

Faunistic Survey of a Fresh Water Environment of Jammu Region J and K- India

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ABSTRACT

Faunistic survey of fresh water environment of jammu especially river tawi that is known as life line of jammu city winter capital of jk ut invites a research work at broader prospective due to its deteriorating condition.once there was a time when river tawi was graced with rich biodiversity but due to consistent and indefinite anthropogenic activities now the scenario have been changed.as it is evident from the fact that environmental changes caused by both human and natural or catastrophic activities worsen its condition.the man made changes includes denudation,soil erosion,alteration in vegetation pattern on stream banks,abstraction of stream water for agriculture ,domestic and industrial use collection of building material from the river bed and pollution caused by release of domestic and industrial effluents or water

The community of organisms in the water body form an important link in the food web apart from their biological role in the mud water exchang of nutrients.the never ending human quest to reap full advantage has always led to irrational utilisation of natural resources and thus to disastrous consequences.same is the truth of river tawi in jammu.the river tawi while running through the thickly populated area of jammu is increasingly being choked with population.

Available literature on the subject reveals that most of the studies are from fish ponds and lakes where as such studies for rivers specially on himalyan streams are very scanty , expecting a few important contribution made by pahwa 1979 dutta 1978 jhingran 1988 in different stretches of the rivers.in view of the scanty information over the subject in river tawi ,the present investigation were conducted.attempts were made to examine the comparative account of distribution and abundance of benthic and short line fauna of river tawi in 7.5km virgin stretch between nagrota to nikki tawi.main emphasis have been laid on the recovery of aquatic insects larvae[arthropoda] and molluscs which are not only important fish food organisms but are also indicators of pollution status of the water body.besides,amphibians which form an important link in the food chain have also been investigated.

The collection techniques were used as a hand net of a fine mosquito net tied around iron ring and fitted to wooden handle.the hand net or scoop net was dragged over the aquatic vegetation and when filled with elements then poured over the cloth piece.the other techniques like caste net , rod and line, bar baskets were also used for collection of invertebrate and vertebrate fauna from river tawi.the identification of collected specimen was done as per the recommended literature.

KEYWORDS:-Arthropods,Biodiversity,Denudation,Fauna And River Tawi.

1. INTRODUCTION

The mighty Himalaya chain of mountains in J and K union territory has the vast repository natural resources,water ,forests ,plants,animals and aquatic life.It is because its complex geology and physiography,antecedent drainage of the major rivers and the relative instability and fragility of the environment complex ,never

ending changes are taking place.The Human interference on the natural environmental condition often give these dynamic process a catastrophic proportion leading to disasters and irreparable damage to the natural balance of the ecosystem and environment.

Same is the case of river tawi in jammu. The river Tawi is shrinking day today due to siltation and inhabitants of the river are also effected adversely due to man made pollution coming through drainage in the form of solid waste as well as sewage waste. River Tawi is also known as "Surya Putri, { daughter of sun} , considered as attraction of numerous religious and aesthetic values now facing the threat of losing its centuries old ecosystem. Available literature on the subject reveals that most of the studies are from fish ponds and lakes where as such studies for river especially on Himalayan streams are very rare and expecting a few important contribution in different stretches of the rivers particularly on river tawi. In view of the scanty information over the subject in river tawi , this investigation was conducted.

2. LITERATURE SURVEY

The aquatic organisms are considered as biological indicators which provide a direct clue and quick information of aquatic ecosystems. Some of the observers have been given the name as "biological litmus paper" to these aquatic organisms. Limnological studies of the rivers have been carried out extensively in USA and European Countries by various workers (Kofoid, 1903; Fritsch 1903; Allen 1920; Classen, 1927; Reinhard, 1931, Rice, 1938; Butchner, 1947; Fijer dingstad, 1950; Lacky and Hupp, 1956; Blum, 1956; Klein, 1957; Palmer, 1959; Waslik, 1965; weber and Moore , 1967; Lam 1971; Willem et al).

The high rate increase in human population and rapid pace of industrialisation have created an acute problem of disposal of waste products. Sewage and domestic wastes include all types of refuse, bathroom

washing, detergent, night soil etc. some of these are quite harmful and effects the quality of water and aquatic life of some respective water bodies. According to most recent investigations conducted on various lotic environment in India have been reviewed during present investigation on river Tawi.

The Chambal river and its tributaries were studied at Kota in Rajasthan (Olaniya et al, 1976) . Rama rao et al; (1978) observed the effects of pollution on river Khan (Indore) and made assessment of river water by biological community. Rishi and Kachroo (1981) studied the effect of sewage and fertilisers on phytoplankton of the Doodhganga river in Kashmir. Patra Nayak (1982) investigated limnobiological survey of Mahanadi during winter season only. Venkateswarlu and Kumar (1982) studied chemical and biological assessment of pollution in the river Moosi, Hyderabad (AP now Telangana) Lal et al. Raina et al; 1984 showed pollution studies on river Jhelum. Palharya and Malviya; 1988 studied pollution of Narmada river at Hoshangabad in M.P. Mittal and Sengar; 1990 studied on the assessment of water pollution and distribution of algal flora of Karwan river at Agra. Tamot and Khare (1991) observed limnological studies of upper lake of Bhopal during certain religious activities. Mishra (1993) studied phytoplanktonic composition of sewage polluted Kalpi river of Gwalior in M.P.

During the initial phase of investigation the physico-chemical characteristics of water and a thorough knowledge of the biotic constituents and their interrelationship were carried out. Keeping this in view Tawi was investigated as a representative of the lotic environment in Jammu. Attempts were made to examine the comparative account of distribution and abundance of benthic and shore line fauna of river Tawi in 7.5km virgin stretch between Nagrota to Nikki Tawi. Main emphasis has been laid on the recovery of insects, crustaceans, insect larvae, molluscs, amphibians and fishes.

The impact of sewage and industrial pollution on physico-chemical characteristics of water in river Betwa at Vidisha (MP) has been observed by Mishra (1996) Singh and Mahavir (1997) have studied the role of heavy metal in riverine pollution and found that the pollution load in river Ganga and river Gomti were maximum in respect of zinc, arsenic and chromium. Harjeet Kour, Prof. K.K Sharma and Arti Sharma of Jammu University in 2015 studied the fish diversity of some lotic bodies of R.S pura tehsil of Jammu District. In the most recent study that was carried out in 2019 by Maseera Shaikh, Roline Throrat and Sameer Padhye, it was carried out during the monsoon months of 2019 when invertebrate fauna such as branchiopods and rotifers were studied in a fresh water body Ahmednagar city.

On the basis of above survey it can be concluded that major Indian rivers are facing the danger of pollution. It is necessary to assess the effect of pollution on living organisms and water quality of fresh water bodies in India.

3. METHODOLOGY AND APPROACH

Tawi river has been investigated for the diversified macrofaunal invertebrate and vertebrate elements from their natural habitat by the methods adopted after Lefroy (1990), Kaburaki (1921), Parker and Haswell (1967), Tonapi (1980), Julka (1988), Verma et al, (1995) and Jayaram (2000) during the year 2007.

The aquatic insects were identified by using hand lens and with the help of field guide and literature (Lefroy, 1990 and Mani, 1982). The articles used in the collection are as follows:-

1. Hand net or a scoop net.
2. A small piece of cloth.
3. A few cloths or polythene bags.
4. Specimen bottles and plastic jars or buckets of different sizes.
5. A thermometer for the record of temperature.
6. A pair of blunt forceps.
7. Enamel trays and petri-dishes.
8. A hand lens.
9. Commercial formalin.
10. A good camera to click the photographs of sites and collected specimen.

Keeping in view the problems faced during this research process, there are some drawbacks that can be rectified in future. These are as already mentioned in the form of topography, location and pollution problems of river Tawi. It is very difficult for any scholar to investigate the river in each site. Therefore, it is necessary to select typical site suitable for data collection and water quality investigation.

Some of the approaches that can be introduced for future research work are as given below:-

1. Identification of polluted and non polluted areas.
2. Comparative study of data collected from both the areas.
3. Avoid the collection from channels of river Tawi that can delinked and changes into pools or ponds.
4. High level water quality monitoring system.
5. Repeated approaches of data collection.
6. Parameters are required to measure the impact of pollution on aquatic fauna and its growth.
7. Comprehensive measures to reduce the influx of pollutants in the river especially towards sensitive areas.
8. Awareness campaign about adverse effects of pollutants in the river.
9. Proper disposal of solid waste and other wastes exposing river to various harmful chemicals.
10. Sewage waste and solid waste treatment plants should be installed at prime locations as earlier as possible to preserve the water body and to conserve the aquatic fauna.

4. RESULTS AND DISCUSSION

The final outcome of research is very informative. During this research the efforts were made to find out maximum fauna present in present in river Tawi and to study their abundance and diversity. As far as result is concerned large no of invertebrate and vertebrate fauna have been observed and studied. The taxonomic and systematic position of fauna found in river Tawi during this investigation are as follow:-

ARTHROPODA:-

Since this the largest group comprising nearly 70% of biotic world, it is more than obvious that they have reached the end of their sufferance in the impoverishment caused by mans wanton interference in diverting the natural water resource suddenly. The insects which are dominant terrestrial organisms have reinvaded in their ancestral aquatic habitats. The developmental stages required considerable modifications to with stand the stress and strains of such a dramatic changes in the Environment. The countless adaptations of insects to aquatic life illustrate the extraordinary varied structural organisation. The tracheal system has been regarded as one of the major keys to their unique success in the terrestrial insects. This structure is retained in the adult of the

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aquatic Hemiptera and Coleoptera. These forms come frequently to the surface of the water to take fresh air which is stored into the air bubble and physical gill in the larval forms. Most of the aquatic insects have piercing and sucking type of mouth parts.

Larvae of many insects move by vigorous muscular movements. Odonata nymphs are a menacing danger to crustaceans, fish fingerlings and Batrachian larvae. Aquatic bugs like notonectids, Belostomids are a threat to other economically useful animals. It is the only studies on similar checks and balances maintained by nature in an ecosystem that can unveil the intricate biological patterns. The Arthropods observed and studied during this research work in river Tawi are as follows:-

1. *Cancer irroratus* (Crab).
2. *Palaemon malcolmsonii* (Prawn).
3. Plecoptera (Stone flies).
4. Megaloptera (Alder flies).
5. Trichoptera (Caddis flies).
6. Ephemeroptera (May flies).

MOLLUSCA:-

There are very limited molluscs present in river Tawi as it has down stream and spreaded flow. The specimen collected and investigated during the research are as follows:-

1. *Physa* species:- This is first record of the Genus from J AND K UT and to the best of the author, perhaps from rest of india as well. However, it still needs to be thoroughly searched and investigated.

AMPHIBIANS:-

The specimen collected from river Tawi fall under the genus *Rana*. The specific investigation reveals characteristic features of a single species as given below:-

1. *Rana cyanophlytics schnidlers* (Skittering Frog):- The diagnosis features of this species are wider head with width 28.6 to 36.5 of snout vent length, snout is bluntly pointed, nostril dorsal nearer to tip. The colour of frog is dorsum light ,olive green or brown; marbled or spotted with irregularly arranged scooty spots; a single white streak on the thighs, the dark pigment below this streak giving a mottled appearance rather than forming a distinct second dark streak.

FISHES:-

Fishes belonging to different family (cyprinidae) and orders (cypriniforms and siluriforms) have been observed and studied during this investigation from river Tawi . The characteristic features with specific elaboration of these fishes are as follows :-

1. *Tor tor* (cyprinus tor):-

The body of fish is elongated ,moderately compressed, abdomen rounded.Head small broad pointed snout angularly rounded often with tubercles,lips fleshy, variable, pharyngeal teeth in 3 rows, five to six barbels with 12 to 13 rays and a strong stout and smooth spine.Lateral line completes with 22to37 scales.

2.Labeo rohita(Rahu):-

The body of fish is small or moderate sized , elongated with abdomen rounded.Head fairly large,snout more or less swollen rounded or truncated often projecting beyond mouth.Jaws with a sharp margin and with a soft movable horny covering which may be thick or thin. Barbels always present in one or two pairs.

3.Mystus seenghala (Cat fish):-

Body short or moderately elongated, abdomen rounded.Head of moderate size compressed, snout rounded or blunt.Lips thin,jaws sub equal firmly villiform in bands on jaws and palate;that on later side always uninterrupted (hora). four pairs of barbells, one each of maxillary,nasal and two mandibulars generally longer.Pectoral fins with 6 to 10 rays, pelvic fins with 6 rays and caudal fins with 9 to16 rays.Caudal fins forked, bilobed with unequal lobes.

These species of fishes are also distributed in different countries of asian continent such as Nepal, Pakistan, Sri lanka,Bangladesh, Myanmar,Thailand,Indo-China and Malaysia etc.

CONCLUSION:-

The Jammu and Kashmir UT, constituting ,the extreme western sector of the Himalayas lies between 32 17 and 36 50 north latitude and 73 26 and 80 30 east longitude.The UT looks like a crown on the head of the country.In Jammu ,the monthly temperature remain almost above 13C round the year,thus at enjoy a growing season of full year.The days are often sunny and warm as compare to nights,which are very cold.

The river Tawi which is flowing very close to Jammu city also known as Surya Putri.”This water body has its origin from SeoJ near Bhaderwah (Distt Doda) a meadow of the Kailash mountain in the middle Himalayas.It flows through middle mountains along Doda, Chenani and Udampur where several tributaries join at different places on its way to Jammu.It is bounded by shivaliks range and covers a distance of 120 kms from its source to Jammu.

Available literature has revealed that scanty information on various subjects in river Tawi is available and in view of this , present investigations were conducted.Attempts have been made to examine the comparative account of distribution and abundance of faunal elements in river Tawi in 15 km stretch between Nagrota to Nikki Tawi area.The macrofaunal elements were collected from the main water body and its side pools for the years 2007and 2008 by

using different effective methods like hand net ,scoop net and hand picking etc. from the specific sites of habitats.

All the invertebrates specimen were classified upto species level by the methods adopted by Lefroy (1990), Mani (1982); parker and Haswell (1967); Tonapi (1980); Subba Rao (1989).All Vertebrate fauna were classified and identified by using key as provided by Jayaram (2000) and Verma etal; (2006-07) especially for Fishes and Amphibian fauna.

The entire collection of macrofaunal invertebrates and vertebrate fauna may be classified into three major phyla (2 invertebrate and 1 vertebrate) and 5 major classes as given below systematically:-

A) PHYLUM	:	Arthropoda
1) Class	:	Crustacea
2) Class	:	Insecta
B) PHYLUM	:	Mollusca
3) Class	:	Physidae
C) PHYLUM	:	Vertebrata
4) Class	:	Pisces(Fishes)
5) Class	:	Amphibia

Mollusca was the minimum group followed by Arthropoda and pisces.Amphibia was also represented by just one family with one Genus Rana and only one species.The identified species was physa which is a rare gastropod mollusc, and to the best of our knowledge, it has been reported from the region for the first time.

Occurance of Prawns and Crabs besides , molluscs and fishes suggest that prawn fishery and crab culture might be another alternative substitute of pisciculture besides shell fisheries, which could solve the problem of protein malnutrition in the fast developing region in the country like india.

Concomitant to above, in river Indus, Jhelum & Tawi, practically no efforts have been made to protect carps, Trouts &cat-fishes from extinction.Although the riverine habitat of river Tawi with the above mentioned characteristics, seems to be quite suitable for carps and cat-fishes.

FUTURE SCOPE:

Transgenic fish technology has a great potential in revolutionizing the capture as well as aquaculture industry.Improved transgenic fish strains could be produced by introducing desirable genetic traits into fishes.The traits may include higher growth rate, improved food conversion efficiency, resistance to diseases,tolerance to low oxygen concentration etc.

However, the following aspects could be taken care, with regard to application of transgenic fish technology in fish culture:-

- 1) Proper identification of genes for desirable traits to develop aquaculture.
- 2) Development of targeted gene-transfer technologies.
- 3) Proper identification of suitable promoters to direct the expression of transgenes at optimal levels during the desired development stages.
- 4) Assessment of safety of the transgenic fish against environmental impacts.

Thus, it is suggested that since, India is a developing country and most of the population is suffering from protein malnutrition so to overcome this serious problem, "Prawn fisheries" and "Crab-fisheries" will be the alternative; which shall provide most palatable dishes to use.

REFERENCES:

- 1) Agarwal, S.K. (1983). Water quality of sewage drain entering Chambal river at Kota Acta. Ecol, 5: 26-29
- 2) Allen, W. E (1920). A quantitative and statical study of the plankton of the Son Joaguin river and Tributaries in and near Stockton California in 1913, Pub li Zool. 22: 1-297.
- 3) Bhatt, S.D., and Pathak, J.K, (1992). Assessment of water quality and aspects of pollution in a stretch river Gomti (Kumaum) lesser Himalaya. J. Environ. Biol 13 (2): 113-120.
- 4) Blum, J.L (1956). The ecology of river algae. Bot. Rev. 22 (5): 291-341.
- 5) Butcher, R.W (1947). Studies in the ecology of rivers and the algae of organically enriched waters, v11j. Ecol. 35: 186-191.
- 6) Chauhan Anil (1991). Effects of distillery effluents on river Wainganga. Indian. J. Environ. Hith. 33(2): 203-207.
- 7) Chopra, A.K; Madhwal, B.P. and Singh. H.R (1990). Abiotic variables and primary productivity of river Yamuna at Naugoan Uttarkashi, Garhwal (1990). Indian J. Ecol. 17(1): 61-64.
- 8) Das H.B, Kalita H., Saikial B., Borahk., Kunnar S.B (1992). Physico-chemical characteristics of Brahmaputra water at Tezpur. Poln. Res. 11 (3): 169-172.
- 9) Das, S.M and Srivastava V.K (1959). Qualitative studies on fresh water plankton 111 qualitative composition and seasonal fluctuations. Sci. (India) 29: 174-189.
- 10) Datar, M.O and Vashista R.P. (1992). Physico-chemical aspects of pollution in river Betwa. Indian J. Environ. Prot. 12 (8): 577-580.
- 11) Fritsch, F.E (1950). Observation on phytoplankton of the river Tames Ann. Bot. 17: 631-647.
- 12) Ghosh, M (1991). A note on Crabs as pests of rice. Proc. 3rd Ent. Meet. Pusa. vol-2, pp. 680-687.
- 13) Ghousuddin, M. (1934). Notes on the algal flora of river Moosi Hyderabad, Deccan J. Osm. Univ. 1-3.
- 14) Govindan and Sudershan (1979). Seasonal succession of algal flora in polluted region of Adyar river. Indian J. Environ. Hith. 21 (2) : 131-142.
- 15) Holmes, N.T.H. and Whitton, B.A (1981). Phytoplankton of 4 rivers, The Tyne, Wear, Tees and Swale, Hydrobiologia. 80: 111-127.
- 16) Hussain A ; Al- Saadt (1996). Algal Ecology and Composition in the Garmet 124-127. Ali river in Iraq. Regulated Rivers. Research and management 12: 27-38.
- 17) Iyengar, M.O.P and Venkataraman G. (1951). The ecology and seasonal succession of the river Cooum at Madras with special reference to Diatomataceae. J Madras Univ. 21: 140-192.
- 18) Israel Abdul Wahid (1992). Occurrence of heavy metals in Ganga river water and sediments. Indian J. Environ. Hith. 34(1): 63-66.
- 19) Karthe, K.N, Rao, K.S. (1992). Environment studies of the Gandhi Sagar reservoir. Fishery Techno 29(1): 14-20.
- 20) Klien, L. (1957). Aspects of river pollution Butterworth Scientific Publication London.
- 21) Lackey, J.B and Hupp, E.R (1956). Plankton population in Indians white river. J. Amer Water works Assn. 48: 1024-1036.
- 22) Lakshminarayan, J.S (1965-b). Studies on Phytoplankton of river Ganha, Varanasi Part-4 Phytoplankton in relation to fish pollution. Hydrobiologia 25: 171-175.
- 23) Mahajan, K.K. (1988). Deteriorating nations rivers In: 'Ecology and pollution of Indian rivers' (R.K Trivedy et.al.) pp. 1-38.
- 24) Mishra, A.K (1982). Chemical Characteristics of surface water at a selected gauging station in the river Godavari Krishna and Tungabhadra Ind. J. Environ. Hith. 24: 165-179.
- 25) Mishra, S.R and Saksena, D.N. (1992). "Aquatic ecology" Ashish publishing House, New Delhi-110026.
- 26) Mittal. Sharad, Sengar, R.M.S. (1990). Studies on the assessment of water pollution in Karwan river poll. Res. 9: 1-94.
- 27) Nandan, S.N and Patel, R. (1984). Ecological studies on algal flora of Vishwamitri river Baroda, Gujarat, Indian J.P.I nature 2 (1): 17-22.
- 28) Nandan, S.N and Patel, R.J. (1985). Eutrophication in Vishwamitri river flowing through Baroda city Geobios 2: 60-62.
- 29) Neema, R.S and Lal, B (1995). Pollution studies of river Sone in Madhya Pradesh Proc. Nat. Sem. Poll. Cent. Environ. Manag. 3: 30-44.
- 30) Pandey, B.N., Lal, R.N., Mishra, P.K, (1992). Seasonal rhythm in the Physico-chemical properties of Mahananda river. Kaithar Bihar. Env. Eco. 10(2): 354-357.
- 31) Parkash C. Rawat D.C and Grover P.F (1978). Ecological study of the river Yamuna IAWPC Tech. Annual V: 32-45.
- 32) Patil, M.R and Patil, A.R (1983). Water quality of Ulhas river with respect to copper cadium and mercury Poll. Res. 2: 24-27.

- 33) Patra ,A.K and Nayak, I.D. (1982). Limno-biotic survey of river Mahanadi during winter Geobios New report 1: 20-23.
- 34) Rai, L.C (1978).Logical studies on a large communities of river Ganga at Varanasi Ind.J.Ecol. 5: 1-6.
- 35) Raina, V., Shah, A,R., Ahmed, S.R (1984). Pollution studies on river Jhelum; An assessment of water quality, India .J. Environ. Hlth. 26: 187-201.
- 36) Ray, P and David, A (1996). Effects of industrial wastes and sewage upon the chemical and biological composition and fisheries of the river Ganga at Kanpur (U.P) Environ.Hlth. 8: 307-339.
- 37) Sunder, S. (1988). Monitoring the water quality in a stretch of river Jhelum Kashmir. In: Ecology and pollution of Indian rivers (R.K Trivedy ed.) pp.131-161 Ashish publishing House , New Delhi, India.
- 38) Tiwari, T.N (1989).Pollution of rivers Jhelum in Kashmir: Cluster analysis of its water quality parameters.Indian J.Envi. and Agra 4: 102-110.
- 39) Uni, K.S, Chouhan, A., Varghese M. and Naik, L.P.(1992).Preliminary hydrobiology studies on river Jhelum.Geobios 4: 238-242.
- 40) Vass, K.K., Raina, H.S., Zutshi, O.P and Khan , M.A. (1977). Hydrobiological studies on river Jhelum. Geobios 4: 238-242.
- 41) Verma, S.R., Tyagi, A.K and Dalela, R.C (1978). Physico-chemical and biological characteristic of Kadarbad in Uttar Pradesh Indian J.Environ.Hlth. 20 (1): 1-3.
- 42) Zingde, M.D., Marvekar,P.V.,Sharma, R.V., Desai, B.N (1980). Water quality of the river Damanganga (Gujrat). Indian J.Marine Sci. 9: 94-99.

