The increasing demand for strategic resources, e.g. rare earth elements (REE) or other critical raw materials (CRM), caused by the technological development of society, stimulate an increase in the intensity of their extraction and processing. As a consequence, increasing amounts of these elements are released into the environment. This can be a potential threat to the quality of the environment and even human health. At the same time, due to their limited resources, effective recovery methods should be developed. The main goal of the project is to develop knowledge on the bioavailability and ecotoxicity of REE, antimony (Sb) and vanadium (V) in relation to their content in soils and wastes and to determine the potential of their natural recovery using plants. The detailed objectives of the project include an assessment of the current state and changes in the content of rare earth elements, Sb and V in representative soils and wastes; accurate determination of bioavailability and mobility of these elements in soil and waste; defining the risk related to pollution of particular components of the environment; assessment of the role of microorganisms and soil additives in shaping the potential of phytoremediation of polluted soils; select plant species to be used for REE, Sb and V recovery; understanding the role of microorganisms and soil additives in the optimization of the natural recovery of REE, Sb and V.

The most important planned project achievements are:

- the project will determine trends in the increase in REE, Sb and V in soils and waste by comparing historical and newly collected samples;
- simulations of REE, Sb and V bioavailability for plants, soil organisms and humans will be performed;
- for the first time, studies on the impact of REE, Sb and V on the genetic and functional diversity of microorganisms in soil will be performed;
- the ecotoxicity of REE, Sb and V will be assessed in accordance with the standard protocols;
- soil additives will be tested to reduce the toxicity of REE, Sb and V and increase their recovery;
- the contribution of various components of the environment to REE, Sb and V cycle will be systematized;
- the ability of rhizosphere microorganisms, cooperating with spontaneous vegetation in soils rich in REE, Sb and V, to support plant performance in phytostabilisation and phytoextraction of these elements will be assessed.