Priority assessment of heavily polluted area's in Serbian riversheds; a practical approach

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The existence of many historically polluted sites in Serbian riversheds is seen as a potential threat to surface water and groundwater resources in Serbia and therefore remediation of these contaminated sites is needed. One of the problems the authorities of the Republic of Serbia are facing, is the absence of national inventories related to pollution sources, accidental risk spots or contaminated sites in Serbia. As a result, the identification of potential sources of pollution and the assessment of their impact on surface water and groundwater is considerably more difficult. Furthermore, the presence of contaminated sites may also form an obstacle for river management and flood protection in the future.

The last decade several nations (e.g. Canada and The Netherlands) and international water bodies, like the International Commission for the Protection of the Danube River (ICPDR), developed systems for the prioritisation of contaminated sites. These (inter)national systems are developed for identifying potential risks based on the assumption that detailed information is available and therefore these methods are not directly applicable for the Serbian situation.

On behalf of the the European Agency for reconstruction (EAR), a step-by-step system for identification and ranking of polluted sites specific for the Serbian situation and with focus on protection of water resources was developed. This system for ranking was validated and used for the assessment of heavily polluted sites (hotspots) in Serbian riversheds.

The assessment started with the identification of sites, which potentially could cause significant impact on the environment. Existing data was supported and extended using satellite and aerial photos, publicly available information (e.g. phone registers and company homepages) and by interviews with stakeholders and authorities. For the classification of the sites a Dutch ranking system 'UBI code' was adjusted to the Serbian circumstances. This inventory resulted in long list of 386 potentially contaminated sites. From this long list ten sites with the highest potential risks were pre-selected using a multi criteria analysis. The main criteria were toxicity and mobility of the pollutants in combination with the distance to surface and ground water.

In the next phase, the actual soil and groundwater quality of the selected sites was determinate during on site investigations. This verification showed that each selected site was significantly polluted and that remediation possibly is needed. In this respect, additional criteria were developed, which relate to cost level and effectiveness of remediation and actual possibility of implementing the remediation on site. The extended multi criteria analysis was used for the final selection.

In the last phase, a Tier II risk assessment was performed to determine the actual humane and environmental risks. These risk analysis were used to design a risk based and cost-effective remediation action plan for each site, with focus on reducing the actual human and environmental risks and preventing further contamination of water resources.

The presence of heavily contaminated sites in riversheds, like the Serbian situation, can form a obstacle for river management and flood protection. Insight in the presence of contaminated sites in the river basin region can provide important information for the (spatial) planning and cost-effective implementation of flood protection action programmes. The long-list of contaminated as identified in the current project can form a perfect starting point for the assessment of Flood Risk Areas or for the spatial planning of flood protection measures.

A practical approach for identification and ranking of polluted sites was developed, validated and successfully applied, to prepare risk based and cost-effective remediation action plans for heavily polluted sites in Serbian riversheds. The project showed that an initial assessment, based on limited input data and professional judgement, can provide within a short time frame a reliable assessment and ranking of polluted sites. This approach can also be a perfect starting point for the assessment of Flood Risk Area's or for the spatial planning of flood protection measures.