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Analysis of Correlation-Coefficient Between Water Temperature and Macroinvertebrates of Kishanpura Lake

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Abstract:
Kishanpura Lake, Indore (M.P.) is a shallow tropical lake. This lake is 22 km away from Indore. It is located in the West-South direction near ChhotaBetma, village on Indore – Dhar road. Littoral zone along the shoreline of the lake is rich in biodiversity of macroinvertebrates and fishes, that's why population dynamics were made between macroinvertebrates. Its basin has shrubs on two sides while on other two sides there is open agricultural land.

Keywords: Macroinvertebrates, physico-chemical parameter, correlation - coefficient

I. INTRODUCTION:

The biological components of fresh water depend on its physico-chemical properties. Correlation analysis is concerned with relationship between two variables. Modern hydrobiology came into its proper shape in the 19th century. Welch (1935) defined limnology as a branch of science, which deals with biological productivity of inland water. According to Odum (1971) a study of fresh water habitat with special reference to its physico-chemical, geological and biological characteristics is termed as limnology. Wetzel (1975) considered limnology is the study of functional relationship and productivity of freshwater biotic environmental parameters.The science of limnology in India was worked by Ganapati (1941), who made the physico-chemical investigations in the ponds of Madras.The studies on benthic communities of shallow tropical lakes of India are reported by several authors (Shrivastava, 1956, 1957; Krishnamurthy, 1966; Michael 1968; Mandal&Moitra, 1975; Pahwa, 1979; Oommachan&Belsare, 1985; Malhotra et.al. 1990; Jaiswal& Singh, 1994; Sharma et.al 2007) reported energy content of macro-invertebrates and their seasonal changes in Indian sub-tropical lake water body, which explains rich biodiversity of the region. The macroinvertebrates of a lake is not a harmonious unit, clearly defined by morphometric or functional considerations. To some, the fauna of a Reservoir includes both a literal and a benthic fauna, as though the bottom dwelling organisms along the shore were distinct from the spatially identified sublittoral and profundal regions.

II. METHODOLOGY

Physico-chemcial analysis was carried out as per methods given in Welch (1953), Golterman (1978), A.P.H.A. (1998). Regular collections of water were made in the first week of every month between 7:00 to 9:00 A.M. from each station. The lake water was collected in a sterilized Pyrex flask and brought to the laboratory for chemical analysis.After preliminary survey of the Kishanpura Lake for the benthic biodiversity and nature of bottom. Four sampling stations were selected for the study, on shore line of the lake. Monthly sampling of all these stations were made (May 2006 – April 2008). A rod net was used in collecting hand sample and sieving them for isolation. The bigger animal species where picked up by hand where as the smaller form was isolated by sugar floatation method and studied under low power (x50) microscope. They were preserved by narcotizing them by Methanol and Chloral hydrate and late 70% Alcohol. The benthic organisms were identified with the help of Tonapi (1984), Pennak (1989). APHA (1998) Standard books.Establishment of co-relation co-efficient between physico-chemical and biological parameters by > APHA (1998), Welch (2002).In order to derive the correlationship between physico-chemcial and biological variables, coefficient of correlation values with degree of significance were computed as per Karl Pearson formula.

III. RESULT AND DISCUSSION:

Benthic macro invertebrates are the best indicators of bio-assessment of water quality. The abiotic environment of the water body directly affect the distribution, population density and diversity of the macro benthic community.

Analysis of correlation-coefficient between water temperature and macroinvertebrates of kishanpura Lake 2006-07

WATER TEMPERATURE

1. Water temperature with Oligochaeta: Moderate positive correlation (0.5089) shows that increase in water temperature. leads to significant increase in the Oligochaeta.
2. Water temperature with hirudinea: Low order negative correlation (-0.0388) shows that increase in water temperature. leads to very small decrease in hirudinea or else both variables are independent.

3. Water temperature with gastropoda: Low order negative correlation (-0.0045) shows that increase in water temperature. leads to very small decrease in gastropoda or else both variables are independent.
4. Water temperature with pelecypoda :- Low order negative correlation (-0.2096) shows that increase in water temperature leads to very small decrease in pelecypoda or else both variables are independent.
5. Water temperature with insect: - Moderate negative correlation (-0.5037) shows that increase in water temperature. leads to significant decrease in the insecta.
6. Water temperature with shrimps: - Low order negative correlation (-0.3396) shows that increase in water temperature. leads to very small decrease in transparency or else both variables are independent.
7. Water temperature with misc.:- Low order positive correlation (0.0038) shows that increase in water temperature. leads to very small decrease in transparency or else both variables are independent.

Analysis of correlation coefficient between water temperature and macroinvertebrates of kishanpura lake 2007-08

WATER TEMPERATURE

1. Water temperature with Oligochaeta :- Moderate positive correlation (0.5498) shows that increase in water temperature leads to significant increase in the Oligochaeta
2. Water temperature with hirudinea:- Low order negative correlation (- 0.0792) shows that increase in water temperature leads to very small decrease in hirudinea or else both variables are independent.
3. Water temperature with gastropoda:- moderate positive correlation (0.5732) shows that increase in water temperature leads to significant increase in gastropoda .
4. Water temperature with pelecypoda :- Low order positive correlation (0.00961) shows that increase in water temperature leads to very small decrease in pelecypoda or else both variables are independent.
5. Water temperature with insecta :- Moderate positive correlation (0.7179) shows that increase in water temperature leads to significant increase in the insecta.
6. Water temperature with shrimps :- Low order negative correlation (-0.2143) shows that increase in water temperature leads to very small decrease in t shrimps.

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V. CONCLUSION

The bottom fauna of this lake is qualitatively diversified and rich.In general, the water temperature varied from 25^0 c to 35^0 c. The minimum temperature 25^0c & the maximum temperature 35^0c were recorded during the study period.When correlation coefficient is applied mathematically it is known as statistical analysis and when correlation coefficient applied with living organism it is called biostatistical analysis.

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