THE EFFECT OF LAND BASED POLLUTION SOURCES ON THE CHEMISTRY OF MEX BAY WATER

Saad D. WAHBY and Saad M. EL-GOHARY

Institute of Oceanography and Fisheries, Alexandria (Egypt)

Summary : Emum drain discharges an average of 6 x 10^6 m^3 of water per day into Mex Bay. This is an agricultural deainage water, in addition several big factories discharge their waste water into the bay. This discharged water has a marked effecton the chemistry of Mex bay water, which can be summeris as follows :-

1. Water salinity is lower than pure sea water.
2. Oxygen percentage saturation is below normal.
3. The oxidizable organic matter is higher than that of sea water off Alexandria.
4. Ammonia is much higher than pure sea water.
5. Nitrogenous fertilizers carried by Emun drain water increased the nitrite & nitrate content of Mex bay water.
6. Reactive phosphate is higher in concentration than that found in uncontaminated sea water.
7. High concentration of hydrogen sulphide is met with.
8. The sulphate chlorinity ratio and the bromide chlorinity ratio is lower than normal.
9. The calcium chlorinity ratio is lower than that for pure sea water; also the Magnesium chlorinity ratio.
10. Total iron content is high in Mex bay water, due to the discharge of waste water from factories producing ferrichloride; All these changes in the water chemistry of Mex bay water has important impacts on the 'ertility of the area.

THE ENVIRONMENTAL CAPACITY APPROACH TO THE CONTROL OF MARINE POLLUTION FROM LAND-BASED SOURCES

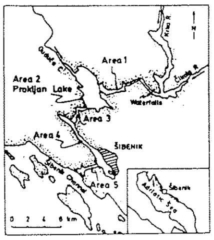
Velimir PRAVDIĆ and Mladen JURAČIĆ

Center for Marine Research, Rudjer Boskovic Institute, Zagreb, Croatia (Yugoslavia)

The strategy based on Environmental (assimilative, receiving, absorptive) Capacity (1, 2) of the marine environment to deal with contaminants is being suggested for use in a sensitive region of the Yugoslav eastern Adriatic, the Krka River estuary. The region comprises a national park, tourist and resort areas, a town of 30,000 inhabitants with alumina and aluminum industries and port facilities, and areas intended for mariculture, recreational boating and fishing. Each single development would possibly conform to such environmental managment principles as uniform emission standards, best available technology, or best practical means available. However, the concentrated development, and land and sea use competition, calls for more comprensive pollution abatement managment strategies.

The example is based on the description of the application of results of research and monitoring activities in the last 5 years (3,4,5). The estuarine region has been subdivided into 5 subareas, of which this example deals with the Prokljan Lake (Fig. 1, subarea 2), a particularly sensitive area, ideal for mariculture but under strong development pressure from the tourist industry, particularly boating and mooring.

The essence of the exercise to estimate the Environmental capacity of the Lake included the following steps: (a) geographical description of the area; (b) identification of the critical target - salmonides in this case; (c) identification and analysis of the critical contaminant-Cu in this case; (d) setting and acceptance of standards of water quality;



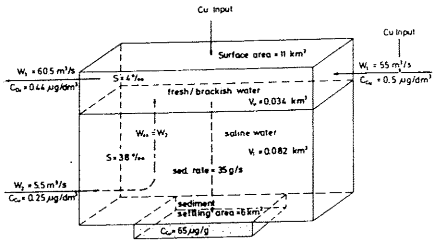


Fig. 1. (left): Map of the area. Numbers indicate subareas.
Fig. 2. (right) : Mass balance and transport model for Cu in the Prokljan Lake.

(d) setting of a mass-balance model for the critical contaminant; and (f) decision making. The follow-up will consist of monitoring and reassessment procedures. The mass balance model is shown in Fig. 2. It is based on the hydrodynamic transport and sedimentation as modes of contaminant transport. It neglects at the present level retention and elimination of the contaminant by biological activity, such as plankton blooms or algal growth. Also, in accepting the maximum allowable concentration of Cu at 0.01 mg/dm^3 no additive or synergistic effects with other contaminants were considered. Interaction with organics was considered only as increasing the mean residence time of Cu in the lake.

The calculation of the capacity is based on the water quality standard for the lower, saline compartment, which receives its contaminant load through sedimentation of suspended matter. Sediments (30 m^2/g; 10 meq/100 g exchange capacity; 40% porosity; 1,6 kg/dm^3 density) at 0.065 mg Cu/g are the ultimate sink for Cu retained in the Lake. On the basis of this simple model and target choice made, the environmental capacity is estimated at 5 kg Cu/day. A managment decision is suggested, that contaminating activities, such as boat mooring and sewage disposal, be limited to 20% of stated capacity, that is 1 kg Cu/day. To translate this figure into operational decision, data are required on the concentration of Cu in urban and industrial sewage and the leach rates of Cu from surfaces of boat bottoms covered with Cu containing antifouling paints.

Monitoring of present activities, of water quality, and of biota will indicate level of precision and the need for reassessment procedures involving both target and contaminant.

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