



ASSESSMENT AND MANAGEMENT OF CONTAMINATED SITES IN SERBIA

Dragana Vidojević¹, Natasa Baćanović¹, Branislava Dimić¹, Nemanja Jevtić¹ and Miroslava Gligorić²

¹Ministry of Agriculture and Environmental Protection, Environmental Protection Agency, Belgrade, Republic of Serbia
dragana.vidojevic@sepa.gov.rs, natasa.bacanovic@sepa.gov.rs, branislava.dimic@sepa.gov.rs, nemanja.jevtic@sepa.gov.rs

²PhD student - Faculty of Security Studies, University of Belgrade, Belgrade, Republic of Serbia

ABSTRACT

Since 2005 Serbian Environmental Protection Agency started creation of National Inventory of contaminated sites. The new legislation enacted in 2010 established the definition of contaminated sites together with reference values and provided a legal background for future prioritization studies and detailed investigations. In the territory of the Republic of Serbia 398 potential contaminated and contaminated sites have been identified. From the analysis of contaminated sites management data, it can be concluded that preliminary studies on all identified contaminated sites up to 2014 year have been carried out, while main site investigations have been completed on a lesser number of sites. On average 0.56 Potentially Contaminated Sites are estimated to exist per 10.000 inhabitants. The greatest number of registered sources of localized soil pollutions is related to municipal waste disposal (45.48%), industrial waste disposal (12.31%) and industrial and commercial activities (33.92%). The great flood, which hit Serbia in May 2014, has shown that there is a need for better planning and management of contaminated sites. The main environmental problems during and after flood disaster included: contamination of water and land from legacy mining operations and activation of landslides. The incident in the old and closed antimony mining site is one of the major independent environmental issues occurring from this disaster. Over 100,000 m³ of contaminated sludge poured into a local creek, which flows into the Sava river. Poorly stored hazardous waste in industrial plants were affected by the heavy rainfall and contributed to soil pollution. Although there were no recognized acute human exposure from toxic chemicals and hazardous waste releases recorded from the floods, several contaminated 'hot spots' pose serious risks of localized chronic exposure in the medium to long-term.

Keywords: Inventory, contaminated sites, industrial sites, soil pollution, flood

The floods affected area contains both historic and active mining operations, which were impacted by the heavy rainfall and floods. Industrial activity, particularly in Sabac and Loznica, has had detrimental environmental effects. Some of the main environmental and public health risks stem from abandoned industrial facilities such as poorly stored hazardous waste at Prva Iskra in Baric. Mining sites such as the Stolice mine tailings and the Zajaca mining with battery recycling waste dump are also important sources of contamination risk (Figure 3).

Mine "Tamnava" West field in mining basin Kolubara - Lazarevac in Kolubara river basin was hit in May 2014 by the large flood wave whereby the mine was filled with water and technical systems which were located and operating at surface exploitation of overburden and coal was flooded. It is estimated that in the open pit mine Tamnava - West field entered about 190 million m³ of water and in the open pit "Veliki Crljeni" over 25 million m³ of water. In those pits, along with water, entered a large amount of sludge created as a result of erosion and the destructive effects of floods (Veljkovic, 2015). Public enterprise "Electric power industry of Serbia" and Mine Basin "Kolubara" in Lazarevac adopted the action plan for mitigation and monitoring of environmental impact during implementation of the project of pumping out water and silt at the open mine Tamnava, west field. The Environmental Protection Agency conducted a monitoring program at 12 measuring points on the Kolubara river, from the mine to Sava river (during the period May 2014 - March 2015 (State of the environment report for 2014, 2015). 205 water samples and 5 samples of sludge were analyzed. In general, it can be concluded that the results of the analysis of the water quality of the Kolubara river upstream from the pumping zone and on the downstream measuring points showed that in the majority of measuring points one or more parameters exceeded the values defined by regulations. Of all measured parameters whose measured values exceeded the limit values, the greatest impact on surface water quality came from nickel and lead. As in the catchment area of the Kolubara river there are no registered impacts of anthropogenic origin, such as metal industry, it is assumed that the increased levels of lead and nickel in the surface water originate naturally from a geological source (Vidojevic et al, 2015).

RESULTS AND DISCUSSION

The greatest number of registered sources of localized soil pollutions is related to municipal waste disposal sites (45.48%), industrial waste disposal (12.31%) and industrial and commercial activities (33.92%).

Open dumping and landfilling have represented the predominant method of waste management in the Republic of Serbia during the past decades (Vidojevic et al, 2016). There are 181 landfills included in the Inventory that are being used by municipal public utility companies for waste disposal which represent a major potential soil and groundwater pollution source (Figure 1).

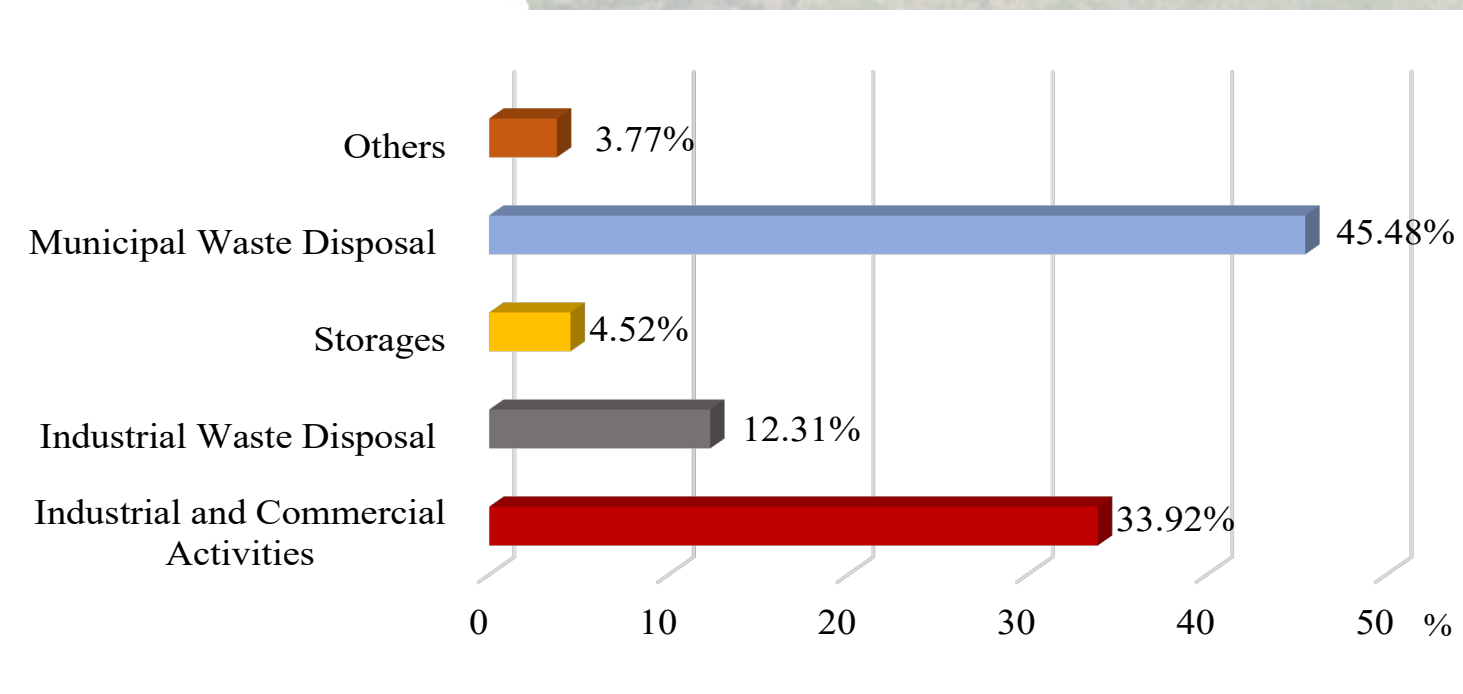


Figure. 1 Breakdown of activities causing local soil contamination [%]

The database of potential contaminated localities within the industry was updated in 2014. There were 200 potential contaminated industrial localities on the territory of the Republic of Serbia (Figure 2). The greatest part of the identified polluted soil localities within the industry belongs to the oil industry (47.5%), followed by the chemical industry (16%) and the metal working industry (14%). The database of potentially polluted and polluted sites does not include military sites.

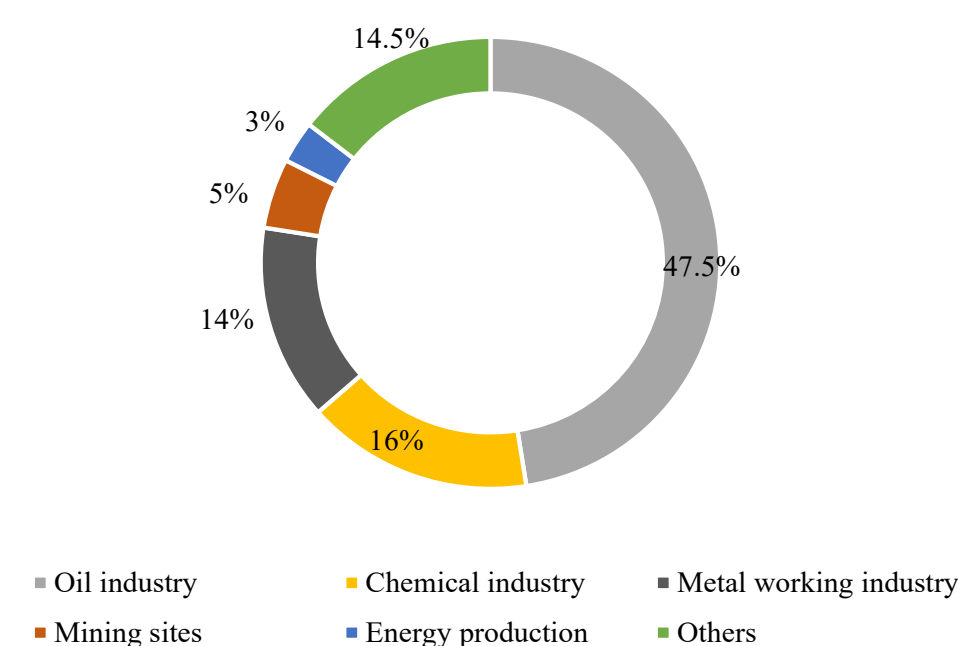


Figure. 2 Breakdown of industrial activities causing soil contamination (%)

CONTAMINATED SITES IN FLOOD DISASTER 2014

In May 2014 Serbia was struck by great floods. The floods affected areas of south-western, western and central Serbia.

The main environmental problems emanating from the floods of May 2014 include: contamination of water and land from legacy mining operations, negative impacts on surface and groundwater from poorly stored hazardous chemical waste, activation of at least 775 landslides in the 24 priority municipalities, generation of 500,000 tons of debris waste requiring disposal, deforestation, forest degradation and biodiversity losses and damages to environmental monitoring equipment (Serbia Floods 2014 report, 2014).

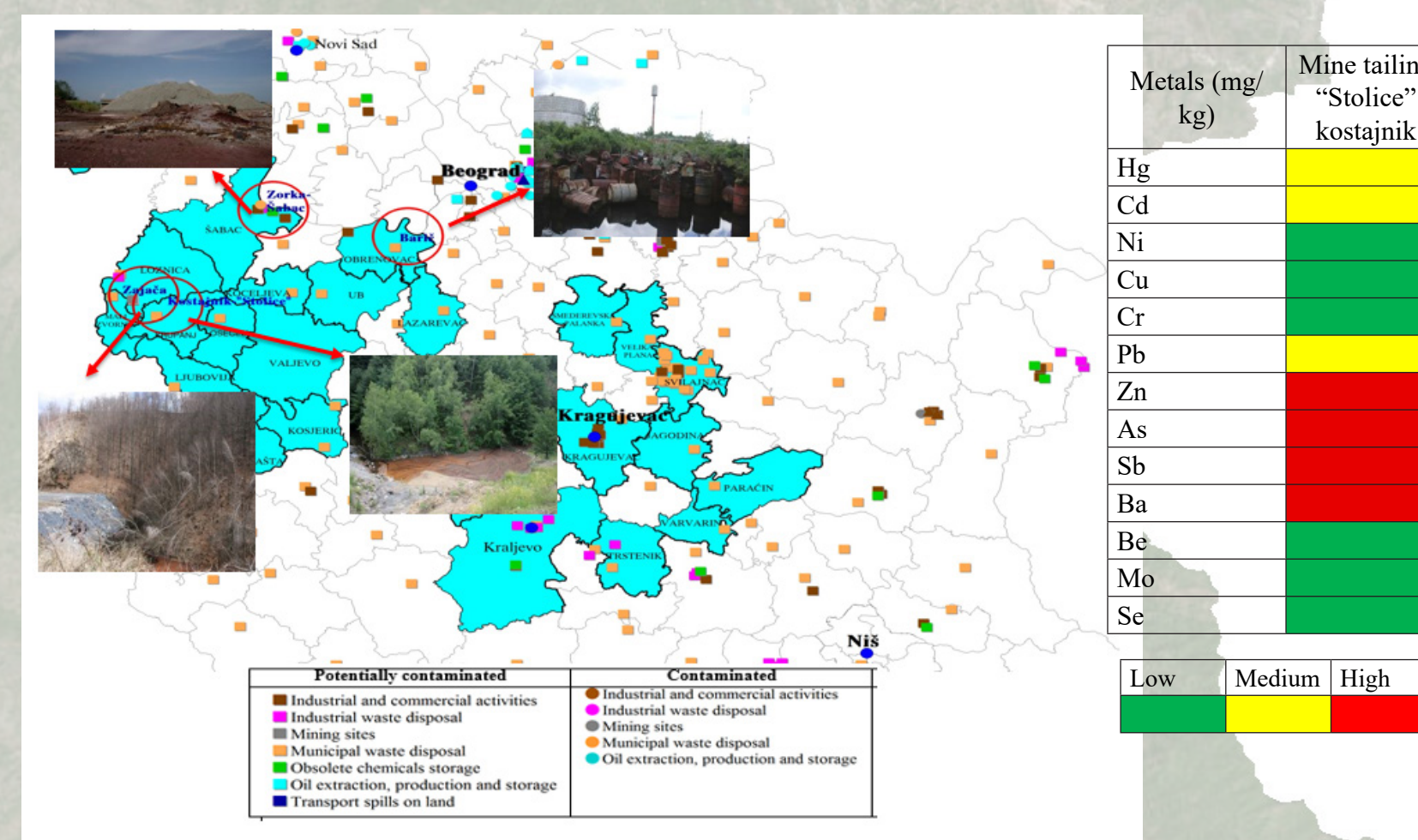


Figure. 3: Flood affected areas and contaminated sites

CONCLUSION

According to the data on Inventory of contaminated sites collected by the Environmental Protection Agency, it can be concluded that:

1. Preliminary studies are conducted at most of the identified potentially contaminated sites in Serbia.
2. The greatest number of registered sources of localized soil pollution are related to municipal waste disposal sites, oil extraction and production sites and industrial and commercial activities.
3. The new legislation enacted in 2010 established the definition of contaminated sites together with reference values and provided a legal background for future prioritization studies and detailed investigations.
4. Additional and more detailed surveys are needed in order to update the inventory of all sites. Resulting from these surveys, a National priority list for restoration and remediation of most polluted localities will be created.
5. Serbia has limited data on the impact of past disaster events. There is a need for generating more information on risk.
6. The rising frequency of natural hazards such as disaster floods in 2014 has increased the awareness of environmental risks and the need for fight against climate change and its causes.

REFERENCES

1. Serbia Floods 2014, The Recovery Needs Assessment, 2014: United Nation, European Commission, World Bank Group, Government of the Republic of Serbia, Belgrade 2014, <http://www.obnova.gov.rs/uploads/useruploads/.../RNA-REPORT-140714.pdf>
2. State of the environment report for 2014: Ministry of Agriculture and Environmental Protection: Environmental Protection Agency, Republic of Serbia, Belgrade, <http://www.sepa.gov.rs/download/Izvestaj2014.pdf>.
3. Veljkovic, N. 2015: Serbian waters - in time of adaptation to climate change, Ministry of Agriculture and Environmental protection, Environmental Protection Agency, Republic of Serbia, Belgrade http://www.sepa.gov.rs/download/Vode_Srbije.pdf
4. Vidojevic, D., Bacanovic, N., Branislava, D. 2013: Inventory of contaminated sites in Serbia, Proceedings of the International conference Contaminated sites Bratislava 2013, Bratislava, Slovak Republic, ISBN 978-80-88833-59-8
5. Vidojević, D., Bacanovic, N., Dimic, B. 2015: Flood disaster and contaminated sites in Serbia 2014, Chapter in the book: Remediated sites and brownfields, Success stories in Europe, Ana Paya Perez, Sara Pelaez Sanchez, Marc Van Liedekerke eds., Institute for Environment and Sustainability, EC JRC, EUR 27530 EN