International Journal of Fauna and Biological Studies
Available online at www.faunajournal.com

International Journal of Fauna And Biological Studies

ISSN 2347-2677
www.faunajournal.com
IJFBS 2015; 2(1): 62-64
Received: 24-11-2014
Accepted: 28-12-2014

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Effect of sediment and aquatic ecosystem on fisheries of Mithilanchal

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DOI: https://doi.org/10.22271/23940522.2015.v2.i1a.758

Abstract
Sediments play on important role in maintaining the productivity of water body, has ability to store the nutrients and release them into water through different mechanisms under different conditions and maintain aquatic ecosystem. The elevate level of sodimentation and turbidity can reduce the productivity of aquatic system both these correlated factors have the potential to decrease primary productivity that may have consequence to secondary productivity and the energy low to higher topic levels. Guidelines that rely on the volumetric determination of "settleable solids" are not endorsed or use because of the difficulty of obtaining a meaningful and generally applicable relationship between this variable and suspended solids Guidelines that rely on gravimetric determination of suspended sediments concentration are recommended for use over those that rely solely on turbidity. However if the relationship is known between these variables, then turbidity may be used as a surrogate or suspended sediment. The use of guidelines that incorporate the duration of exposure to sediments provide useful analytical information or predictive purposes but caution is warranted when attempting to predict the effects of low (d" tens of mgl") levels of sediment over protected period of time. It is concluded that elevated levels of sediment may be harmful to fish and in addition negatively impact on their habitat.

Keywords: Sediments, aquatic ecosystem, fisheries, Mithilanchal

Introduction

Mithilanchal is rich in several diverse inland water resources including several ponds, tanks, chaurs, rivers and other reservoirs. The sediments act as the store house of the nutrients in aquatic ecosystems. Their nutrients are utilized for the production of biomass in the ponds. The replenishment of these nutrients during need and their consequent removal for biogeochemical cycles in the pond ecosystem. The productivity of a pond depends upon the quality of soil as it controls pond bottom stability ph of overlaying water and concentration of plant nutrients necessary for growth of phytoplankton. Sediments of water bodies are supposed to be a kind of memory of natural and anthropogenic processes affecting these water additionally, sediments are important for cycling of nutrients including nitrogen, phospherus and carbon within an aquatic ecosystem, while the elevated levels of sediment may be harmful to fish i.e actually lethal, or elicit sub lethal responses that could compromise their well being and jeopardize survival. The biodiversity of ponds ecosystem is currently threatened by a number of anthropogenic disturbances including well known problems such as eutrophication, acidification and contamination from metals and organic chlorides. It will create a major imbalance in parameters like the ranges of temperature, pH, BOD, COD, Alkalinity, nitrates, organic carbon and free carbon dioxide. These also causes altered sedimentation. The elevated sedimentation and deficiency of water quality will reduce the fisheries potential in Mithilanchal.

Material and Methods

The increasing level of organic waste and toxic compounds in aquaculture causes due to elevate sedimentation that disturbs aquatic ecosystem and decrease the potential and growth of fisheries. The study was done for one year five samples were selected randomly integrating the whole water body. Sediments samples were collected thrice a day i e at morning, mid day and at evening time. The samples were air dried and pulverized to fine size and sieved through a standard test sieve (15 No. 405, pore size 0.425mm). Well dried and seived soil samples were stored in polythene bags foe estimation of pH, Organic carbon, available nitrogen, available phosphorus, sediment exchangeable potassium in the laboratory. The sediment PH was determined by method described by tan (1996) sediment organic carbon was determined by Elwakeela and Riley (1957) sediment available nitrogen was estimated through titrimetrc method described by subbaiah and Asija (1956). Available sediment phosphorus was estimated spectro photometrically following the method of Bray and Kurt (1945) [7]. Sediment exchangeable potassium was determined by flame photometric method as described by Jackson (1958) [13] water quality parameters like temperature, PH dissolved oxygen, secchi depth total solids and total alkalinity total alkalinity, carbonates, bicarbonates, total hardness, calcium and magnesium hardness, chloride, phosphate, sulphate and nitrate were investigated during the study period. The mean value of sediment pH was 6.80 + 0.25 in January and 7.09 + 0.05 in December. The sediment organic carbon values sevealed that the minimum value was 0.93 + 0.0704. In April and maximum value was 1.67 + 0.064% in November. The range of variation was 0.74. The average available nitrogen of sediment was observed to be toward lower side the minimum nitrogen was recorded as 14.15 + 0.265 mg/100g during November and maximum was observed 21.18 + 0.904 mg/100g during March. The sediment exchangeable potassium was minimum as 8.20 + 0.07 mg/100g during September.

Table 1: Sediment Parameters

Months	PH	Organic carbon	Available nitrogen	Available phosphorus	Exchangeable potassium
JAN	6.79+0.250	1.26+0.056	19.05+0.262	4.92+0.100	8.74+0.107
FEB	7.01+0.044	1.06+0.046	18.58+0.294	5.21+0.104	8.94+0.057
MAR	6.96+0.104	1.08+0.045	21.17+0.903	4.96+0.105	9.20+0.051
APR	7.02+0.048	0.92+0.069	20.19+0.309	5.28+0.110	9.39+0326
May	6.92+0.069	1.08+0.077	18.67+0.542	5.76+0.99	9.79+0.203
JUNE	7.06+0.029	1.18+0.074	18.47+0.512	6.12+0.131	10.02+0.105
JULY	7.04+0.044	17.59+0.498	6.32+0.410	6.33+0.410	10.10+0.039
AUG	7.00+0.019	0.94+0.051	16.25+0.314	6.78+0.477	9.82+0.149
SEPT	7.02+0.124	1.01+0.034	15.35+0.640	7.03+0.094	9.94+0.094
OCT	7.07+0.039	0.96+0.043	15.74+0.264	7.00+0.123	9.94+0.094
NOV	7.01+0.022	1.66+0.063	14.14+0.264	6.10+0.140	8.66+0.119
DEC	7.08+0.049	1.08+0.029	16.35+1.102	5.83+0.121	8.013+0.141

Recommendations

The sediment pH is controlled by many environmental parameters and undergoes fluctuation depending upon the nature of the soil. The ph range concludes the aquatic body to be suitable for fish culture. A significant inverse relationship is noticed in between the pH and organic carbon of sediment The organic carbon fluctuation was mainly mainly due to the quantity of macrophyte present and their magnitude of decomposition (Sugunan and Bhatta chariya 2000) sediment available nitrogen status represent the easily oxidisable form of total nitrogen in the soil and largely the organic carbon content of soil influences its level (sugunan and Bhattacharya 2000) Nitrogen controls the quantity of overlaying waters in an aquatic system and is the critical limiting factors to algal growth and eutrophication among aquatic biota. The extent of decomposition of organic matter is reflected in the amount of NH3 present in the water and soil. The increase level of nitrogen content is related with the increased organic matter in the soil. Phosphorus content is influenced by sediment often play an important role in the uptake, storage and release of dissolved inorganic phosphorus in aquatic system. Lower value of exchangeable potassium were observed. The distribution of exchangeable potassium showed a correlated fluctuation with that of available nitrogen and available phosphorus.

Conclusion

The Non-organic pollution of the water body was used for the recreational purposes so utmest care should be taken to restrict the anthropogenic pollutants to water body. The excessive growth of weeds has reduced the nutrients, phosphate in particular. The shallow depth and low turbidity allow the light to have access up to the bottom which promotes macrophytic growth further and thus enrich the detritus pool continuously. The succession of weeds is an indicator of extreme eutrophication and a factor pointing towards unconductive ecological regime for fisheries department. The fisheries development has to be centred around the utilization of control of macrophyte to achieve the goal of sustainability.

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