Diatoms reveal freshwater pollution

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Bijaya Kumar Padhi, Jnanendra Rath, and Pratap Kumar Padhy of the Visva-Bharati University, in Santiniketan, India, have looked at the ecological responses of diatoms to pollution and nutrient enrichment, caused by domestic and municipal sewage, in five freshwater ponds. Absent diatom species were present in some heavily polluted lakes, while raised levels of nutrients boost numbers of other species. They suggest that a Biological Index for Diatoms could be used as a simple biological method for monitoring water quality that avoids the need for sophisticated chemical analysis.

Rapid urbanization and economic development have resulted in unfavorable changes in the hydrology and ecology of freshwater systems, which are felt most acutely in the developing world. The researchers explain that the remediation and protection of freshwater ecosystems is increasingly important but water quality management requires reliable long-term data on water quality and how remediation work affects the water. Moreover, information about natural, baseline, conditions in undisturbed ponds, lakes and rivers is needed against which polluted bodies of water undergoing remediation might be gauged.

Natural changes in environmental conditions, such as flow rate, water temperature, dissolved oxygen, and food resources exert direct control on the population dynamics of aquatic organisms, which gives rise to characteristic biological communities within different ecosystems. However, pollution and other human activities also disturb these community profiles significantly and so can provide such a measure.

Diatoms are important contributors to the primary production in aquatic ecosystems, sitting at the bottom of the food chain. They are eukaryotic algae, commonly unicellular, although they do exist as filamentous colonies and are good indicators of the environmental integrity, the researchers explain. They have several advantages over other indicators, the team adds.

First, they are readily dispersed and can invade a variety of habitats. They are relatively easy to sample and such sampling has negligible impact on the ecosystem during collection. Their "response" time to variation in environmental conditions lies between bacteria (change hourly) and bigger invertebrates (change over the course of months). Finally, diatoms are sensitive to very subtle changes in environmental conditions and/or disturbances that may not visibly affect other communities, or may only affect other communities at greater levels of disturbance.

The team's evaluation of diatom monitoring of five freshwater bodies was consistent with more conventional physical and chemical determinations carried out in parallel. Diatoms usually grow better in unpolluted ponds and streams and this preliminary investigation suggests that they could be useful for biological

monitoring of pollution levels and ecosystem integrity in the short and potentially in the long-term once seasonal studies confirm the preliminary results.

SOURCE [1]

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