

TRANSBOUNDARY POLLUTION OF RIVER “LEPENEC” (ONE YEAR AFTER KOSOVO CONFLICT)

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Abstract. The “Blace camp” (3 ha site) was used as a transit camp for refugees entering Macedonia from Kosovo, during 1999. The potential impacts on the water quality of the Lepenec river, caused by the refugees, may have occurred through improper storage and management of refugee wastewaters. Its contamination may have also occurred if groundwater flow interacted with the refugee wastewaters that were contained within soak-away pits located in the alluvial terrace. The aim of this study was to evaluate the water and land quality in Macedonian side in Blace, as a result of such an impact, through estimating the presence of heavy metals in the water, asbestos, the water and land radioactivity, gamma emitters, alpha emitters. The results of microbiological, physico-chemical, radiological (gamma emitters, alpha emitters), pesticides and other contaminants as well as asbestos (coming from asbestos-cement factory from Kosovo) show that after some parameters this river belongs to IV and V class water quality (microbiological parameters refer to IV class; significant deficit of dissolved oxygen, big amount of sediments and high values of BOD₅, increased quantities of phosphorus substances, etc.) and under unfavourable hydro-meteorological conditions reaches a class that is beyond the prescribed water quality.

Keywords: transboundary pollution, water pressure, asbestos, river Lepenec, Kosovo refugees.

AIMS AND BACKGROUND

Disaster – natural or manmade, especially war conflicts, is changing the environmental conditions and leads to disruption of normal lifestyle with higher exposure of the involved population to different harmful elements. From March/27/1999 when the war conflict in Yugoslavia started, almost 350 000 refugees are hosted in Macedonia and distributed in private accommodations, reception centers or after humanitarian transfer program are departed in another countries.

Pressures are the factors that potentially stress the environment. There are three main types of pressure¹:

- emission of chemicals, waste and radiation to the environment;
- excessive use of environmental resources;
- land use.

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There pressures induce physical changes in the hydrological system and landscape structure, and chemical changes in the air, water and soil media². A wide range of human activities may lead to environmental deterioration of inland surface waters, either directly or indirectly^{3,4}. While the use of inland surface waters for waste disposal has an obvious effect, land use in the catchments area may have an indirect effect on the hydrological cycle or on the water quality⁵.

There is a potential impact on the water quality caused by the refugees and it's may have occurred in the Lepenec river through improper storage and management of refugee wastewater at the Blace transit camp. Contamination of the river may have occurred if groundwater flow interacted with the refugee wastewaters that were contained within soak-away pits located in the alluvial terrace. The location of cement factory in Kosovo, FR Yugoslavia on the border with Macedonia (General Jankovic Village – location 150 m near the border line Blace on Macedonian side) is a recognized impact into river Lepenec because of emission of dust, asbestos, and eventually heavy metals as chromium and lead, during the technology process as well as non-treated wastewater from the village. The aim of this study was to evaluate the water and land quality in Macedonian side in Blace, as a result of such an impact, through estimating the presence of heavy metals in the water, asbestos, the water and land radioactivity, gamma emitters, alpha emitters.

EXPERIMENTAL

Different indicators were used to assess the pressures on river and groundwater quality related to, in particular: nitrate, pesticides, heavy metals, radionuclides, and microbiological contamination. In water samples were taken from Blaceborderline point of Lepenec river during 1999-2000. The parameters were analysed according to the National Legislation (Act, and a number of buy-laws). In the authorized laboratories in the Republic of Macedonia as the Republic Institute for Health Protection, Skopje, the water samples were examined for the hygienic quality, microbiological and chemical parameters by standard methods: heavy metals by atomic absorption spectrometry with flame; pesticides by gas chromatography method, microbiological standard method, alpha- and beta spectrometer (nucleus model 5030), gamma spectrometer – 2 number (1: Genie 2000), asbestos by transmission electron microscopy (TEM) with identification by energy – disperse X-ray analysis.

Figure 1 shows the distribution of the analysis types and parameters taken from Lepenec river.

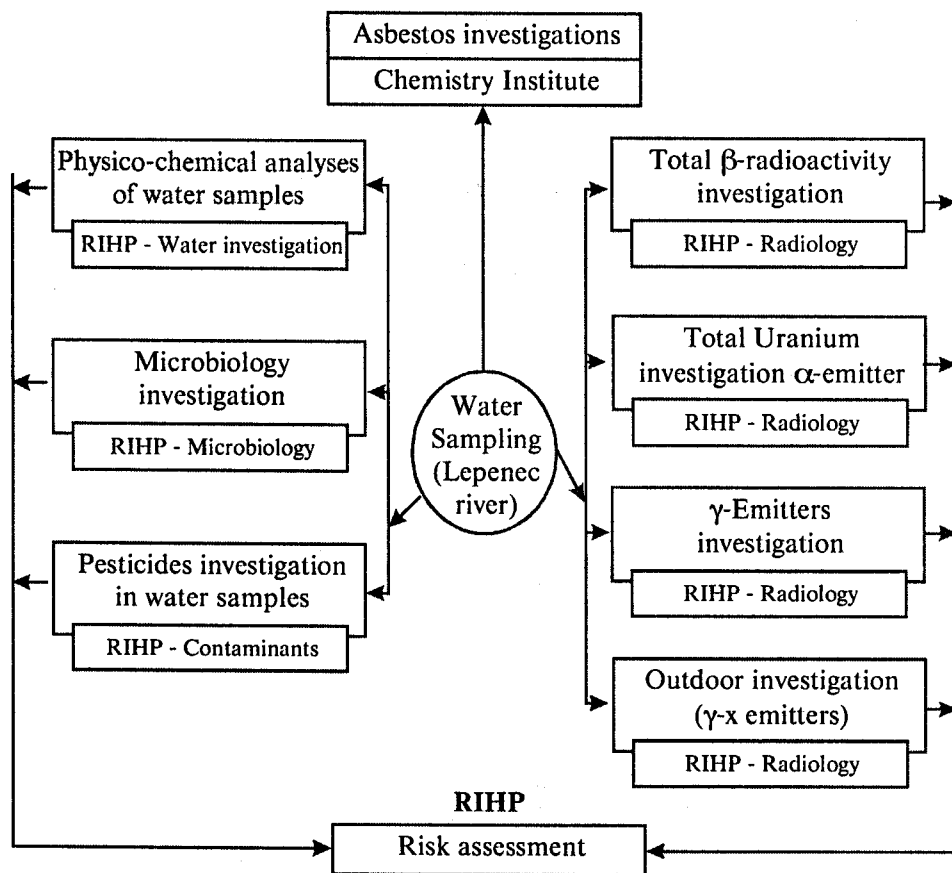


Fig. 1. Monitoring of Lepenec river 1999-2000 (distribution by parameter analyses)

RESULTS AND DISCUSSION

Six types of adverse change influence the potential risk of communicable diseases after disaster. These are changes in pre-existent levels of disease; ecological changes which are the results of the disaster, population displacement, changes in population density, disruption of public utilities, and interruption of basic public health services. This 3 ha site was used as a transit camp for refugees entering Macedonia from Kosovo. Official site closure occurred on June 20th 1999. The site is privately owned and has been used for agricultural production. It has been cleaned, but is still partially covered with gravel and has not been rehabilitated. In the case of Lepenec river there are two potential environmental impacts associated with the site. First, the soil compacting effects of the gravel, refugees and infrastructure may have negatively affected the fertility and productivity of the site. In addition, the current presence of gravel on the site may be interfering with site productivity

and vegetation regeneration. The second environmental impact associated with the site is that improper storage and management of refugee wastewaters may have negatively affected the water quality in the adjacent Lepenec river. Minor contamination of the river may have occurred if groundwater flow interacted with the refugee wastewaters that were contained within the soak-away pits located in the alluvial terrace. Microbiological diseases are still transmitted in certain areas, in particular via drinking water and on recreational exposure to surface water. Apart from anthropogenic contamination of water, natural conditions may also make water unsuitable for different uses without extensive and costly treatment.

CONCLUSIONS

There was not significant difference between water quality in Lepenec river, among 1999 year examination and one year after. The results of microbiological, physico-chemical, radiological (gamma emitters, alpha emitters), pesticides and other contaminants as well as asbestos (coming from asbestos-cement factory from Kosovo) show that after some parameters this river belongs to IV and V class water quality (microbiological parameters belong to IV class; significant deficit of dissolved oxygen, big amount of sediments and high values of BOD₅, increased quantities of phosphorus substances, etc.) and under unfavourable hydro-meteorological conditions reaches a class that is beyond the prescribed water quality.

The microbiological examinations of underground drinking water in the same area showed negative absence of bacteria which has not been observed one year ago, because of refugee's impact.

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