

GEOCHEMICAL SOIL MAPPING, PHYTOEXTRACTION OF CRITICAL ELEMENTS AND ENERGY PLANT PRODUCTION IN THE POST MINING AREA OF FREIBERG

Precious Uchenna Okoroafor

*TU Bergakademie Freiberg, Freiberg, Germany
precious-uchenna.okoroafor@student.tu-freiberg.de*

The soil, heterogeneous in nature, is a very important part of the environment. It plays a major role in the existence, health and functioning of the organisms found in it, the other compartments of the biosphere and the life forms in them. Therefore, a negative deviation from a healthy soil will have a great impact on the biosphere and the environment at large. Some of these unhealthy deviations are caused by human activities and the aftermath of such activities such as mining and resource prospecting within the earth crust. Since these deviations are now very common and because economic gains from mining and prospecting of resources must continue, several research works are focused on highlighting the possible ways of carrying out sustainable mining and restoring the soil back to health conditions.

The proposed research looks at the sustainable concept of bio-mining, which explores soil-plant relationships for resource recovery and promotion of economic gain in a sustainable way and has the potential to restore contaminated soils back to healthy status. Associated focus also includes investigating and highlighting other useful consequences of the soil-plant relations that aim to promote good soil and environmental conditions and generally, welfare of humans and other living organisms.

There are many contaminated soils within Freiberg and its environs resulting from mining activities in the region. To identify the elements in these soils, suggest possible bio-techniques for removal of contaminating elements, ascertain the possibility of recovery of useful quantities of critical elements by plants, and possibly make some economic gains, geochemical mapping of soils will be carried out on some selected field-sites and the technique of phytoremediation/phyto-mining will be applied.

From the geochemical mapping of soils in the selected fields, which is aimed at revealing the elemental compositions of soils, this research hopes to determine the level of contamination in these soils and the risks that the presence of these elements pose. The application of phytomining will reveal the bioavailability of these elements to plants under different conditions; provide information on the feasibility of resource recovery via phytomining, the possibilities of phytoremediating the contaminated soils and the best possible plants for phytomining/phytoremediation. In addition, the possibilities of making economic gains via bioenergy produced from biomass of plants used for the process of phytoremediation and phytomining will be investigated.

The outcome of the investigations will provide useful information for concerned authorities, remediation and bioenergy experts on the specific elements in the fields investigated, their amount, their environmental risks and the possibilities of extracting the contaminants from the soil using plants and making economic gains from phytomining and bioenergy production from some selected plants used for extraction of contaminants. In addition, the results of this research could be used in making environmental policies for the region of Freiberg and areas with similar contamination problems.

Key words: Geochemical Mapping of Soils, Phytoextraction, Critical Elements, Bioenergy Production