirrhinus mrigala*, *Labeo calbasu*), Minor carps (*Cirrhinus reba*, *Puntius sophore*, *Puntius ticto*, *Puntius ranga*), Catfishes (*Channa striatus*, *Mystus tengra*, *Notopterus notopterus*) and Miscellaneous including Tilapia (*Mastacembelus*

*armatus, Gudusia chapra, Chanda nama, Glossogobius giuris, Parambassis ranga, Oreochromis mossambicus*). Tilapia was restricted to only few specimens in daily catch during 1990 but subsequently catch composition was change and its dominancy trend was observed in the fish production Bio invasion of exotic fish Tilapia (*Oreochromis niloticus* Linn.) in Jayanti sarovar, India .

While some may argue that 'the horse is out of the barn' with regard to tilapia because certain species are already so widespread and well established, there are rivers, streams, and estuaries in every region that have not yet experienced introductions. The prevention of further introductions as well as the control of established feral populations will go a long way towards stemming the loss of biodiversity in aquatic ecosystems worldwide. During 2016-17 dominancy of tilapia was increased, it was 82% of total fish production 119 mt and remaining 18% of composed by Indian major carps were only 11%, minor carps 3%, catfishes 4%. The result depicted that tilapia dominated and virtually eliminated all other indigenous fishes including major carps, minor carps including endemic fish *Labeo rajasthanicus* (icar), catfishes and so many other fishes in Lake Jaisamand. Similar findings were also reported by (Jhingran 1991 & Ganie *et al.* 2013)<sup>1,2</sup>. Sugunan reported that Vaigal, Krishnagiri, Amaravathi, Upper and Pambar reservoirs in Tamil Nadu are harboring sizable population of tilapia, since 1960s contributing substantially to commercial catches. In Krishnagiri, the exotic fish change the scenario on account of competition with the mullet (*Rhinomugil corsula*) from the predominant position in the 1960s the percentage of tilapia came down to 4.3% only in 1983-86, to increase in the year 1989-90 to 68% (Jhingran, 1991)<sup>1</sup>. In Jubilee lake the fish production fluctuation due to contribution of tilapia suggest simultaneous visible impact on the total production of the

Indian major carps and catfishes as evident from the observations of (Gupta and Jain 1994, Durga & Srivastava 2008)<sup>3,4</sup>. Similarly, decrease in population size of established fishes due to overcrowding of tilapia were also reported by Courtenary and Hensley (1979)<sup>5</sup> and Bhagat and Dwivedi (1988)<sup>6</sup>. For controlling Tilapias in Jubilee lake certain remedial measures such as selective fishing and even under sized Tilapias removal were practiced with special permission from the state Fisheries Department.

Similarly, for few years catfish catching was stopped and Indian major carps fingerlings was stocked in adequate numbers. These controlling measures observed good recovery in the production of IMC and other indigenous fishes, however, in the recent years resurgence of tilapia and it is dominating the catch once again which requires attention for control by appropriate means.

#### ACKNOWLEDGEMENT

We would like to thanks to Tata Steel Zoological Park Director Mr. Bipul Chakarvarty and Jamshedpur Angling Club Secretary in helping collect the data and for valuable suggestions.

#### REFERENCES

1. **Jhingran AG. 1991.** Role of exotic fish in capture fishery waters of India. In Conservation and management of Inland capture fisheries resources of India. Eds. Jhingran A G and Sugnan V V. Fisheries Society of India, CIFRI, Barrackpore, 275.
2. **Ganie, Mushtaq Ahmad, Mehraj Din Bhat, Mohd Iqbal Khan, Muni Parveen, Balkhi MH. 2013.** Invasion of the Mozambique tilapia, *Oreochromis mossambicus* (Pisces: Cichlidae; Peters, 1852) in the Yamuna River, Uttar Pradesh, India. *J Ecolo Nat Environ.* **5(10):**310-317.
3. **Gupta AK, Jain AK. 1994.** Occurance of tilapia in Lake Jaisamand: A threat to indigenous fishery resources of Rajasthan. *Fishing Chimes* ,15.
4. **Durga IA, Srivastava RM. 2008.** Tilapia invasion and its control in Jaisamand Lake, Udaipur: A case study. In: *Mangement of freshwater ecosystem*, (Eds.) Sharma et al., Agrotech Publishing Academy, Udaipur , 327-335.
5. **Courtenary WR Jr, Hensley DA. 1979.** Range expansion in southern Florida of introduced spotted tilapia, with comments on its environmental impress. *Environmental Conservation.* **6 (2):**149-151.
6. **Bhagat, M.J. and Dwivedi, S.N.1988.** Impact of exotic fish *Oreochromis mossambicus* on the indigenous fishery of Powai Lake Bombay. *J Ind Fish Assoc.* **18:**511-515.

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