Remediation of Polluted Soil in China: Policy and Technology Bottlenecks

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Faced with severe soil pollution, China has promulgated environmental laws, regulations, and standards to control soil pollution. For example, in 2016 the State Council of China issued a Soil Pollution Prevention and Control Action Plan. The plan was aimed at making 90% of polluted farmland soil safe for human use by 2020 and 95% by 2030, as specified in China’s 13th Five-Year Plan. The Chinese government has made progress by promulgating policies, but the country still lags in its effort to realize these goals in actual practice. China has undertaken 100 soil remediation projects from 2013 to 2015, and the number of projects is 28, 40, and 32, respectively, indicating a decline in 2015 compared to 2014. Farmland restoration accounts for only about 10% of the projects, significantly below the expectations of the government.

A significant problem facing local governments, companies and the general public is the lack of clarity on the extent of China’s soil pollution. In 2014, a soil survey report was released by the government. It indicated that 16% of the samples collected from sites across 1500 surveyed areas representing 6.3 million square kilometers exceeded soil standards for a range of organic and inorganic contaminants. However, the survey was limited in its extent and did not fully reflect the actual extent of soil pollution across the Chinese landscape. We believe that more comprehensive information is needed to assess the risk to the population and to prioritize remediation of agricultural and urban soils.

The Institute of Public & Environmental Affairs published a map (see Figure 1) detailing soil pollution risk, the first such map made available to the public in China following public outcry regarding soil pollution at a Changzhou school, which caused almost 500 students to suffer symptoms such as skin inflammation, eczema and bronchitis. The map identified 4500 companies from 13 industries including chemical production, mining and smelting that could have polluted nearby soils. The companies were classified according to whether they were state-owned (89%), nonstate owned (11%) or if they were located in industrial zones. Although geographic regions of potential impact were useful, the map did not provide specific detail regarding the location of polluted sites nor the degree of soil pollution. However, the map may be useful in the soil risk assessment and its remediation prioritization.

The pollution risk map and polluted site registry increased public awareness of soil pollution and related issues. To turn awareness into action, we believe that a strategy is required to consolidate soil pollution data and implement China’s new environmental policies. In addition, it is unclear whether there are enforceable requirements for soil pollution and how these data will be managed and reported.

The implementation of long-term soil remediation strategies faces significant economic challenges. The Soil Action Plan is based on the polluter pays principle, which is the idea underlying the U.S. Superfund. Although this is a pragmatic approach, it may be impractical for China. In China, it is often difficult to identify parties responsible for pollution and to enforce the polluter pays principle. This situation is complicated further by the fact that some soil pollution may have resulted from agricultural inputs by farmers. According to the Ministry of Environmental Protection, the cost of soil remediation could be as high as hundreds of thousands of yuan per ha depending on the contaminant and the extent of contamination. With an annual income from farmland at

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∼¥7500 per ha, it may take over a decade for farmers to generate the required revenue, which is beyond their means. This is particularly challenging for a country with a rapidly developing economy and a large population, where economic growth still remains the primary social priority.

In contrast, some countries require local governments to bear the costs of cleanup rather than enforce the polluter pays principle. For example, when Japan faced a significant cadmium pollution event in the 1970s, 856 ha of soil was remediated at a cost of $350 million over a 33-year period. Faced with this burden, the Mitsui mineral company (the polluter), received 61% of remediation costs from the government. For China, however, this approach is infeasible. China has 124 million ha of farmlands to feed over 1.4 billion people, with estimates indicating that nearly 20% of the country’s farmland is polluted. According to Professor Lan Hong of Renmin University, China requires ¥7 trillion to remediate polluted soil using technologies imported from the U.S. and Japan, which is equivalent to a third of its foreign exchange reserves. The prohibitive cost is a main obstacle impeding soil remediation in China. We believe that the government should actively guide companies to participate in soil remediation through positive policy measures. We also believe that they need to support policies to drive the development of less expensive soil remediation technologies. Although there are a number of companies in China, which offer remediation services, these companies lack effective technologies for the remediation of soil-borne contaminants. To solve this dilemma, some companies actively import advanced technologies, however, almost all soil remediation technologies are too expensive for practical application. In addition, it is unclear whether or not these technologies will be effective under the diverse soil conditions encountered in China. Therefore, the highest priority challenge is the development of inexpensive and effective remediation technologies locally.

Policies and technologies must be practical to implement. Currently, the absence of clear regulations, incomplete monitoring data and a lack of inexpensive technologies are the main bottlenecks for pollution control and remediation in China. As a consequence, refined, accountable and standardized policies as well as cost-effective technologies on soil remediation are urgently required to accelerate soil remediation activities. More importantly, a consolidated effort is needed to integrate policies, technologies and practice to achieve needed soil remediation in China.

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**Notes**

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