

# Urban geochemistry and environmental risk assessment of selected elements in the Sisak region, Croatia

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Portorož, Slovenia. ADRIA Innovation Day is a one-day event aiming to present available opportunities for the business sector under the EIT Raw Materials and the Regional Center ADRIA to enhance raw materials network in the South-East Europe. Invited speakers and participants of the ADRIA Innovation Day are professionals from business organizations in primary and secondary raw materials sectors - large companies, SMEs, Start-ups or idea holders, decision and policy makers as well as business support organizations from Slovenia, Croatia and other countries from the region (Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, Serbia). Event is co-organized by Geological Survey of Slovenia and Slovenian National Building and Civil Engineering Institute.

**Internship programme for ESEE raw materials students** is an on-going pilot project aiming to develop a structured internship programme for ESEE students. Students of the final year of graduated study in Mining, Geosciences, Metallurgy; Waste management from Croatia, Slovenia and ADRIA region can apply to participate at in-

ternship in ADRIA companies and institutions at <https://www.rgn.unizg.hr/en/online-application-for-adria-internship-programme>. Companies and institutions working in Mining, Geosciences, Metallurgy; Waste management from Croatia, Slovenia and ADRIA region can apply to accept interim students <http://www.rgn.unizg.hr/en/online-application-adria-internship-programme-for-companies>. Internship programme lasts between 1 and 3 months and must be conducted in year 2019. Structured supervision and conduction of the internship will be ensured via webinar support for both supervisors and interim students.

**RawMaterials business idea development** will be conducted in Zagreb in the last quarter of the 2019 with main aim to develop 20 RawMaterials innovative with practical exercise and idea pitches. Several participants of the programme (idea-holders) will be selected for participation in the EIT Jump-starter follow-up programme, starting in February 2020.

*Keywords: EIT RawMaterials, Regional Center Adria, activities, networking, innovation*

## Urban Geochemistry and Environmental Risk Assessment of Selected Elements in the Sisak Region, Croatia

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A geochemical investigation of the urban area of the city of Sisak and its surroundings was carried out to determine the concentration and spatial distribution of the potentially toxic elements (PTEs) As, Ba, Cd, Cr, Co, Cu, Hg, Mo, Ni, Pb, Tl, V and Zn in the soil and to assess the risk for the environment and human health. The elements were selected according to proposal of the PTEs in soils in the project Development of the program for permanent monitoring of the Croatian soils with a pilot project (MESIĆ et al., 2008).

The city of Sisak is an old Roman settlement, with a developed transport network and heavy industry. The city is located on siliciclastic Quaternary alluvium deposits of the rivers Kupa and Odra, carbonate deposits of the river Sava and loess (PIKIJA, M., 1987a,b). Topsoil samples were collected at 144 sampling locations according to the URGE procedure manual of the EuroGeoSurveys Geochemistry Expert Group (DEMETRIADES & BIRKE, 2015a), with the exception that a composite sample was taken at each sampling location. Multi-element chemical

analysis was performed at Acme Labs Vancouver, Canada, by ICP-MS (ŠORŠA et al., 2017). Quality control of the sampling procedures and laboratory analytical results was performed in accordance with the methods described in REIMANN et al. (2009) and DEMETRIADES & BIRKE (2015b).

The potential risk for human health of the individual PTE and potentially cumulative risk of all selected PTEs were assessed based on the comparison of metal concentrations in the soil and its prescribed limit values in soil versus land use (MESIĆ et al., 2008). There is no risk for human health for As, Cd, Co, Cr, Hg, Mo and Tl in the whole investigated area. A low risk for Ba, Cu, Ni, Pb, V and Zn was observed in some agricultural areas and for Pb along the more frequented roads. The elevated content of PTEs was recorded in old town Sisak. The highest values of PTEs in soil in the investigated area was detected around industrial facilities in the south and represent a threat for the adjacent settlements Kanak, Caprag, Capraške Poljane and Crnac (ŠORŠA & HALAMIĆ, 2014). Considerable

contamination with Ba, Pb and Zn was observed in the Kanak area which is located between a steel works, refinery and thermal power plant. The settlement Kanak is polluted with Ba, Pb and Zn and has the highest cumulative risk

(18.61) for health and environment in the entire investigated area (Fig. 1).

**Keywords:** potentially toxic elements, urban soil, risk assessment, pollution, land use

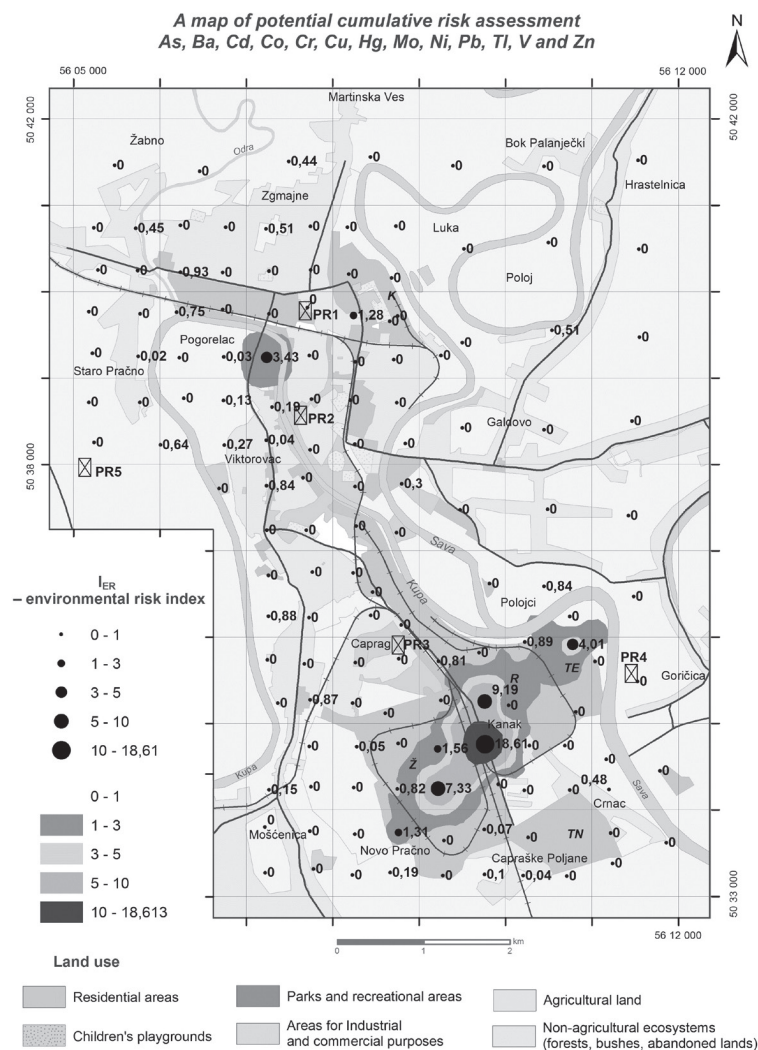


Figure 1. A map of potential cumulative risk assessment.

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