Nature Environment and Pollution Technology
An International Quarterly Scientific Journal

p-ISSN: 0972-6268
e-ISSN: 2395-3454

Vol. 16 | No. 2 | pp. 419-424 | 2017

General Research Paper | Open Access

Ecological Responsibility of Local Governments in Contaminated Site Treatment: Liaoning Province of China as an Example

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Nat. Env. & Poll. Tech.
Website: www.neptjournal.com

Received: 16-02-2017
Accepted: 23-04-2017

Key Words:
Site contamination
Ecological responsibility
Local government
Liaoning province

ABSTRACT

Industrialization and urbanization have promoted the rapid development of China's economy. However, the site contamination, environmental and health damage, and the government's ecological responsibility supervision have become hot topics in the society in recent years. This study selects Liaoning province of China to further analyse the local governments' ecological responsibility in treating contaminated sites. Moreover, the ecological responsibility of foreign governments in the treatment of contaminated sites is summarized, the characteristics of site contamination are analysed, and the functional localization of local governments in the treatment is clarified. Finally, the paths for local governments to realize the ecological administrative responsibility in the treatment process are pointed out. Research results show that site contamination is characterized by concealment, lag, accumulation, difficulty of repair and complexity. In the treatment process, local governments have two roles, namely: (1) as the public service provider; and (2) as the restorer and redeveloper in the contaminated site treatment. This study suggests the establishment of the perfect treatment laws for contaminated sites, acceleration of the law system construction, strengthening of the responsibility supervision and accountability mechanisms, implementation of the administrative accountability system, improvement of external supervision means, encouragement of the public to participate in environmental contamination control, formulation of environmental management measures in contaminated sites, and regulation of contaminated site treatment market to encourage the local governments to fulfil and implement the ecological responsibility during the treatment of the contaminated sites. This research provides a reference value for the discussion in the dominant role and ecological responsibility of the local governments in the remediation and redevelopment of contaminated sites and the establishment of an effective remediation mechanism.

INTRODUCTION

With the acceleration of China's urbanization and industrialization, the problem of soil pollution has become prominent. Especially in recent years, China is at the height of urban land replanning and industrial structure adjustment, which might lead to transfer, migration, or closing of industrial enterprises. However, during contaminated enterprise transfer, migration, and site redevelopment, soil pollution accidents have occurred frequently, which led to serious personal casualties and huge economic losses. Thus far, China's system for soil treatment in the contaminated sites has achieved a breakthrough. Further research and exploration on the legal system for soil management in the contaminated sites are both of theoretical and practical significance in China.

Liaoning province is a big industrial province in Northeast China. With the acceleration of its urbanization, more and more industrial enterprises have moved away from the cities, which have left many contaminated sites in urgent need of development. These contaminated sites can cause many problems in the process of remediation and development. A series of site contamination accidents have occurred frequently in Liaoning province in recent years; thus, the environmental situation is unsatisfactory, as given in Table 1. The remediation and development of contaminated sites have become a public concern. Behind these frequent pollution accidents is the government's lack of responsibility. Undoubtedly, the government plays a dominant role on this issue, including legislation, regulation, and control. From the perspective of ecological responsibility with Liaoning province as an example, this paper studies and discusses the dominant role of local governments in the remediation and development of contaminated sites. This study will also serve as a reference in the establishment of an effective remediation mechanism and in the improvement of the legal system for contaminated sites.

EARLIER STUDIES

Domestic and foreign studies on the damage of contaminated sites and the government's ecological responsibility in contaminated site treatment, have achieved satisfactory

results. In particular, the systematic studies of many scholars in developed countries on the contaminated site management have formed a relatively mature treatment system and institutional framework. Syms proposed the need to establish a risk assessment mechanism in the remediation process to determine the potential damages of the contaminated sites on humans, surrounding buildings, and environment (Syms 1999). Murphy suggested establishing a compensation fund in the management of the soil pollution and a treatment fund to support the management and cleaning of the brownfield sites (Murphy 2000). Mermut held that the contaminated soil issue developed along with social industrialization (Mermut et al. 2001). Tedd argued that the risk assessment, risk analysis, and risk management should be taken as tools of policy analysis and management means to control the contaminated land (Tedd et al. 2001). Dylewski suggested full understanding of the public opinion and advice, continuous collection and analysis of the materials for the implementation, and dual mechanism of market and government to solve the contamination problem (Dylewski 2001). Pollard thought that the management methods of contaminated lands have had great changes in the past 30 years and proposed the environmental management strategy of sustainable development (Pollard et al. 2004). Alberini believed that the market-based incentive mechanism promoted the redevelopment of contaminated sites better compared with the government's direct subsidies (Alberini et al. 2005). Schooner argued that full attention should be given to the public dialogue mechanism between local governments and regional groups to bring full vitality to the social and economic development based on extensive public participation (Schooner et al. 2005). Luiza introduced the management policies of Brazil and Germany in the brownfield site remediation and proposed some suggestions (Luiza et al. 2010). Panagos reviewed the current situation of contaminated sites in Europe based on European network data and proposed corresponding control measures (Panagos et al. 2013). Dupuis J. held that the countries with high industrialization were particularly in urgent need of effective regulation guidance in the international laws and policies about contaminated sites (Dupuis et al. 2014). Van Liedekerke M. analysed Europe's effective practice in contaminated site control (Van Liedekerke M. et al. 2014). Moreover, Brombal D analysed China's environmental management system in contaminated sites and held that it could draw lessons from EU's experience to guide treatment of its contaminated sites (Brombal et al. 2015). Hooper analysed the comprehensive risk and restoration monitoring of the ecosystem repair in the contaminated sites and suggested creating a more comprehensive national management plan to implement the effective treatment of site contamination (Hooper et al. 2016). Li analysed the policy framework and tool selection of the different provinces in China for the management of the contaminated sites (Li et al. 2017). The above mentioned studies on the environmental management issue on the contaminated sites have great significance in promoting the perfection of China's contaminated site management system. However, most of these studies focus on introducing other countries' legislation of environmental laws and regulations in the contaminated sites and emphasized the importance of polishing China's related legal framework and system. Studies on the government's ecological legal responsibility in the contaminated site treatment are limited. Therefore, this paper aims to conduct an in-depth research on this issue.

CHARACTERISTICS OF SITE CONTAMINATION

Concealment: Atmospheric pollution caused by dense smoke from the cement plants, straw burning, or car exhaust emissions, water pollution caused by the toxic and harmful substances discharged into rivers and lakes, and solid waste pollution caused by solid waste landfill accumulation can all be observed through the senses. Contaminated sites, however, mainly involve soil pollution, and the toxic and harmful substances in the soil can neither be seen nor be easily smelled. These substances have to be detected through soil tests or even after being taken by humans or animals through the food and fruit, thereby causing health damage.

Hysteresis: Contaminated soil causes secondary contamination to underground water through infiltration or rainwater. People's production and life are directly or indirectly affected, but people's recognition of soil toxicity at the foot always has a lag. A long interval between the pollution behaviours and the pollution accident results exists; thus, the seemingly healthy land sometimes suffers toxicity outbreak after a few decades.

Accumulation: The pollutants in the air and water migrate for a long distance with the atmosphere and running water. They are also easily spread and diluted in the remediation work. The soil in the site has certain self-purification capability. When the pollutants in the site are extremely abundant to be self-purified, those which cannot be removed are accumulated for a long period and reach a high concentration of toxicity. In addition, soil remediation needs to be conducted in the original place, the pollutants in the soil then become deeply accumulated.

Remedy difficulty: The long cycle, high cost, and technique of contaminated site remediation makes it difficult to carry out. Once the soil in the site is contaminated, self recovery is difficult when only pollution sources are cut off. Instead, treatment must rely on biological (e.g., phytoremediation

Table 1: Main environmental pollution index data of Liaoning province from 2006 to 2014.

Index	Wastewater Emissions	Smoke and Dust Emissions	Discharge of Hazardous Wastes	Solid Industrial Waste Emissions
Unit	10 thousand tons	10 thousand tons	10 thousand tons	10 thousand tons
2006	212,952.93	71.45	44.50	24.69
2007	220,996.73	71.64	61.96	4.48
2008	212,021.33	69.20	91.24	1.16
2009	217,154.68	61.27	90.98	2.75
2010	215,868.50	61.90	105.98	2.88
2011	232,247.02	69.32	78.49	8.18
2012	238,786.35	72.63	73.21	10.40
2013	234,508.18	67.05	104.64	9.05
2014	262,878.96	112.07	98.08	5.93

and biological aeration method), physical (heat treatment), chemical (leaching, chemical oxidation, and soil gas phase extraction), and remediation technologies (heat treatment) of the repair technology (such as leaching, chemical oxidation, and soil vapour extraction) to reduce the contamination. Remediation of contaminated sites is a long-term and huge project, which will last for years or even decades. Thus, to turn the brownfield land into the green land, a large amount of manpower, materials and funds for decades are needed.

Complexity: The interval from soil contamination to accident occurrence is long, during which the right to use the site may have changed several times, and the production activities in the site may also be different. Thus, identification of the cause of the contamination is difficult. In addition, even if the evidence to identify the polluters exists, they may have been already dissolved or bankrupted during investigation. The phenomena of multiple polluters and multiple pollutants are also common. The discharge of a single pollutant may be safe, but the discharge of multiple pollutants may cause chemical reaction and serious damages, which make the problem become more complex. At this time, identifying the contamination liability is more difficult.

FUNCTIONAL LOCALIZATION OF LOCAL GOVERNMENTS IN CONTAMINATED SITE TREATMENT

Providing collection and processing services of all kinds of living and production wastes for the public and enterprises is one of the responsibilities of an effective government. Furthermore, the government functions to provide a guarantee of life's basic necessities for the residents and to provide sustainable power for the natural environment that people depend on. All these service contents need to be implemented by the government. In the absence of the government, no individual will be willing to bear or accept. Due to the special properties of the contaminated site generation and treatment, preparations for contaminated site treatment like soil monitoring and warning must be technically supported by the government. The dominant role of local governments is mainly reflected in the migration of industrial enterprises and the macroscopic planning of original sites, including soil contamination legislation and coordination between all departments. Development of traditional extensive secondary industries leads to serious site contamination and, thus, seriously interferes with the normal production and life of the residents. The environmental management departments of local governments should focus on macro control, comprehensive decision, and concentrated efforts to ensure the environmental supervision and law enforcement and meet the standard of a service-oriented government. By changing the focus of the government's responsibility, previous production and construction-oriented and supervision-oriented government should transform into the one, which provides and markets public goods and commodities. Furthermore, the government should transform from a previous controlling government into a service-oriented government according to the current trend and demands, especially in functions and responsibilities. In addition, they should adjust the inefficient and bureaucratic administrative style to a friendly, convenient, and efficient service concept. The government's serving role should work based on the concept of citizen and society standards rather than on the power standard to realize fully its service function endowed by the constitution and the laws. This role should be dependent on procedures and the provisions of law and regulations through establishing the framework of equal democracy and harmonious order. Local governments have become a service provider in the contaminated site treatment because the public's demand for ecological environment protection has been growing. Meeting this demand has become a main function of modern governments. Although the supervisory role can also pro-

vide different levels of security or service, the public supply system is a subsidiary of the government's functions and is often inadequate. The localization of a service provider puts the work of providing the residents with a sense of security and meeting their public demands first.

PATHS FOR LOCAL GOVERNMENTS TO REALIZE THE ECOLOGICAL ADMINISTRATIVE RESPONSIBILITY IN THE PROCESS OF CONTAMINATED SITE TREATMENT

Establish and improve the contaminated site treatment law and accelerate the construction of the legal system: Contaminated site treatment can be truly implemented only by improving and enriching the legislative work. Considering the lack of laws in contaminated site treatment, step up research and legislation of soil contamination prevention or addition of content related to contaminated sites in the existing laws are suggested. Local governments and environmental protection departments can also introduce some ordinances and local regulations related to contaminated sites according to the actual situation; comprehensively regulate the judging standard and cognition of contaminated site control, its treatment, capital guarantee, and accountability; establish the long-term effective mechanism of contaminated site treatment; actively guide the society to conscientiously protect the good situation of the ecological environment; and carry out the contaminated site remediation and development. In addition, they should set up the contaminated site accountability system and clear up the responsibility as soon as possible. For the contaminated sites left over from history, if remedy is needed after risk assessment, the government should pay the cost first to reduce the risk. Local governments should clear up the responsibility subjects and order them to undertake the corresponding repair costs. For the contaminated sites whose responsibility subjects cannot be cleared, the government should pay the remediation bill to promote the standardization of contaminated site treatment and remediation, promote social and economic development, and protect ecological security.

Strengthen the responsibility supervision and accountability mechanism and implement the administrative accountability system: The realization of the government's ecological responsibility mainly refers to the implementation of the ecological administrative responsibility it should bear and the investigation of its legal responsibility when it fails to perform or improperly perform its responsibility. A special institution to supervise and investigate the government's ecological responsibility does not exist; thus, improving the accountability mechanism to ensure its fulfilment is needed. The focus and regulations of China's current ecological environment legislation target at the supervision and investigation of the administrative counterpart's ecological responsibility. Local governments at all levels and their functional departments have the right to supervise the performance of the administrative counterpart's ecological environment obligation and to meet out administrative sanctions and investigate the legal responsibility of those failing to perform their obligations. In addition, the traditional administrative law emphasizes that the government must abide by the law. Any administrative act is not allowed to go beyond the power boundary limited by the administrative law. The development trend of the administrative law requires actively supervising the performance of the government's administrative responsibility through legislation, preventing the government from exceeding, abusing the authority to invade the rights of the administrative counterpart, and urging the government to take the initiative in its responsibility in ecological protection, so as to meet the growing demand of the ecological environment and avoid the situation of government failure.

Improve the external supervision means and encourage the public to participate in the environmental contamination control: The social public accountability takes the social organization and the public as the accountability subjects; the realization of ecological environment democracy and the protection of the citizens' ecological rights as the purpose; the government and its staff as the object; the performance of criticism, suggestion, denunciation, petition, reports reconsideration, litigation, and other rights as the means; and the specific supervision activities of ecological environmental law as the content to supervise and investigate whether the government performs its ecological responsibility. Different from the control of general environmental contaminations, remediation of contaminated sites needs to focus on the soil and underground water. The public's accountability well makes up for the inadequacy of the government in this regard. The most direct influence of contaminated sites on the public is whether the ecological living environment can effectively protect their survival and development. Social public accountability is a kind of bottom-up, non-power external supervision and investigation with the characteristic of comprehensiveness. It can play the most comprehensive supervision role in the contaminated site treatment. The social public, who directly feel the ecological environment system, is very sensitive to check whether the government has fulfilled its ecological responsibility that satisfies the public demand. When it fails to fulfil or poorly fulfils its ecological responsibility, the social public can timely percept it, supervise, and investigate it.

Take measures on the environmental management in the contaminated sites and guide the contaminated site treatment market: Improving and refining the regulatory measures; implementing strict regulation from monitoring and collection of the suspected contaminated soil information; starting investigation and evaluation procedures, remediation activity, and acceptance; and clarifying the rights and responsibilities of the environmental law enforcement at every stage make the legislation more operable and ensure the implementation effect and execution of legislation. Soil and underground treatments should be coordinated. In the contaminated site, both soil and underground water are easily contaminated. Separate treatment of soil and underground water easily causes waste of resources. Thus, coordination of the management department with the law enforcement in the water contamination treatment and simultaneous treatment are suggested. Moreover, the coordination of the management authorities with the environmental law enforcement department and other administrative departments is needed. Land development and utilization involves land planning department, construction department, and other governmental departments. In practice, each acts independently, leading to the redevelopment of contaminated sites before remediation. Land development and utilization should stick to the principle of environmental protection first. The environmental law enforcement department and other government departments can fully coordinate to ensure the environmental safety of the soil. Based on the huge demand for contaminated site utilization, many environment remediation companies emerge, and foreign-related enterprises also covet China's environment remediation market. Thus, to ensure the healthy development of the environmental remediation market and guarantee the remediation quality, standardized quality and obligations of the environment remediation enterprises are needed. Soil management has high requirement on the technological level; thus, to guide the healthy development of the industry and encourage and promote the new technologies and self intellectual property rights of soil management, a standardized management of the contaminated site treatment market is suggested.

SUMMARY

Remediation and redevelopment in the process of contaminated site treatment is still new in China. The large number of problems left over by history after the migration of industrial enterprises from the cities has been formed for decades. Proper solution to the contaminated site problem needs local governments at all levels to focus and actively respond to the related treatment decisions. To analyse further the current situation and characteristics of contaminated sites and clarify the ecological responsibility of local governments in the contaminated site treatment, this paper takes Liaoning Province as an example for analysing the characteristics of the existence of site contamination, clarifying the functional localization of local governments in the treatment, and finally pointing out the paths to realize the ecological administrative responsibility in the treatment process. Research results show that site contamination is characterized by concealment, lag, accumulation, remedy difficulty, and complexity. In the treatment process, local governments should be the public service provider, restorer, and redeveloper in the contaminated site treatment. Local governments can establish and improve the contaminated site treatment law, strengthen the responsibility supervision and accountability mechanisms, and implement the administrative accountability system to supervise fully the government's role in the treatment process and ensure the effective investigation on the government's ecological administrative responsibility. However, because of the limited data about site environment contamination and inadequate materials, a wider and deeper site contamination research, such as analysis of the first-hand materials, refinement of the contents of the government's management rules and regulations in this aspect, screening of the technical standard and support to the economic policies of site contamination, and establishment of site contamination database, should be performed.

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