Chapter 8
Effects of Soil Contamination on the Selection of Remediation Method

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ABSTRACT

Soil is a thin (up to 50cm) loose top layer of the Earth’s surface, located between the lithosphere and atmosphere. Total available land area on Earth is limited, and the soil is extremely important, and in one generation it is a non-renewable natural resource. Unfortunately, nowadays the soil is, next to water, one of the most endangered natural resources. Among the many processes of soil damage, which is not being addressed at this point, is the growing importance placed on soil contamination. Contaminated soil is the soil in which human or natural activity has increased the content of harmful substances whose concentrations may be harmful to human activity, that is, for the production of plants or animals.

INTRODUCTION

The first International Conference of Agrogeology was held in Budapest in 1909 and attended by 84 participants from 23 European countries, and is considered to be the first step in organizing soil science. The 100th anniversary of the foundation of soil science in Europe was marked in 2009 at a science conference attended by European soil scientists who visited the sites at which the first conference was held. The second conference of agrogeology was held in 1910 in Stockholm, the third in 1922 in Prague, and the fourth in 1924 in Rome. At that conference the term agrogeology was replaced by Soil Science, and the organization is renamed and given the international attribute by the name International Society of Soil Science. Today it operates as a union of national soil science associations: International Union of Soil Science (IUSS). The last, 19th congress, was held in 2010 in Brisbane, and the next will be held in June 2014 in South Korea.

In 2000 European soil scientists held their first meeting (Reading, UK) and have founded the European Confederation of Soil Science Societies (ECSSS), www.ecsss.eu that unites all European
national associations of soil science. Confederation congresses are held every four years, the second was in 2004 in Freiburg, the third was in 2008 in Vienna, the fourth in 2012 in Bari and the fifth congress will be held in 2016 in Istanbul.

A generally accepted definition of soil is as follows: The soil is the loose layer of the Earth’s surface, located between the lithosphere and atmosphere, originated from parent materials under the influence of pedogenic processes (Basic, 2013).

By the end of this chapter it is necessary to clearly distinguish between the two terms which are often misunderstood and cause confusion, and those are soil and land. The difference is obvious. Soil is a natural formation that is formed by the described processes of soil formation (pedogenesis), and the term land refers to the mainland area (Basic, 2013). The term land defines a broader concept - a land (terrestrial) surface and bio-productive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes that occur in the landscape. As the soil science has developed through centuries as a part of agronomic and forestry profession, it is understandable that its focus were those soil properties that make it more or less suitable for growing plants, that is, the productivity function of soil. But the problems of soil damage have upstaged this function, in a certain way, and soil scientists have adopted the attitude that the productivity function of soil has been overemphasized, while others soil functions have been marginalized (Blum, 2005). It was not until recent decades that a growing interest is seen specifically for non-production soil functions, primarily those relating to environmental protection, especially protection of natural resources whose quality depends directly on soil and soil management.

As conditionally renewable natural resource soil has a decisive influence on sustainable development of global economy, especially sustainable agriculture and environmental protection.

POTENTIAL SOIL POLLUTANTS

Soil contamination is one of the most dangerous forms of soil degradation with the consequences that are reflected in virtually the entire biosphere, primarily heterotrophic organisms, and also the man as a food consumer. The path that any contaminant takes from the soil to the plate is very short and food safety is crucial and increasingly important requirement which is becoming more difficult and complex to implement. In order to define the contaminated soil, it can be said that this is the soil in which human activity has increased the content of harmful substances whose concentrations may be harmful to human activity, that is, for the production of plants or animals (Swartjes, 2011). That is why in the last decade the remediation of contaminated soils is becoming more important subject (Bardos et al., 2011; Mirsal, 2008). In order to achieve quality remediation of contaminated soil it is very important to conduct an inventory, as accurately as possible, that is, to determine the current state of soil contamination. Therefore, prior to remediation or reclamation of soil the initial state of the soil should be determined as accurately as possible. After completing the remediation process soil sampling should be repeated, that is, the final state should be determined (Kisic, 2012). Based on the determined values of soil contamination after completing the process of remediation, recommendations will be provided for the future land use.

Although there are several classifications of soil contamination, in this chapter potential soil contaminants are divided in groups: Organic contaminants; Fuels; Explosives; Inorganic contaminants (metals and metalloids) including radioactive elements. Locations where volatile and semi-volatile organic contaminants are found are the mines and their environment, chemical plants, landfills, contaminated marine sediment, pools for municipal sludge disposal, septic tanks, electro-