IMPACT OF POULTRY AND AQUACULTURE POLLUTION ON THE WATER QUALITY OF VALLIVATTOM WETLAND, THRISSUR DISTRICT, KERALA

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The assessment of the impact of poultry and aquaculture pollution on the waterquality was done for the period of four months from March to June 2012 at Vallivattom village of Vellangallurgramapanchayath in Thrissur district, Kerala.The analysis of physico-chemical parameters indicates that the water quality of wetland near the poultry farm and the prawn culture fieldshowed comparatively higher values. Thirty two phytoplankton genera under five taxonomic classes were identified during the period of study,of which eighteen were pollution indicators. The wetland near the poultry farm has the higher number of phytoplankton (organisms/litre). Naviculaand Oscillatoria were abundant in this area. Euglena was observed in both the wetlands near the poultry farm and the prawn culture field.Thirteen plant species under eleven families were identified from the study area, which includes three true mangroves namely Acanthus ilicifoliusL., AvicenniaofficinalisL. and RhizophoramucronataPoir.The present study revealed that the quality of water was deteriorated in the wetland near the poultry farm and the prawn culture field. The addition of poultry wastes stimulated the luxuriant growth of algae in water and the algal blooms reduced the oxygen content in the water.

Keywords: Wetland, Phytoplankton, Mangroves, Mangrove associates, Water pollution

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Wetlands are seasonally or permanently water-logged habitats, with stagnant or flowing fresh or saline water. Aquaticmacrophytes are inhabiting various sections of aquatic ecosystems and are of considerable importance for the productivity of the water bodies. They play an important role in providing food to fish and other aquatic animals and also play an important role in cycling of nutrients in the aquatic ecosystem (Trivediet al., 1998).Pollution of any form first affects the chemical quality of the water and then destroys the community, disrupting the delicate food web in these aquatic ecosystems (Ramachandra&Ahalya, 2001). The present study analyzes the impacts of a poultry farm and the prawn culturing fieldon the environment.

Materials and Methods

The present study was conducted at three sites in Vallivattom village of Vellangallur gramapanchayath in Thrissur district, Kerala (Figure 1). The western boundary of the wetland is defined by the Poovathumkadavu Canal, also called Canoli Canal and the eastern by the Thrissur - Kodungallur road.

Site 1 (S1) - Wetland near the poultry farm: The site is situated about 13 kms from Irinjalakuda and this area lies at10016.832' North latitude and 76011.610' East longitude.

Site 2 (S2) - Wetland area at Vallivattom village: The site is situated 300meters away from the poultry farm and 500 meters away from the prawn culturing field. This area lies at10016.845' North latitude and 76011.55' East longitude.

Site 3 (S3) - Wetland near the prawn culture field: The site was the "cheminkettu", an artificial prawn culturing field and is 750 meters away from the poultry farm. This area lies at10016.693' North latitude and 76011.318' East longitude.

The surface water samples were collected monthly from the sites selected during March to June, 2012 between 8 to 10 a.m.The water quality parameters were analyzed using standard methods (APHA, 1998) and the parameters analyzed were temperature,turbidity,conductivity, pH, total

dissolved solids (TDS), dissolved oxygen (DO), biochemical oxygen demand (BOD), free CO2, total hardness, calcium hardness, magnesium hardness andsalinity.

The algal samples were preserved in 4% formalin solution and the abundance of phytoplankton was estimated by the Sedgwick Rafter (S-R) cell method(APHA, 1998). The algae were identified with the help of standard publications (Desikachary, 1959; Philipose, 1967; Prescott, 1982; Sarode&Kamat, 1984). The plants in the study area wereidentified with the help of Gamble & Fischer (1935)and Manilal&Sivarajan (1982).

Results and Discussion

The water samples wereanalyzed and the values obtained are given in Table 1. The changes due to environmental factors have substantial effects on the phytoplankton species composition and biomass, potentially favouring the growth of phytoplankton species (APHA, 1998).During the present study 32 algal genera were identified, that belongs to 5 taxonomic groups, of which 18 were pollution indicators (Palmer, 1969). Seven genera come under Cyanophyceae or blue green algae, ten genera come under Bacillariophyceae or Diatoms, twelveunder green algae or Chlorophyceae (including five desmids), twounderEuglenophyceae and one underChrysophyceae (Table 2).

The total values of phytoplankton reveals that the class Bacillariophyceae (Diatoms) was the dominant group of algae found in all the three sites during the period of study (Table 3). Navicula, Nitzschia, Pinnularia, PleurosigmaandSynedra were found abundantly in the area under study. The class Chlorophyceae was the second dominant group at site III and the Cyanophyceae was the second dominant group at site I and site II.

The analysis of total number of phytoplankton in the study area shows that the site I was showing the highest number of phytoplankton compared to other two sites. The monthly fluctuations of the total phytoplankton (organisms/L) in the study area were presented in the Figure 2. The site I showed very high number of phytoplankton andwas more polluted than other two sites studied.This site is near a poultry farm and the water was polluted due to the poultry farm wastes into the wetland. The site II and III also showed significant deterioration of the water quality.The total phytoplankton showed positive correlation with TDS, total hardness and calcium hardness at site 2.

During the period of study three true mangroves were observed namely Acanthus ilicifoliusL., AvicenniaofficinalisL. and RhizophoramucronataPoir. Hygrophilaerecta. Vahl., Clerodendruminerme (Linn) GaernFruct., Derris uliginosa (Roxb.) Benth., Acrostichumaureum L., Mariscusjavanicus(Houtt.) Merr. and Metcalfe. and Sphaeranthusindicus L. were the mangrove associates recorded from the study area during the period of study. Ceratopterissiliquosa (L.) Copeland, Fimbristylisumbellaris(Lam.) Vahl.,Ipomoea bilobaForssk., and NymphaeastellataWilld. were also found in the study area.

Summary and Conclusion

The physical and chemical characteristics of water bodies affect the abundance and species composition of aquatic organisms.The present water quality studies of the area revealed that the quality of water was deteriorated. The addition of poultry wastes stimulated luxuriant growth of algae in water and the algal blooms reduced the oxygen content in the water. It is concluded from the present study that the poultry wastes into the wetland caused adverse impact on the quality of water and the wetland in Vallivattom Grama Panchayath in MukundapuramTaluk, Thrissur district, Kerala.

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