



## Heavy metal content in soils of the Curonian Spit ecosystems (Russia)

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The Curonian Spit is the largest accumulative sandy form of the Baltic region with linear dunes of the shaft-like type. The soil cover of the Curonian Spit is peculiar, it includes 5 types of soils, combined into 2 groups of fully developed and underdeveloped soils, as well as moving, drift sands devoid of vegetation. The purpose of this work is to analyze the content of heavy metals in the accumulative horizon of the soils of the main ecosystems (coastal dune, the pre-dune plain (palve) zone, large dune ridge) of the Curonian Spit National Park and assess their degree of anthropogenic pollution. Soil sampling was carried out from the upper accumulative horizon with a thickness of 0 to 10 cm using the envelope method. The content of heavy metals in the samples was determined by the method of X-ray fluorescence analysis on the instrument "Spectroscan Max - G" ("Spectron", Russia). Soil samples for analysis were prepared in accordance with the method M049-P / 10.

The main ecosystems of the Curonian Spit that were studied are: coastal dune, the pre-dune plain (palve), dune ridge. The content of heavy metals in soil samples of coastal dune was: lead - 3.4 mg / kg (The threshold limit value (TLV) - 32 mg / kg); zinc - 13.5 mg / kg (TLV - 55 mg / kg); nickel - 4.1 mg / kg (TLV - 20 mg / kg); copper - 16.2 mg / kg (TLV - 33 mg / kg); strontium - 14.3 mg / kg (clarke in the soil - 380 mg / kg); arsenic - 2.1 mg / kg (TLV - 2.0 mg / kg); chromium - 26.4 mg / kg (TLV - Cr3+ - 100 mg / kg); manganese - 60.3 mg / kg (TLV - 300 mg / kg). In the palve zone, the level of heavy metals in the soils was (blueberry-lily spruce-fir forest; alder nettle-bedstraw; grass pine forest): lead - 8.4-14.2 mg / kg; zinc - 19.4-27.4 mg / kg; nickel - 6.0-6.2 mg / kg; copper - 0-6.3 mg / kg; strontium - 13.7-27.3 mg / kg; arsenic - 2.0-6.3 mg / kg; chromium - 22.4-32.4 mg / kg; manganese - 60.4-140.8 mg / kg. In the soils of the large dune ridge the content of heavy metals was found: lead - 14.5 mg / kg; zinc - 11.3 mg / kg; nickel - 5.2 mg / kg; copper - 14.7 mg / kg; strontium - 34.5 mg / kg; arsenic - < lower limit of quantification (LLOQ); chromium - 22.1 mg / kg; manganese - 27.4 mg / kg.

The analysis of the accumulation of heavy metals in the soils of the main ecosystems of the Curonian Spit did not reveal an excess of hazardous toxicants in them; the content of heavy metals in the soils of the spit did not exceed the national standards (TLV). For many metals, their content can be considered as background.