



Heavy metal retention of different embankments

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The accumulation and retention of heavy metals in roadside soils has been studied for at least over forty years, but it is still subject of major interest. The continuously increasing road traffic induces high heavy metal loadings in runoff and seepage water. Elevated concentrations of heavy metals are a potential environmental risk. Especially in the long term development there is an increasing problem of soil contamination and groundwater pollution. A significant rate of road runoff infiltrates into the hard and soft shoulder. They are usually built during road construction and located directly along the road edge. According to valid German law, newly constructed hard shoulders have to provide a specific bearing capacity to enable trafficability in emergency cases. Therefore the applicable materials consist of defined gravel-soil mixtures, which can fulfill this requirement.

To determine and compare the concentration of Pb, Cd, Zn, Cu, Ni, Cr in the road runoff and seepage water of different hard shoulder substrates, we installed 6 lysimeters along the edge of the German highway A115. Three lysimeters were filled with different materials which are commonly used for road construction in Germany and compacted afterwards. Surface runoff is sampled, as is seepage water in two depths in the three lysimeters. Furthermore three lysimeters were installed and filled with plain gravel, to observe the distribution, quantity and quality of road runoff. Additionally soil column experiments were carried out with the same construction material. Both, the measured seepage water concentrations from field and column experiments of Pb, Cd, Zn, Cu, Ni, Cr do not yet exceed the trigger values of the German Federal Soil Protection and Contamination Ordinance (BBodSchV). No significant differences in heavy metal concentrations of the three artificial hard shoulder lysimeters were determined so far. First analytical results of the road runoff show concentrations of up to 12.9 $\mu\text{g/l}$ Pb, 0.1 $\mu\text{g/l}$ Cd, 19.8 $\mu\text{g/l}$ Cu, 3.9 $\mu\text{g/l}$ Cr, and 49.6 $\mu\text{g/l}$ Zn. They are in the same order of magnitude as literature values.