

Effects of catchment land use practices on eutrophication, blooming and sedimentation of the Kandy Lake-A case study using GIS

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Abstract

Kandy lake is a tiny ornamental water body situated in the city of hill country, Kandy Sri Lanka. Land use practices of the catchment area affect the water quality degradation and sedimentation of the lake. A severe algal bloom appeared in the lake in April 1999 and is continuously appearing from time to time indicating sensitivity towards seasonal eutrophication. The objective of the present study is to analyze possible catchments characteristics, which contribute towards eutrophication, sedimentation and algal blooming of the lake using GIS as a tool.

Morphometric features of the lake and catchment area were determined using digitized contour map with the aid of Arc View 3.2 software. The digital elevation model (DEM) of the lake bottom was prepared to get the information on the lake basin. The land use practices of catchment was used to produce the land slope map, which has been used with land use map to generate the soil erosion prone area map and stream network flowing to the lake to find out the suitable location for the nutrient / silt traps.

The results of the study indicated approximately 50% of the catchment area consist of human settlement. Activities of this area mainly affect the lake eutrophication and sedimentation. The suitable locations for silt / nutrient trap created from GIS work overlaps with the existing once. The point sources of pollution in the vicinity of the lake with human settlement greatly affect the eutrophication rather than non point sources. Approximately 70% of the point sources of pollution are located within 100m periphery of the lake.

Enforcement of law and regulations to treat waste water release from point sources of pollution is an urgent need to control nutrient enrichment. The soil erosion prone area map indicate both human settlement area and bare lands influence the lake sedimentation. In high soil erosion potential area any kind of construction or land clearing should not be allowed and an application of soil conservation method should be recommended.

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