DEGRADATION OF WATER QUALTY IN CUIBUL VULTURILOR RESERVOIR AS EFFECT OF SOIL EROSION

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ABSTRACT

Potential surface water resources for Romania are appreciated by ANM Bucharest as follows: the rivers and inland lakes-39.6 milliard m³/year, the Danube river 53.3 milliard m³/year. From these resources, only, 11 milliard m³/year are from reservoirs.
For a period of 14 years, 1992-2006, the Research and Development Center for Soil Erosion Control, Perieni monitored the Cuibul Vulturilor reservoir in order to ensure a part of the water necessary for the population of Bârlad city.
Soil erosion has a great impact on this reservoir through the processes of sedimentation and degradation of the water quality. The degradation of the water quality is caused by the decrease of water depth and by the natural or artificial addition of fertilisers.

RESEARCH METHODS

Sedimentation of this reservoir, at NRL (normal retention level) under the impact of the erosion process, was determined by bathymetric and topographic measurements of cross profiles, in 1992. These profiles are re-make at 3 or 4 years. The cross profiles were spaced off by 200 to 700 m. Along the leght of these profiles bathymetric measurements were made every 30 m on a floating platform mechanically powered.
The dynamics of water quality degradation, as effect of the nutrient losses, was established by monitoring the concentration of nutrients at the entrance points of the Cuibul Vulturilor reservoir (frontal entrance-Tutova river,158 samples; lateral entrance-laura, Roşcani and Cârjăoani rivers, 474 samples and intake area-158 samples).
Water samples were taken manually and with an automatic water sampler (ISCO), during normal dicharge flow and after hydrologic events.
Determinations of nitrogen, phosphorus, and potassium contents have been made according to the Romanian standard.

RESULTS

The obtained results are presented in Figures 1-8

Concentration evolution of analysed elements are shown in Figure 5-8, where multi-year average and standard limits concerning quality of water are presented.

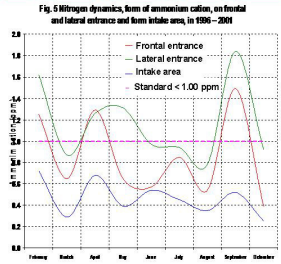


Fig. 5 Nitrogen dynamics, form of ammonium cation, on frontal and lateral entrance and form intake area, in 1996 – 2001

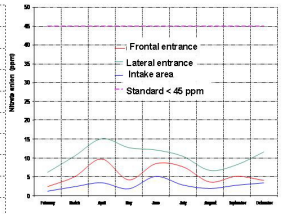


Fig. 6 Nitrogen dynamics, form of nitrate anion, on frontal and lateral entrance and form intake area, in 1996 – 2001

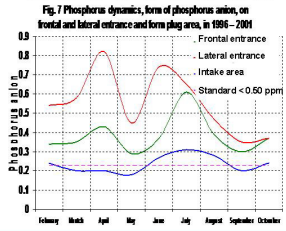


Fig. 7 Phosphorus dynamics, form of phosphorus anion, on frontal and lateral entrance and form plug area, in 1996 – 2001

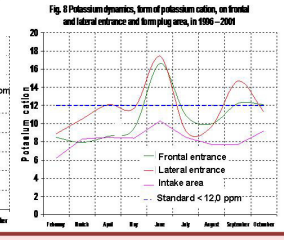
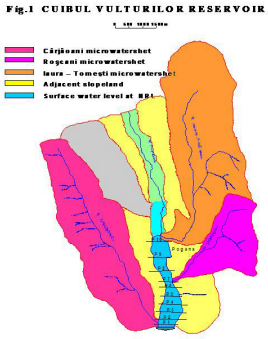
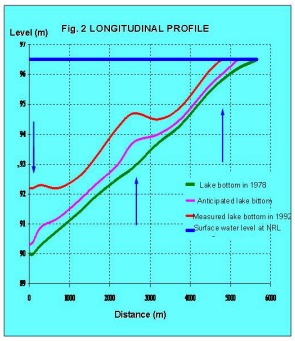
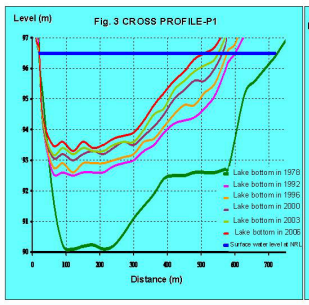
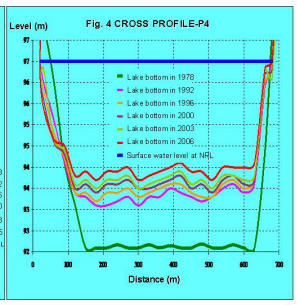


Fig. 8 Potassium dynamics, form of potassium cation, on frontal and lateral entrance and form plug area, in 1996 – 2001









CONLUSIONS

- Due to sedimentation process, a regression of the reservoir length it was observed, decrease being from 5668 m to 4780 m;
- Thickness of sediment deposited along the accumulation and sediments distribution tend to keep the same accumulation kind similar to those occuring in the Barlad hilly plateau;
- The thickness of sediment have maximum values near the dam decreasing through to tail reservoir.
- Concerning the dynamics of water quality:
  - between June-July (coinciding with critical erosion season) the concentrations of elements studied are the highest;
  - the largest accumulation of elements is recorded on the lateral entrance, 2 - 3 times hair than the frontal entrance;
  - due to dilution phenomena of accumulation, the water quality is not affected in the plugs area.

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