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STUDIES ON POPULATION DYNAMICS OF A FRESHWATER FISH, *NEMACHEILUSSINUATUS* OF TAPI RIVER, MAHARASHTRA INDIA.



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ABSTRACT:

Population dynamics of freshwater fish *Nemacheilussinuatus* from Tapi River and its tributary, Gomai in Satpuda range is studied during 2014-2015. *Nemacheilussinuatus* are tremendous in Tapi River and its tributaries with their standard length ranges between 52-75mm. The ecology and the relationship between their diameter and standard length of the fish, *Nemacheilussinuatus* investigated. The correlation studies revealed that there is a positive correlation ($r^2=0.9358$) was observed in samples collected from Tapi river whereas the samples from its tributary Gomaigave contrast in their correlation ($r^2=0.4756$).

KEYWORDS :Population dynamics, freshwater fish, *Nemacheilussinuatus*,

INTRODUCTION:

Tapi is one of the major rivers of peninsular India with a length of around 724 Km. in Maharashtra. It runs from east to west with a large fish diversity. In an area of about 75 Km. some tributaries joins to Tapi river like, Gomai, Devvaril, Dehali, Panzars, etc. of them Gomai is the main tributary flowing from satpuda mountains to surat, Gujarath where it joins to sea. The fish *Nemacheilussinuatus* was not studied with respect to their ecology, population dynamics, richness, length-size relationship and diversity.

Nemacheilus is recently known as Acanthocobitis fish. This is a fish of order-Cypriniformes from the family Nemacheilidae. The populatin of the fish, *Nemacheilussinuatus* varies in Tapiriver and fits tributaries. In different regions. Study of population dynamics can be used to describe the functioning of population of fish. McMahan & Matler (2006) studied on fish population dynamics, their stock exploitation and estimate the current status of the species in ecosystem. Recently the population biologist work with interest in population level work as it is a demographic feature. (Lokmnicki, 1988; Sutherland, 1996) while studying population dynamics, immigration and emigration may be an important issue to study various population process (Hanski, 2001).

Humston et.al.(2004) studied on structure and population dynamics of fishes. Kottelat (2012a) remarkably studied on identity of *Nemacheilussinuatus* species of fish.

MATERIALS AND METHODS

Study area: The field study was carried out in Gomai tributary which flows through Londhare, Shahada, Damarkheda and in prakasha it joins to Tapi river. These are the four locations from where the samples were collected. From Tapi River the locations selected for study are Pisawar, Taloda, Akkalkuwa and Khapar. These are adjoining places of Tapi River in Maharashtra. From each location, three sites were selected for study. The population dynamics, ecology, length-size relationship and their correlation studies were carried out. Statistical calculations were made by using formula as given below and condirmed from calculator from Internet.

$$r = \frac{n \sum_{i=1}^n x_i y_i - \sum_{i=1}^n x_i \sum_{i=1}^n y_i}{\sqrt{(n \sum_{i=1}^n x_i^2 - (\sum_{i=1}^n x_i)^2)(n \sum_{i=1}^n y_i^2 - (\sum_{i=1}^n y_i)^2)}}$$

Sample collection: The fish catching nets and fisherman's were used to collect the sample fish, *Nemacheilussinuatus*. Sample fish collected from different sites from upper stream, middle stream and lower basin of the locations. Gomairiver flows through satpuda mountain ranges. The triplicate transact of the length-size of the sample fish was made and average values were used for study. The cast net of fisherman is used to catch the sample fish. The net is circular net was used with a 3-12 foot diameter for fish catch having small mesh (1/4 inch) having a series of lead weights around the perimeter. At the centre, the net is attached to a rope which is with the thrower. When properly thrown the cast net opens up into a perfect circle before hitting the surface of the water, and then quickly sinks to trap the fish beneath. The fish species was identified from reputed references.

RESULTS AND DISCUSSION:

Taxonomy: The fish, *Nemacheilussinuatus* is from order-Cypriniformes and family, Nemacheilidae.

Synonyms: *Nemacheilussinuatus*. Day, 1870.

Etymology: *Acnthocobitis sinuate* (Day, 1870) meaning 'Thorny', 'a kind of sardine'. And *sinuatus* means 'bent' showing curved markings on caudal fins.

Ecology:

Distribution: Described from Tapi and Gomai River in Nandurbar district, Maharashtra, India. Also reported from Wynad district from Kerala and probably found in Cauvery River. The physicochemical characteristics of water shows 24^o C temperature, Ph-6.7 and Hardness is 188ppm.

Habitat: Sample fish, *Nemacheilussinuatus* is inhabiting in number of places having different hydrophytes and ecological status. They found tremendous in tributaries or in small rivers. They are also found to inhabit under stones, among gravels,, cobbles, aquatic plants like hydrilla, vailsneria, etc. and floating green algae.

Population dynamics: The fish *N. sinuatus* grows from 53-74 mm in length with 1.0-1.6 mm in wide. These are also known as aquarium fish. The average temperature is 24^o C in which *N.sinuatusinhabits*, PH-6.7 and hardness 188. Fish *N.sinuatusis* probably a micro predator because it occasionally feeds on larvae. A total of 638 specimens of *N.sinuatus* were collected from six different sites and observed, data recorded and again released in the river. These are found 38 in upper stream, 40 in middle stream and 87 in downstream of Gomai River whereas in Tapi river these are tremendous in downstream i.e. 287 whereas very low in upper stream zone of study area. In both location the fishes were more in downstream followed by middle stream and very low in upper streams.

Standard length-size relationship:

The sample fish *N.sinuatus* collected from Gomairiver were with the length-size range of 0.75 to 1.5 mm diameter and 53-74 mm. in length. The samples collected from TapiRiver were with 1-1.5mm. in diameter and 55-69 mm in size. These differences might be due to feeding competition and availability of food and predators in an ecosystem. The highest population of *N.sinuatusisin* Tapi river whereas these fishes re found in large numbers in lower steam sites of collection. The standard length –size relationship between individual found in Gomai river is insignificant ($r^2=0.6897$)[Fig-1] whereas it is significant in Tapi river. ($r^2=0.9674$)[Fig-2] Freshwater fishes are important source of food, ornamentation, medicine, etc. for mankind since beginning. *Nemaheilussinuatusis* also a food source for many animals in an ecosystem. In early 1700's Peter Artedis study report, he identified first time 230 species of fishes, today we know about 31,900 different species of fishes.

The migration of fishes may be for searching food, selection and tacking towards better environmental conditions to have a good and nutritious quality of food and safe reproduction. Fish migration may be for getting optimal environmental conditions through time and space. (Julian J.Dodson, 1988). The relationship of body length-width size are discussed within the context of the trophic ecology (Karpouzi and Stergious, 2003) and along their functioning in all fishes studied. In present work medium sized fishes and few larger sized fishes migrate towards the tributary Gomai where maximum food comes from Satpuda mountain area with fallen leaves, fruits, decaying matter, etc.

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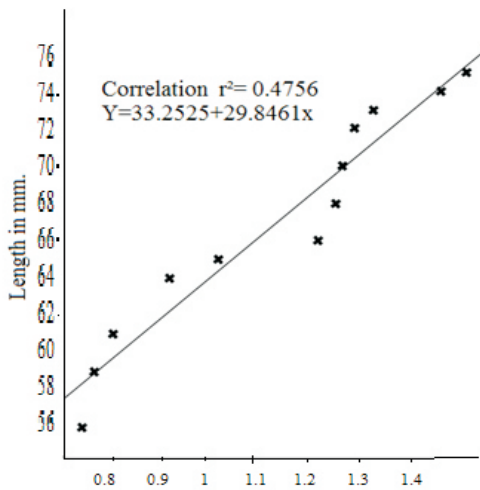


Fig.1: Correlation of standard length width of *Nemacheilus sinuatus* from Gomai river.

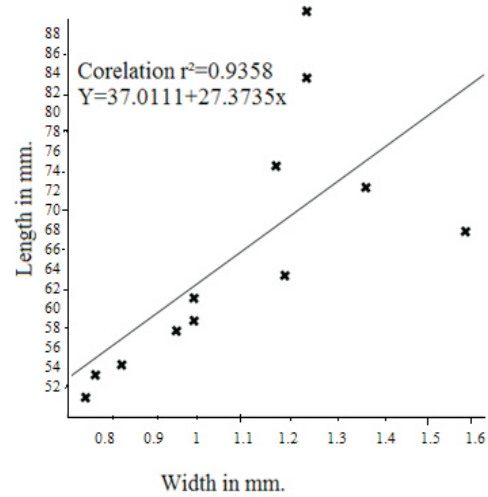


Fig.2: Correlation of standard length width of *Nemacheilus sinuatus* from Tapi river.



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