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Research Article

Analysis of Pollution Status of Wetland Areas using Various Species Diversity Index

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Abstract: India has large coastal wetlands which cover an area of over 40,230 km^2. Among various types of marine ecosystems, tidal mudflats, mangroves, estuaries, lagoons, beaches, marshes, vegetated wetlands and coral reefs have a major share. The double threats of development and overexploitation of the coastal and marine resources have led to severe development pressures along the coastal areas world over. This has resulted in substantial loss to coastal wetlands, mangroves, forests, seagrass beds, coral reefs, biodiversity and increased coastal erosion and so on. Researchers globally are analyzing the species diversity of the wetlands to determine its pollution status. They are utilizing various species diversity indexes such as Shannon - Weiner, Margalef and Goodnight. Scientist like Staub and You Jia have given a table where they have correlated the index value with pollution and so these tables can be utilized to exactly determine the pollution status of any wetland area rather than just assumptive conclusion.
Keywords: Margalef biodiversity index, Shannon – wiener index, Benthos, Goodnight biodiversity index, Phytoplankton, Zooplankton.

INTRODUCTION

India possess a coastline of about 8000 km with a exclusive economic zone of about 2.02 million km^2 adjoining the continental regions and the offshore islands. India also has a very wide range of coastal ecosystems such as estuaries, lagoons, mangroves, backwaters, salt marshes, rocky coasts, sand stretches and coral reefs which contains unique biotic and abiotic factors [1].

India has large coastal wetlands which cover an area of over 40,230 km^2. Among various types of marine ecosystems, tidal mudflats, mangroves, estuaries, lagoons, beaches, marshes, vegetated wetlands and coral reefs have a major share [2].

Recent globalization of the economy has led to a rapid growth in population in the coastal cities by providing more employment opportunities and energizing the economy for having an infrastructure development. The double threats of development and overexploitation of the coastal and marine resources have led to severe development pressures along the coastal areas world over. This has resulted in substantial loss to coastal wetlands, mangroves, forests, seagrass beds, coral reefs, biodiversity and increased coastal erosion and so on [3].

Many scientist and researcher globally are now using the various species diversity index of any given water body to find out the degree of pollution of that water body because the level of pollution is always equal to the loss of species biodiversity [4].

The most commonly used diversity index is Shannon – wiener diversity index. The Shannon – wiener diversity index can be obtained for any species population such as zooplankton, phytoplankton, benthos etc, which are surviving in the wetland area. Staub et. Al [5]. in 1970 have proposed a different scale of pollution in terms of species diversity index, which is a modified one and states a negative correlation between Shannon's index and pollution.

Table-1: Shannon's index and pollution [6]

Shannon – wiener diversity index	Status of pollution
3 to 4.5	Slight Pollution
2 to 3	Light Pollution
1 to 2	Moderate Pollution
0 to 1	Heavy Pollution

Another most commonly used biodiversity index is Margalef biodiversity index. It is widely used in evaluating the water pollution. It can more objectively reflect the degree of water pollution and its trends. Xumugi in 1996 study expounded the relationship between Margalef Biodiversity index and water pollution.

Table-2: Margalef Biodiversity index and water pollution [4]

Margalef Biodiversity index	Water Pollution
0 – 1	More serious pollution
1 – 2	Serious pollution
2 – 4	Moderate pollution
4 – 6	Light pollution
> 6	Clean water

Similarly there is a Goodnight biodiversity index but specifically for benthos. The water environment is being evaluated with benthos biodiversity.

S = (The number of Oligochaetes / The total No. of benthos) x 100

Table-3:Relationship between pollution dominant species of benthos and water pollution

S	Water Quality
0 - 30	Clean water
30 - 60	Light Pollution
60 - 80	Moderate Pollution
> 80	Serious Pollution

Source [4]

CONCLUSION

Wetlands are the most productive ecosystems. They directly or indirectly support million of people and provide goods and services to them. The direct benefits of wetlands are in the form of fishes, agriculture, fuel wood, recreation and water supply etc. And their indirect benefits arise from functions occurring within the ecosystem such as flood control, ground water recharge and storm protection. Wetlands are areas of land where the water level remains near or above the surface of the ground for most of the year. Today wetlands are under tremendous threats due to urbanization, climate change, introduction of new species, salinization, dumping of sewage and toxic chemicals by industries, construction of canals, dredging etc.

Researchers globally are analyzing the species diversity of the wetlands to determine its pollution status. They are utilizing various species diversity indexes such as Shannon - Weiner, Margalef and Goodnight. Scientist like Staub [5] and You Jia[4] have given a table where they have correlated the index value with pollution and so these tables can be utilized to exactly determine the pollution status of any wetland area rather than just assumptive conclusion.

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