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Book of Abstracts



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Spatial distribution of natural and anthropogenic radionuclides in Danube sediments from invasive crayfish *Faxonius limosus* harvesting sites

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Abstract

Sediment represents an important reservoir of radionuclides and can provide valuable information on the radioecological status of aquatic ecosystems. Within the DANUBEcare project, 'Reducing the negative impact of invasive crayfish *Faxonius limosus* in the Danube by smart exploitation of their meat and shells', which aims to reduce the negative impact of this invasive crayfish through the sustainable utilization of its meat and shells, a radioecological characterization of sediment was conducted at crayfish harvesting sites.

The aim of this study was to determine the activity concentrations of natural and anthropogenic radionuclides in sediment and assess their spatial distribution. Sediment was sampled at four riverbank sites along the Danube - Bogojevo, Apatin, Begeč, and Sremski Karlovci. At each site, sediment was sampled four times over one year, after which one composite sample was prepared. Following drying and homogenization, the samples were analysed by low-level gamma spectrometry using a coaxial high-purity germanium (HPGe) detector manufactured by ORTEC (Oak Ridge, TN, USA), with a relative efficiency of 28% and an energy resolution of 1.67 keV at 1.33 MeV (⁶⁰Co), and a typical counting time of 100 ks. Activity concentrations were normalized to dry mass and expressed in Bq/kg. ⁴⁰K, ¹³⁷Cs, ²¹⁰Pb, ²²⁶Ra, ²³²Th, ²³⁸U, ²³⁵U, and radionuclides from their decay series were determined.

Pronounced spatial variability was observed. ⁴⁰K activity ranged from 310 ± 17 Bq/kg in Sremski Karlovci to 530 ± 30 Bq/kg in Apatin, while ¹³⁷Cs activity ranged from 1.19 ± 0.07 Bq/kg in Sremski Karlovci to 33.3 ± 1.9 Bq/kg in Apatin. ²¹⁰Pb activity ranged from 20.9 ± 1.2 Bq/kg in Sremski Karlovci to 73.7 ± 4.1 Bq/kg in Apatin. Similarly, ²²⁶Ra activity ranged from 22.5 ± 1.3 Bq/kg in Sremski Karlovci to 45.3 ± 2.5 Bq/kg in Apatin, while ²³²Th ranged from 20.5 ± 1.1 Bq/kg in Sremski Karlovci to 36.7 ± 2.1 Bq/kg in Apatin.

All measured activity concentrations were below the relevant levels prescribed by the *Rulebook on Limits of Radioactive Contamination of Persons, Working and Living Environment and the Method of Performing Decontamination* ('Official Gazette of the Republic of Serbia', No. 38/2011). Activity concentrations of natural radionuclides were compared with the global median values for soil reported by the *United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)*. Activities of ²³⁸U and ²³²Th were below the corresponding medians, whereas ⁴⁰K activity ranged from values below to values above the global median. The results indicate relatively low radionuclide activity concentrations in the investigated sediment, with pronounced spatial variability and the highest activities of most investigated radionuclides observed at the Apatin site.

Keywords: radionuclides, gamma spectrometry, sediment, Danube River, radioecology

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