

Sustainable Remediation of Polluted Agricultural Land in China

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Background/Objectives. China is facing the daunting task of dealing with almost a 1/5th of its agricultural land being polluted. Ambitiously, the government plans to clean up ~700,000 ha of contaminated agricultural land by 2020, and to utilize 95% of the nation's contaminated land in a safe manner by 2030. Amongst the many challenges being faced is the need to assess the sustainability of these actions, especially in arid and semi-arid regions where rehabilitation of degraded land is particularly challenging. There is a growing body of publications addressing sustainable remediation at industrial sites, but the remediation of agricultural land involves different sustainability concerns and, therefore, different indicators. Agricultural land remediation needs to take into account social and economic considerations, life cycle secondary environmental impacts, and agricultural sustainability.

Approach/Activities. Based on a growing body of scientific knowledge about green and sustainable remediation, as well as the sustainable agricultural land management literature, the present study, for the first time, proposed a framework of sustainability assessment for agricultural land remediation. The proposed framework consists of four impact categories (social, economic, environmental, and agricultural), 11 subcategories, and 32 indicators. A sustainability assessment was conducted for five case study sites of agricultural land remediation, and an in-depth LCA was conducted for one site located in an arid region of northern China. The proposed framework adds agricultural sustainability to the traditional environmental, social and economic pillars of sustainability for a variety of reasons. First, we view that sustainability considerations pertaining to agricultural production to be particularly important and are often overlooked by remediation practitioners in China; therefore, it is important to place it at the forefront of sustainability here, in order to raise its awareness. Second, some agricultural indicators such as soil quality and soil productivity are overarching, that is, having both environmental and social or economic implications and putting them under one of these specific categories may lose some of the information that it conveys. Third, existing sustainability theories suggested that the pursuit of sustainability assessment should be both universal and context dependent.

Results/Lessons Learned. The assessment results indicated that most of these case study projects need to enhance community involvement and farmers' satisfaction, to further consider and, where necessary, improve the long-term efficacy of the remedies, to mitigate life cycle emission of secondary pollutants, and to ensure soil fertility is maintained during the remediation processes. Many of these concerns are associated with externalities that are not considered in traditional human health risk-based decision-making processes. It is imperative that more scientific studies be conducted and more policy instruments developed and implemented to enhance the life cycle sustainability of agricultural land remediation in China.