

Remediation of contaminated soil and groundwater in Thailand

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http://www.shimz.co.jp/corporate_information/sit/index.html

1. Introduction

In Japan, soil and groundwater pollution becomes one of the main environmental concerns, and many contaminated sites have been cleaned up in these two decades by several technologies like soil washing and bioremediation.

Also, in Southeast Asian countries, typically in Thailand, there are some problems of soil and groundwater contamination, however, few remediation works have been done yet mainly due to financial problem and insufficient experience.

In this paper, the author presents the situation of contaminated soil and groundwater in Thailand, and some remediation method suitable for Thailand using green plants called phytoremediation.

2. Legal Systems of Soil and Groundwater Contamination Prevention

Improper management of solid/liquid waste leads to soil and groundwater contamination in some part of Thailand. Department of Industrial Works under Ministry of Industry studied soil and groundwater at small factory sites in 1999, and found some sites contaminated by oil or heavy metals.

Thailand government is trying to prevent soil and groundwater contamination risks by issuing the Environmental Quality Standards for Soil Pollution and Ground Water Pollution recently. Nevertheless, few clean up activities have been done yet, because of the lack of both experience and fund. To reduce environmental risk of soil and groundwater problem, technology transfer of proper hazardous waste management is important. More economical and effective remediation method using its biologically high activity must be developed.

3. Remediation technology of contaminated sediments using green plants

Phytoremediation is the direct application of green plants and their associated microorganism to stabilize or absorb contaminants from soils, sludge, sediments, surface water, or groundwater. For phytoremediation, plant species of fast growth and large water uptake capacity is suitable for groundwater contaminated sites.

The author tested phytoremediation focusing on fluoride and boron in Japan and Thailand in laboratory scale.

The boron and fluoride content was analyzed in roots, stems, leaves. The result in Japan showed that boron is easy to be concentrated in leaves. Grasses can concentrate more boron than trees in their body. Especially, *Phytolacca Americana*, *Ambrosia trifida* L., and *Commelina communis* can accumulate boron with higher efficiency. The boron content in soil was 480-550mg/kg, and the boron content in these grasses was up to 3 times more than that in soil.

The result in Thailand showed that fluoride is easy to be concentrated in roots. *Ipomoea aquatica*, *Hydrocotyle unbellata* L., and *Pityrogramma calomelanos* can accumulate fluoride up to 40-120 mg/kg in their body, although fluoride content of common plants is 10mg/kg.

This result shows that there are some plants which can accumulate boron and fluoride with high efficiency and they are capable of cleaning up contaminated area in the long run.

4. Conclusion

In this paper, the author presents the remediation of contaminated soil and groundwater in Thailand.

Improper management of solid/liquid waste leads to soil and groundwater contamination in some part of Thailand. To reduce environmental risk of soil and groundwater, technology transfer of proper hazardous waste management is important. More economical and effective remediation method using its biologically high activity must be developed. Phytoremediation is one of the promising technologies in Thailand.