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THE REGION OF SEBES-KÖRÖS AND HOLT-SEBES-KÖRÖS AS SAMPLE AREAS OF THE WATER FRAMEWORK DIRECTIVE

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Water is an essential element of life and therefore must be protected and managed. The water policy and main aims in water economy of the European Union is summarized in the Water Framework Directive (WFD), which has operated in Hungary since 2002. WFD concerns to the maintenance and improvements of the freshwater ecosystems. Therefore the protection and long term conservation of the freshwaters and wetlands - in consideration of the water requirements of these lands - is first of the objectives. The competent authority according to the instructions of the WFD in Hungary marked out for reference areas: the area of Sebes-Körös and Holt-Sebes-Körös, because they have special ecological significance therefore the areas are important objects of the conservation. In 1997 then in 2002 the Hungarian authorities made a study of the water state of the territory. The monitoring of the water's conditions is started in 2004 with the examination of the values of ecosystems. The primary aim of my research to the selected reference points of measurement determines the main physical and chemical water parameters and a comparison with the previous measurement data and observe the changes in evolution.

Keywords: Water Framework Directive, physical and chemical parameters of Sebes-Körös and Holt-Sebes-Körös, water classification

Introduction

Water Framework Directive provides the solutions and one of the most significant manifestations of water management [1]. WFD additionally gives clear shoots on how to achieve good ecological conditions till 2015 [2, 3]. It is obviously necessary to know the qualitative and quantitative parameters of the freshwater, to know the ecosystem of the freshwater and wetlands in order to protect the waters and maintenance of good conditions. The competent Hungarian authorities started to examine the exact factors of the balanced ecological systems of the wetlands and the freshwater ecosystems and they according to the instructions of the WDF in Hungary marked out for a reference areas just as Körös. Examination units have been defined in the Water Management Plan. According to this Hungary has been divided into 42 units [4]. Holt-Sebes-Körös and Sebes-Körös is included within category 2–14 [5] *(Fig. 1).*

The region of Körös is found in the south-east border of Hungary (Fig. 1). The Körös that came from the Transylvanian mountains has formed the surface of the area for thousands years. The infilling could not balanced everywhere the sinking of lithosphere, therefore we can find marshlands in a huge territory. The area of the marshlands that is covered by water increased in the years when there was more precipitation and shrank those years that had less precipitation. Those areas that did not have permanent water cover but effected by the change in the level of groundwater went through a salinization process because of the leaching of sodium ions. In addition these days the effects of the human impacts also influence the ecosystem. The biggest environmental change – because of the spread of agriculture – started with the water regulation of the Körös in the 18-19th centuries.

Figure 1: Catchment area of Sebes-Körös and Holt-Sebes-Körös

Materials and methods

My measures started with the help of water specialist. I marked two townships (Okány and Mágor) at part of Holt-Sebes-Körös and three townships (Körösszakál, Komádi, Körösladány) at part of Sebes-Körös *(Fig. 2)*, where I did some important physical, chemical measurements minimum four times per year from 2007.

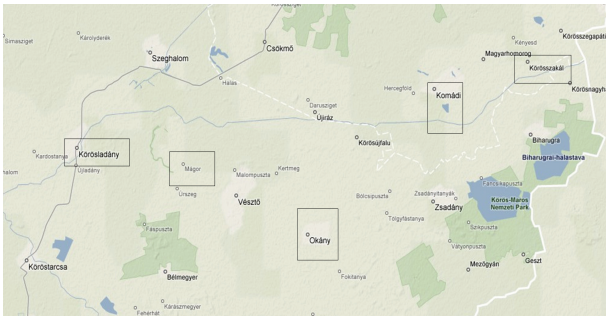

Figure 2: Sampling sites

Calibrated and portable devices were applied to take outside measurements like temperature, pH-value, conductivity.

Alkaline and COD_{ps}; CO_3^{2-}; HCO_3^- were analyzed by titrimetry. The SO_4^{2-}, PO_4^{3-}; NH_4^+; NO_3^-; NO_2^-; Cl^- were analyzed by spectrophotometer. Na^+; K^+; Ca^{2+}; Mg^{2+} concentrations were defined using AAS methods [6].

So far on the base of the results of field and laboratory measurements surface water has been qualified according to MSZ 12749:1993 standards (excellent, good, tolerable, polluted, extremely polluted) [7].

Result and discussion

To describe the physical and chemical parameters of the Sebes-Körös and Holt-Sebes-Körös I did my measures in 2009.

During my work on the characterization of water status of the Water Board and the Körös-Maros National Park Directorate made by experts (in 2004) of the physical and chemical analysis of the results I wanted to use [8, 9, 10]. The classification of the water samples, were based on the physical and chemical parameters defined in the 6/2002. (XI. 5.) Ministry of Environment and Water Regulation.

On-site measurements

Fig. 3 represents clearly the seasonal changeability of temperature. The measurement points are approximately the same temperature.

Along downstream pH-level is between 7.5–9 so the water is defined as smoothly alkaline. The pH of the water flow at higher speed (at Körösszakál, Komádi and Körösladány), more balanced (the year varies only 1-2 decimal places). Mágor and Okány has a pH measurements in April projecting the times *(Fig. 4)*.

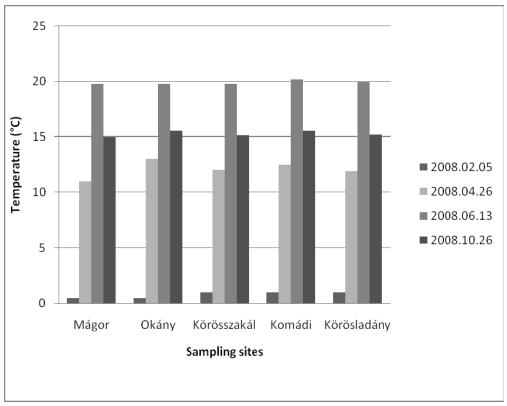

Figure 3: Temperature values in Körös

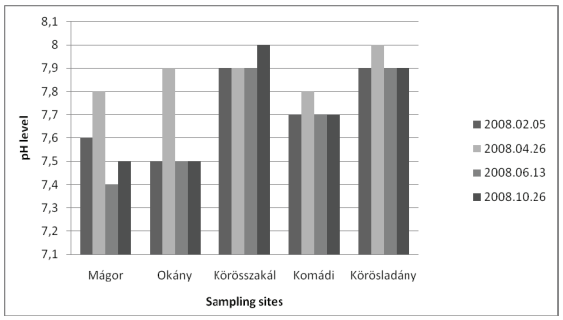

Figure 4: pH-level in Körös

Tendency of conductivity in Körös was also permanent (400–600 µS cm^{-1}). The highest values (1000 µS cm^{-1}) was measured in Mágor. In general, the conductivity is the highest in spring *(Fig. 5)*. The values of conductivity is due to the bed material (salinated).

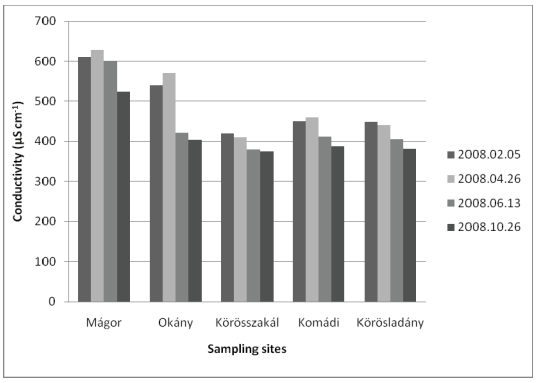

Figure 5: Conductivity in Körös

Laboratory measurements

The nitrate concentration is somewhat higher in winter than in summer, but the difference is striking in Mágor (about three times higher than elsewhere), which indicates probable contamination of the town *(Fig. 6)*.

The nitrate concentration in contrast to the ammonia concentration is higher in summer primarily for the direct pollution (livestock, fertilizer, liquid manure). *Fig. 7* shows the highest concentration values measured in Mágor.

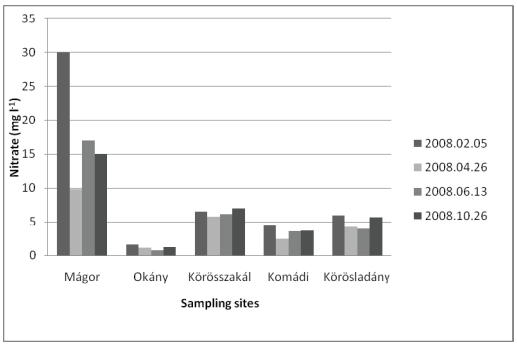

Figure 6: Nitrate concentration in Körös

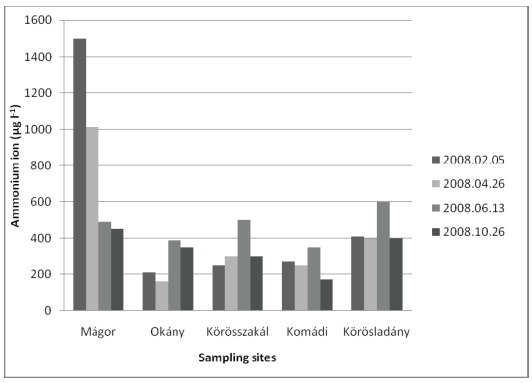

Figure 7: Ammonium ion concentration in Körös

Level of the orthophosphate concentration in Körös was changed always between 150–650 µg l^{-1} *(Fig. 8)*, except for two villages (Körösszakál and Körösladány), where the measured concentration was twice as much because of human fertilizer.

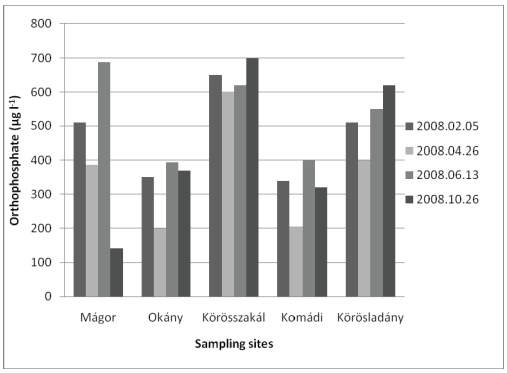

Figure 8: Orthophosphate concentration in Körös

Results of the measured 8 main ions have supported that Körös runs through in salinated area because of high concentration of Na^+, HCO_3^{2-} and Cl^- was measured.

Conclusion

Categorization of Körös was performed according Hungarian standards.

In point of conductivity the tested part of Körös can be classified as moderate water except at Mágor which has been ranked as polluted backwater. Ammonium ion, orthophosphate and nitrate concentration has been changed between good and polluted categories. Water quality in Mágor has been considered as polluted and it refers to contamination caused by local husbandry. In Körösszakál and Körösladány the measured concentration of orthophosphate is higher than the average value in the sampling point because of sewage of the townships transmitted into freshwater. The nitrite and nitrate concentration of the water is lower than the average values of the measurements in 1970. That is because of the area is pronounced to be protected by the law, thus the farm production is limited.

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