

EVALUATION OF ALTERNATIVE MEASURES FOR CONTROLLING POLLUTION IN PART OF WEST MORAVA RIVER BASIN

A. Filip and D. Obradović

Energoprojekt Co., Beograd, Yugoslavia

A mathematical model describing the ambient water quality in the West Morava watershed was developed by the program STEKAR. The total length of the West Morava part which was investigated, together with its tributaries Despotovica, Dičina, and Čemernica, is 94 kilometers. There are two major towns in this area: Čačak and Gornji Milanovac. The model was used to evaluate the impact of wastewater loads, both municipal and industrial, from these point sources upon the ambient water quality in the watershed. It was found out that the existing water quality criteria were not met in these rivers during low flow conditions even if a flow increase of 1.0 cm to West Morava was applied. Locations and extent of C-BOD and dissolved oxygen criteria violation were determined for measured pollution loads.

Different alternatives of water quality protection were then formulated and analysed by the model. Each alternative is a set of different wastewater treatment levels for all point sources. The wastewater outflows dislocation was also considered in some cases. The effects of these steps on water quality improvement in the rivers were evaluated. Using the step-by-step procedure, i.e. by increasing the treatment levels, several alternatives have been formulated which lead to a better ambient water quality. The selected alternative was such that the water quality criteria were met everywhere. Even in the river Despotovica the situation was improved.

These simulations have shown that:

- a) Flow augmentation of the West Morava river downstream of Medjuvršje dam, during low flow conditions by 1.0 cm does not provide satisfactory results since the necessary degree of wastewater treatment remains the same, as though no flow augmentation was applied.
- b) Dislocation of wastewater outflows to some point further from Gornji Milanovac are not acceptable because the pollution is shifted to downstream sections.
- c) The necessary degree of wastewater treatment for 1985 and 1990 pollution loads is the same.

To protect the ambient water quality the following wastewater treatment should be applied:

Čačak:

- . Municipal wastewaters: secondary.
- . Industrial wastewaters: physico-chemical.

Gornji Milanovac:

- . Municipal wastewaters: tertiary.
- . Industrial wastewaters: physico-chemical.

Trbušani:

- . Industrial wastewaters: physico-chemical.

Therefore the efficient protection for 1990 could be achieved by increasing the treatment capacity of treatment plants.