

A Taxonomic Comparison of Biological Water Quality of Hindon Canal and Gang Canal

Sapna Saxena¹, Rajpal Tyagi²

¹Assistant Professor, Dept. of Zoology, R.C.C.V Girls College Ghaziabad, C.C.S University, Meerut

²Assistant Professor, Dept. of Chemistry, M.M. College, Modinagar, C.C.S. University, Meerut

Abstract - The present study aims at water quality assessment through biomonitoring of about 13.6 km stretch of Hindon Canal with comparison to Gang Canal. The variation in taxonomical composition is prominent in Canals with respect to various families of benthic macroinvertebrates. Water quality assessment has been done on the basis of Biological Water Quality Criteria (BWQC) developed by Central Pollution Control Board.

Index Terms - Biomonitoring, benthic-macroinvertebrates, bioassessment.

INTRODUCTION

Water is one of the most important and basic natural resources. It is essential for our day to day life. While the total amount of water available in the world is constant and is generally said to be adequate to meet all the demands of mankind, its quality and distribution is uneven and causes problems of scarcity and suitability. One of the important provisions of the Water Act 1974, is to maintain and restore the 'wholesomeness' of our aquatic resources. Canal System now comprises a significant portion of the flowing – water habitat at low elevation and may soon constitute the major lotic habitat as studied in the state of Arizona (Marsh and Minckly, 1982). Suitability of Canal water for drinking and irrigation purposes has been reported for Physico-chemical, biological and bacteriological water quality of Kadatur Canal of River Amaravathi in TamilNadu (Karthikeyani et.al 2002). However, canals are usually lined with cement and concrete do not possess substratum for colonization of benthic-macroinvertebrates. To overcome such problems a method of artificial substratum has been devised specially for cleaner stretches of water bodies such as Gang Canal and Western Yamuna Canal.

MATERIAL AND METHOD

Details of Study area

Hindon canal – Hindon Canal originated from Hindon River at Hindon Barrage 700 meters downstream to G.T road, at Ghaziabad in Uttar Pradesh. Following sampling locations were selected on Hindon Canal joining two rivers i.e river Hindon and river Yamuna. Five number of sampling locations were selected on 13.6 km stretch of Hindon Canal starting from off take point of Hindon Barrage up to Chilla regulator before confluence to river Yamuna at Okhla Barrage. These locations were selected are Hindon Barrage, Indirapuram, Kondli, Vasundhara, Chilla and Okhala Barrage. The sampling was carried out during year 2006 -2007. The hydrological parameters for water quality assessment of Hindon Canal were measured in the field such as depth, width, flow velocity, type of water body, substratum composition, air and water temperature, pH and dissolved Oxygen and bioassessment of benthic macroinvertebrates. Other Physico-chemical Parameters were analyzed in the water laboratory of Central Pollution Control Board. The genus level identification of benthic-macroinvertebrates was carried out for preserved samples in CPCB's Bio-laboratory. Macrophytic vegetation in the water were uprooted, washed and the animals were collected. Biological Water Quality of Hindon Canal showed moderate pollution (class 'C') with a complete absence of Ephemeroptera, Placoptera and Trichoptera group. Low dissolved Oxygen levels in Hindon Canal affected the survival of sensitive group of Ephemeroptera, Placoptera and Trichoptera (Gaufin, 1971).

Gang canal – The Gang Canal which is basically used for irrigation purposes, originates from River Ganga at downstream of Haridwar in the Rishikesh District of Uttarakhand. The Canal passes through agricultural

and urbanized areas of Roorkee, Muzaffarnagar, Meerut and Ghaziabad. Bio monitoring of water quality of Gang Canal was carried out through artificial substratum located at raw water intake of Gang Canal, Canal at Bhagirathi Water Treatment Plant at Gokulpuri (figure -1). Majority of taxa were dominated by Ephemeroptera and Odonata. Prosopistomatidae, Caenidae and appearance of Siphonuridae were common families of Ephemeroptera in Gang Canal. Perlida family of Placoptera and Hydropsychidae family of Trichoptera was commonly observed in Gang canal.

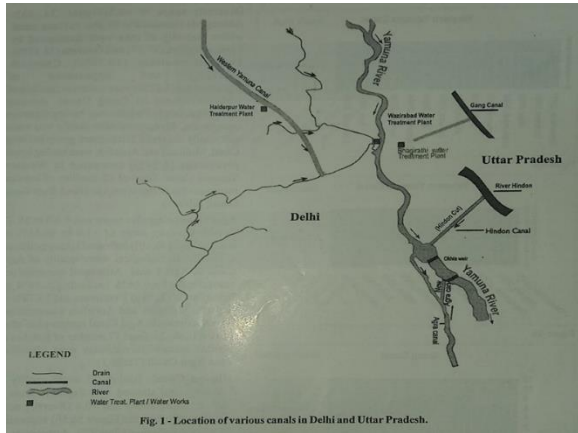


Fig – 1 Location of Hindon Canal and Gang Canal
Taxonomical data of Gang Canal was collected from biomonitoring laboratory of central pollution control board, Delhi. The biological water quality evaluation of both the canals was done by using biological water quality criteria developed by CPCB.

Table -1 Average Biological Water Quality of Canals

S.No.	Score	Average biological scores of canals	
		Hindon canal	Gang canal
1	Saprobic score	3.89	7.06
2	Diversity score	0.48	0.55
3	Biological Water Quality Class (BWQC)	Moderate pollution ('C')	Clean ('A')
4	Indicator Colour	Green	Blue

Table – 2 Taxonomic Composition of Benthic macro-invertebrates in canals.

S. No	Name of canal	% Taxonomic Composition			
		Arthropoda	Mollusca	Annelida	Platyhelminthes
1	Hindon canal	72.08	16.29	11.60	0.0
2	Gang canal	90.92	4.55	4.54	0.0

RESULT AND DISCUSSION

Result of the study support that the use of benthic macro- invertebrates as indicators in the waters body is an effective methodology for the assessment of water.

Biological establishment of benthic macro-invertebrates in rivers and canals determined the ecological change due alteration in substratum and hydrology of rivers. Due to provision of an artificial substratum as an experimental tool in clean water bodies of Gang Canal, Western Yamuna Canal at raw water intake for drinking water supply of Delhi (Sharma et.al.,2003), it was possible to collect biological establishment for water quality assessment. Normally percent biological Composition of invertebrates in surface water bodies follows a decreasing sequence of Arthropoda<Molluscan<Annelida<Platyhelminthes.

ACKNOWLEDGEMENT

The author is thankful to the central Pollution Control Board and Principal (MMH college) for providing laboratory facilities and guidance for the study.

REFERENCES

- [1] Sharma H R, Trivedi R C, Akolkar P and Gupta A (2003) Micro-Pollutants levels in Macro-invertebrates collected from drinking water sources of Delhi, India. Int. J. Environmental Studies 60,99-110.
- [2] Marsh PC and Minckly W L (1982) Fishes of the Phoenix Metropolitan area in Central Arizona. N. Am. J. Fish Manage. 4, 395-402.
- [3] Karthikeyani T P, Sashikumar J M and Ramesh M(2002) Physico-chemical, Biological and

Bacteriological study of Kadathur Canal water of Amaravathi River, TamilNadu. Poll Results. 21, 21-23

- [4] Gaufin A R (1971) studies on the tolerance of aquatic insects to low oxygen concentration. In: Book on River Ecology and Man. (eds.Ray T. Oglesby Clarence A.Carlson and James A McCann) Academic press.
- [5] Saxena Sapna, Pratima Akolkar, and H.S.Bhamrah, (2007): A Comparative Taxonomic Composition of biological water quality of canals.J.Exp.Zool.India Vol.11, No.2, pp. 433-438.
- [6] Tyagi Prasm, M.P.Arora, Pratima Akolkar, Rajpal Tyagi, and Amrit Arora,(2006): Occurrence of benthic macro-invertebrates families encountered in River Hindon in Uttar Pradesh (India) J.Exp.Zool. India Vol.9, No.1, pp 209-216.
- [7] LATS/13/1998-99: Application of artificial substratum for bio- assessment of water bodies. Central Pollution Control Board Delhi.