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Short Communication

Fish diversity of a small hill stream Dhundeshwer Gad of Uttarakhand (India) and need of its conservation

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Abstract

The present study deals with ichthyofaunal diversity in small hill stream Dhundeshwar Gad of Garhwal Himalaya. Different species of fishes have been recorded during the investigation. Total 19 fish species recorded during study from different sampling stations of the tributary. Stream shape, stream order, length of stream, and average gradient of stream also studied. Various factors responsible for depletion of fish fauna were also observed during investigation.

Keywords: Fish diversity, conservation, hill stream, Dhundeshwer gad.

Introduction

The hill stream Dhundeshwar Gad originates from the Gaddikhal at the height of 2339mtr and flows north to south direction covering about 50.5km area from origin to confluence of the river Alaknanda. Dhundeshwer Gad rises from the water divide zone of Alaknanda and Bhilangana river and is situated in the lower basin of Alaknanda. This is fifth order stream of different profile nature. Tributary generally have rough, rocky, bouldered and pebbled substratum which affects the occurrence, distribution and productivity of fish fauna. The stream has been divided into five sampling stations. All the freshwater resources of the Garhwal region contains a very rich and colourful ichtyofauna, different species of fishes have been abundantly habited in different snow fed rivers and streams in Garhwal Himalaya. Fish diversity of a country depends on the geographical position, varied aquatic ecological conditions, awareness amongst the native regarding the importance of fish diversity, health of the aquatic bodies, optimum exploitation of the commercial fish species, enforcement of legal laws and the implementation of fish habitat restoration programmes in case of ecologically degraded fish habitats[1]. Work on snow fed river system conducted by different workers[2-6] but no information available on fish fauna of Dhundeshwer Gad hence an effort has been made.

Materials and methods

Fishes collected personally as well as procured from local fisherman. The fresh fish were preserved in 10% formalin. The snout of the collected fish was kept downward and the caudal region upward in the jar to avoid damage of soft parts of the fish. Identification work done with the help of Day[7], Srivastava[8], Badola[9], Husain[10], Talwar and Jhingran[11] and Badoni[12].

Results and discussion

Altitudinally and longitudinally the Dhundeshwer Gad has been divided into five sampling sites. Fish diversity has been recorded from different sampling stations of the stream Dhundeshwer. Highest diversity recorded in monsoon season followed by summer and winter. It is noticed that *Schizothorachthys progastus* and *Nemacheilus gangeticus* remain totally absent from this site. The seasonal differences in the availability of fishes are due to altitudinal and longitudinal variation in different sampling sites. This change may be due to the physico-chemical and hydro biological nature, nature of profile of stream and diverse benthic biota[13]. Geographic considerations may influence distribution of fish species between river systems[14]. Garhwal is divided into three physico-graphic zones i.e. greater Himalaya, lesser Himalaya and central Himalaya.

The vast range altitude, coupled with the complexities of widely varying mountainous topography give rise to large differences of climatic conditions[15]. Stream pattern and stream geometry influence the distribution and abundance of fish fauna. Geometry and flow pattern of the streams is a determining factor of the fish fauna[16].

Fish diversity: Nineteen fish species have been reported during the field survey. The most abundant fish species were based on the catch i.e. *Nemacheilus sp.* Followed by *Barilius sp., Glyptothorax sp*. and *Pseudocheneis sp.* respectively.

Economic importance of fish species found in Dhundeshwer Gad: Fishes found in Dhundeshwer Gad during the investigation are of economic value as food, as well as recreational value, while fish *Nemacheilus have medicinal value.*

Table-1: The check list of fish fauna recorded in Dhundeshwer Gad.

Family	Order	Genus	Species
Cyprinidae	Cypriniformes	Barilius Hamilton- Buchanan	*Barilius barna* *Barilius bendelisis* *Barilius vagra*
Cyprinidae	Cypriniformes	Tor Gray	*Tor chelynoides* *Tor putitora* *Tor tor*
Cyprinidae	Cypriniformes	Crossocheilus Kuhl van and Hasselt	*Crossocheilus latius latius*
Cyprinidae	Cypriniformes	Garra (Hamilton- Buchanan)	Garra gotyla gotyla Garra lamta
Cyprinidae	Cypriniformes	Schizothorax (Heckel)	*Schizothorax richardsonii* *Schizothorax plagiostomus*
Balitoridae	Cypriniformes	Nemacheilus (Bleekar)	*Nemacheilus botia* *Nemacheilus montanus* *Nemacheilus rupicola* *Nemacheilus zonatus* *Nemacheilus multifaciatus*
Sisoridae	Siluriformes	Glyptothorax (Blyth)	*Glyptothorax pectinopterus* *Glyptothorax madraspatanum*
Sisoridae	Siluriformes	Pseudecheneis (Blyth)	*Pseudecheneis sulcatus*

Stream Geometry:

Table-2: Showing stream Geometry of Dhundeshwer Gad.

S.N.	Parameters	Dhundeshwer Gad
1.	Length	17.5 Km
2.	Stream Order	Fifth Order
3.	Stream Shape	Linear
4.	Area	50.5 Km^2
5.	Average Gradient	0.11 Mtr/Km.

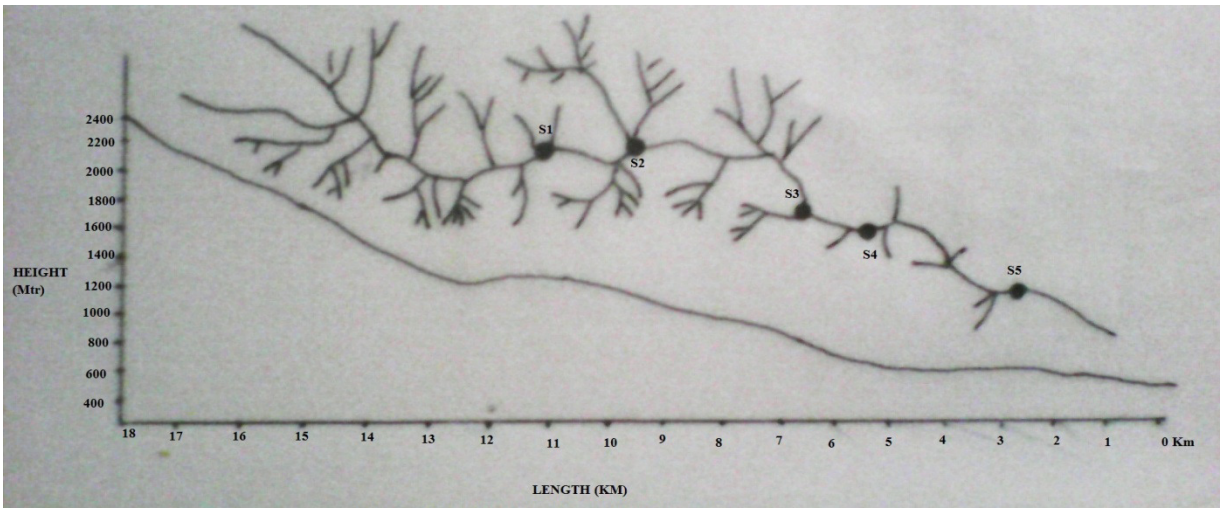

Figure-1: Longitudinal profile of Dhundeshwer gad.

Factors Responsible for depletion of fish-fauna in Dhundeshwar Gad: Various factors observed in the study area which are responsible for the depletion of fish fauna in the study area which are following:

Construction activities: different construction activities such as road construction, building construction observed near the catchment. These activities change the flow pattern of the stream due to deposition of soil which results into mortality of fish fauna.

Fish toxins: local people used various types of ichthyotoxic plants such leaves and bark of akhrot (*Juglans regia*) *Sapindus mukorossi*, *Aesculus indica*, *Lyonia ovalifolia*, *Zanthoxylum armatum* etc[17,18]. And use of bleaching powder causes heavy mortality of fishes.

Illegal and unscientific methods of fishing: such as hammering and dynamiting which is extremely destructive method of fishing and affects population of juvenile as well as brooder fishes[17].

Spawning ground destruction: Due to construction activities and breaking down of boulders and pebbles causes high mortality of attached eggs, hatchlings and fingerlings.

Channelization: Channelization from main tributaries for irrigation and watermills creates harmful effects for the fish population. They become barrens for fish migratory movements[17]. This method causes wanton destruction of fish fauna[19].

Dams**:** due to large dams construction drastic changes occur in river hydrology which causes change in seasonal variation. Storage of water in the dams reduces flow of water in downstream area which affects the inhabitant flora and fauna. Dam construction reduces riverbed gravels which affects spawning habitat of fishes[20].

Extraction of bed material**:** Dredging and extraction greatly reduces the abundance and variety of flora and fauna of the river system[21]. Habitat patterns in the Himalayan streams are altered by removing boulders, cobbles, gravels and sand[20]. During the study period extraction of bed material observed in almost in every station of the stream, which affects the flora and fauna and reduces the fish breeding grounds.

Conclusion

Total 19 fish species recorded during study from different sampling stations of the tributary. Differences in the seasonal availability of fishes recorded due to altitudinal and longitudinal variation in different sampling sites of the stream. Physico-chemical and hydro biological nature as well as stream profile i.e. stream shape, stream order, length of stream, average gradient of stream also affects the fish fauna. Similar observations recorded by Bahuguna and Badoni[13]. Various factors which are responsible for the depletion of fish fauna in the study area also observed and sincere efforts have been suggested to conserve the fish fauna of the stream.

Suggestions: i. Sincere efforts should be made by state fishery department, NGOs etc. to create awareness among the local communities. ii. Illegal and unscientific fishing methods should be banned. iii. Fishing during close season should be banned. iv. Destructive and indiscriminate fishing should be banned by educating the local peoples.

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