

Virtual Symposium Event Report

Sustainable Financing for Soil Remediation Projects in China and Beyond

October 19-21, 2021

Sustainable finance has gained considerable attention in the finance industry in recent years, but a massive gap still exists in mobilizing adequate financial resources to address legacy and existing environmental and climate problems. One such example is the remediation of contaminated or otherwise degraded soil.

Preserving appropriate soil quality is essential, as it provides us with numerous ecosystem services, such as filtering water, providing a habitat for billions of organisms, supporting the growth of plants, recycling raw materials, and mitigating climate change. Unfortunately, human activities have hugely damaged and contaminated soil through mining, waste disposal, intensive agricultural activity, or industrial activities. Very often, the level and extent of contamination remain unknown, coming to light years after the contaminating activity has taken place. Today, despite the undeniable efforts in the last years to restore and remediate soil, the rate of degradation and contamination is still much higher than the rate of restoration and remediation. Furthermore, the COVID-19 pandemic has erased years of development progress and resulted in major setbacks to all sources of finance for sustainable development.

From October 19 to 21, 2021, the International Institute for Sustainable Development (IISD) and the Norwegian Institute for Water Research (NIVA) co-organized a Virtual Symposium on Sustainable Financing for Soil Remediation Projects in China and Beyond to share the most recent research findings on the topic, to engage in broader discussions with experts and practitioners in this field, and to establish a community of global experts and practitioners where they can exchange experiences and discuss emerging trends in the area of environmental financing. The symposium was built on the findings of a research project jointly carried out by IISD, NIVA, and the Chinese Academy for Environment Planning (CAEP), which has looked at sustainable investments in soil remediation projects in China. The research identified potential funding avenues, including blended finance options, especially in those areas where it is most difficult to attract private sector funding. Although the main focus was China, the research results can be extrapolated as similar issues regarding soil remediation are faced by other regions worldwide.

This virtual event gathered panellists and participants from Europe, the United States, and China and was held in English with Chinese interpretation. The speakers included senior government policy-makers, leading industry practitioners, and finance experts, all gathering to share their perspectives and thoughts on the urgent topic of the protection and restoration of soil. In order to look at the soil remediation problem from the broadest possible

perspective and allow for discussion between different stakeholders, the symposium was divided into three sessions, each covering different aspects:

- Session 1 (October 19, 2021): Governance Perspective
- Session 2 (October 20, 2021): Industry Perspective
- Session 3 (October 21, 2021): Financing Perspective

Session 1: Governance Perspective

Governments' soil management practices seem to be rather fragmented, and little governmental reporting considers soil remediation, particularly in climate mitigation strategies. Soil remediation projects around the world are governed in different ways; each jurisdiction has an approach to carrying out such projects that can represent a unique perspective, highlight challenges, and offer ideas for future solutions. Session 1 has gathered policy-makers from China, the European Union (EU), and the United States, as well as experts from a non-governmental organization, to discuss governance issues faced by governments in treating contaminated land.

In her opening remarks, **Nathalie Bernasconi-Osterwalder, Executive Director of IISD Europe**, emphasized the importance of soil health, drawing the example of a very recent contamination found in Lausanne, Switzerland, which has been unknown for many years. While setting the scene for the 3 days that followed, she provided insight into the challenges identified by the recent research project carried out by IISD, NIVA, and CAEP, identifying financing as the biggest obstacle.

Dietmar Müller-Grabherr, General Secretary of the Common Forum on Contaminated Land, presented an overview of soil pollution policies across the EU. He shared a chart that showed the ratio of public to private capital for contamination remediation projects across the EU. In some countries, such as Norway, the majority of projects are privately funded. In other countries—such as Portugal, Austria, and Italy—national, regional, and EU funds bring most of the capital to the table. These EU funds have been expanded with the creation of the European Green Deal in 2019, which set a new co-funding mechanism for environmental projects. Furthermore, he stressed the importance of two factors. The first factor is stakeholder involvement since governance involves all societal actors commonly searching for ways to improve their environmental behaviours. Second, pollution prevention should be the priority since it is much more effective and less costly than subsequent remediation.

Zhanfeng Dong, Deputy Director of the Department for Environmental Policy, Chinese Academy of Environmental Planning, Ministry of Environmental Protection, briefly introduced the soil remediation situation in China, presenting the major developments and challenges. He stressed that the Chinese government has attached great importance to soil remediation and environmental control in recent years by developing land pollution prevention laws and implementing an action plan—for environmental protection and conservation generally and for the soil pollution control specifically. Actions are also undertaken at the local level through capacity-building programs, the establishment of a soil monitoring system, and the development of special regional funds for soil pollution prevention and control. However, one of the biggest challenges preventing efficient soil remediation at a large scale is a lack of general policy supply and measures with regard to soil pollution prevention and control. That is linked with the problem of huge regional differences within China. Some provinces cope with the contamination relatively well, while others need

to significantly strengthen the technical capacity and put in place appropriate soil pollution monitoring and surveillance systems.

The final presentation in Session 1 was given by **Steve Wolfson, Senior Attorney at U.S. Environmental Protection Agency**. In the United States, there are two main laws that deal with soil health: the Resource Conservation and Recovery Act (RCRA) for preventing contamination of sites and the Comprehensive Environmental Response, Compensation, and Liability Act (otherwise known as CERCLA or the Superfund law) for cleaning up. Small or less complex site cleanups are governed by local laws at the state level in the United States. Many of the states are authorized by the Environmental Protection Agency (EPA) to take primary responsibility for the implementation of the RCRA. To ensure consistency across states and minimum standards, the EPA conducts a process of State Authorization. The RCRA is based on a principle of prevention and includes a permit program for treatment, storage, and disposal of waste that forms a “cradle-to-grave” system for managing hazardous waste. Thus, through tight regulation, it prevents the creation of many new contaminated sites (“Superfund sites”). When prevention is not possible and pollution occurs, the CERCLA law is implemented, and two scenarios are possible: removal actions (in the case of an immediate hazard that does not require evaluation—e.g., removal of abandoned drums, barrels, of contaminated waste or explosive material) or remedial actions (a long-term cleanup that may take a decade or more to complete). CERCLA has an important role in helping to determine liabilities. Seventy percent of Superfund remedial actions are performed by the responsible parties that are identified by the EPA before the remediation process. The EPA only funds cleanups when the responsible parties are incapable of doing so due to bankruptcy, cessation of a company’s operations, or in rare cases when a company is too small and cannot afford the proper remediation.

In the moderated discussion, all speakers emphasized the importance of prevention over remediation. Preventive measures should be combined with appropriate systematic control to avoid future costs related to pollution. Currently, soil pollution prevention and control capacities, including policy support and technical capacities, are weaker compared to water and air pollution prevention measures. The discussion was joined by **Dimitri de Boer, Chief Representative for ClientEarth’s China Office**, who concentrated particularly on environmental court cases in China, which tend to be focused on existing pollution rather than preventing new pollution from occurring. He stressed the importance of preventive litigation, that is to say, the potential to bring cases when there appears to be a risk of environmental harm, not when the harm is already done. In Dimitri de Boer’s opinion, in contrast to Europe or the United States, the polluter-pays principle is often not applied in China. Steve Wolfson recommended that the polluter-pays principle should be applied whenever possible, and significant taxes should be imposed on the use of potentially hazardous substances, which could be then used for the cleanup by governments. Moreover, in the United States, companies are incentivized to perform cleanup themselves as it is often cheaper than being sued by the EPA and having to deal with additional costs.

Danting Fan from ClientEarth further demonstrated the power of central environmental inspection by using two Chinese cases where government itself falsified the soil test results and allowed the hazardous land to be used by the public. In such cases, the central inspection team can bring governments to court and save the health and life of many people who would have been exposed to toxins. One question from the public referred to opportunities to fund soil remediation projects by private funds or sources. Panellists agreed that the opportunities depend on the specific regional context and therefore differ across China, Europe, or the United States. Two solutions that have been mentioned are applying the polluter-pays principle in as many cases as possible and using taxation to create a fund that can later help

finance remediation projects. **Mr. Dong** shared an interesting innovatory mechanism of insurance that could assure that companies could be held liable to fund remediation projects. However, so far, it is at a very early stage of development, and companies are not incentivized to insure themselves.

Key takeaways:

- Pollution prevention should be the priority; remediation is much more difficult, expensive, and time-consuming than putting in place appropriate preventive measures.
- Contaminated sites should be properly identified, registered, and monitored; an appropriate data system should be put in place.
- There is a need for a clear liability mechanism with a fundamental principle being that the polluter pays.
- Taxation imposed on the use of potentially hazardous substances can be an effective way of creating funds, which can then be used for cleanup by governments when the responsible party cannot be identified and held responsible.

Session 2: Industry Perspective

Soil remediation is a very technical process requiring extensive knowledge in the field, research on contamination, and, finally, the use of appropriate technology and tools. In soil remediation projects, the gap between science and policy is particularly visible. Hence, it is crucial that investors have the opportunity to learn the whole process from the technical side in order to minimize their concerns and understand the prospective benefits. So far, the introduction of modern, sustainable remediation methods is innovatory, but in the long term, it may turn out to be much more profitable for industries, especially in light of climate change, which can be mitigated through appropriate soil management. To discuss some of the biggest challenges faced by industry, such as insufficient capacity or risks associated with soil remediation projects, as well as innovatory solutions that could be applied, Session 2 gathered experts representing research institutes and industry, each sharing innovative technologies and practices in tackling soil remediation.

Thorjørn Larssen, Deputy Managing Director, NIVA, opened Session 2 by drawing attention to the problem that ranks on par with financing: capacity with sufficient expertise. Attainable soil remediation requires extensive knowledge related to the local situation in the field, biodiversity, different contaminants entering the ground, the choice of technology, and impacts on local communities. In his view, it is crucial for potential investors to have an opportunity to learn and understand the whole remediation process from the technical side to minimize their concerns and be more encouraged to invest.

Xiaoming Wan, Deputy Director, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, shared her team's experience in remediating arsenic-polluted land using phytoremediation, a method using plants to reduce the concentrations of toxic substances in the soil. Ms. Wan argues that the technology was landscape friendly, required a relatively small upfront financial investment, and was relatively simple compared to other remediation methods. Ms. Wan and her team are currently working on increasing automation during the remediation process to decrease the cost of manpower, as well as developing a waste-utilization approach that would transform the remaining arsenic waste into an economically viable by-product to offset the whole cost of phytoremediation.

Hua Zhang, Director, Institute of Geochemistry, Chinese Academy of Sciences, shared his team's findings on sustainable remediation of farmland soil contaminated with mercury, emphasizing that the ultimate goals of farmland remediation projects are protecting the life and health of human beings, as well as addressing the concerns of the local community. In his project, he found that selenium acts as a natural killer of mercury pollution exposure, reducing the mercury accumulation in food products such as rice but also reducing the risk of human exposure to mercury. His technology was not only able to eliminate and reduce heavy metals in healthy soil but also to enrich the products with healthy minerals, increasing the quality of agricultural products and therefore creating higher revenues for farmers. Finally, he pointed out the importance of the development of rapid monitoring and inspection technology to ensure the quality and safety of agriculture products.

Noting that both the examples shared by previous speakers would fall into the category of nature-based solutions (NbS), **Nikolai Friberg, Research Director for Biodiversity, Norwegian Institute for Water Research**, shared additional thoughts on the benefit of applying NbS to soil remediation projects. NbS involves working with nature to address societal challenges, bringing benefits to human and ecosystem well-being. They are developed by joining technology with biological or ecological sciences and can be applied to freshwater and terrestrial ecosystems. One such example is planting mangrove forests in the riparian zone of a river to help clean up pollutants and provide living space for biodiversity and carbon storage. Although NbS imply fewer direct costs (i.e., they are cheaper to construct), they are sometimes criticized for indirect costs, such as the loss of valuable land that could be used for a more profitable activity (e.g., agriculture or housing). To avoid such indirect losses, priority areas need to be determined. Mr. Friberg suggested that NbS should particularly be used in places where the indirect costs are insignificant and where they can bring the most benefits, especially by protecting people who live nearby.

Arne Pettersen, Section Leader for Environmental Chemistry, Norwegian Geotechnical Institute, wrapped up the presentations by speaking about the role of a circular economy within remediation projects. Using Norway as an example, Mr. Pettersen noted that around 750,000 tonnes of waste timber is produced each year in the country, which could be converted into a sustainable sorbent called "biochar" that absorbs contaminants when added to soil. Compared to traditional remediation processes that involve very expensive excavation and transportation, Mr. Pettersen noted the biochar method would allow the reuse of the waste timber and generate heat from the process for other purposes. Finally, he noted that the whole process would be environmentally friendly and would protect the health and life of human beings and other ecosystems.

The moderated discussion began with a focus on NbS. Agreeing that one of the biggest advantages of NbS projects is their multifunctionality, speakers noted that each soil remediation project should be tailored on a case-by-case basis. When it comes to challenges, **Mr. Pettersen** mentioned the importance of increasing the knowledge of local communities about pollution and cleanup. Often, people would have the misunderstanding that "cleanup" would require "complete removal of pollution," whereas, in the vast majority of cases, it would be enough to immobilize organic contaminants to reduce the danger. Following a similar line of argumentation, **Mr. Zhang** stressed the significance of risk control and the identification of priority areas for remediation based on the location of people. Noting prioritization should be of particular importance in developing countries due to the limited resources available, he suggested planting fungi as a solution, which can bring direct benefits as they can be cultivated on non-fertile soil and the economic value of these fungi is relatively high. The discussion also stressed the importance of community involvement; in this regard,

Mr. Friberg believes that all the stakeholders, including local communities, should be so-called “co-creators” of NbS.

Key takeaways:

- NbS can be applied in soil remediation projects. These solutions involve working with nature to address societal challenges, bringing benefits to human and ecosystem well-being. Using such innovatory technologies turns out to be more profitable not only for the environment but for farmers and other stakeholders.
- The benefits of NbS could be more obvious when applying a circular economy approach, which is a model of production and consumption that extends the life cycle of products throughout the value chain. For example, the innovatory technology of waste wood pyrolysis allows reuse of the waste timber and turns it into biochar; in addition, it reuses the heat from the process of pyrolysis for other purposes. In such a case, the life cycle of timber is extended.
- Appropriate communication and engagement with all the stakeholders, particularly from local communities, should be prioritized, as they are the most impacted by soil pollution.
- At the backbone of all remediation processes lies the health and life of human beings. Therefore, actions should be prioritized, targeting the most populated and dangerous sites first.

Session 3: Financing Perspective

Soil remediation can be a costly endeavour that depends on a multitude of factors. Aside from the size of the area to be remediated and the costs associated, soil remediation projects face numerous other questions that can introduce complexity in the project financing. These questions include, among others: Who is the actor principally responsible for the contamination? When did the contamination occur? Who will benefit from remediation efforts? Furthermore, these questions are even more difficult to address when the actors responsible for the contamination no longer exist. To address the gap in financing for soil remediation, public and private funds can employ a variety of financing instruments, such as grants, concessional loans, green bonds proceeds, and/or climate funds’ investments. To discuss such innovative sustainable financing solutions to soil remediation projects, the final session had a high-level panel of experts in the financing field.

In his welcoming remarks, **Matthew Gouett, Sustainable Finance Analyst, Economic Law and Policy, IISD**, noted that the fiscal situation for most countries has worsened over the course of the past few years. In particular, countries have taken on more debt to fund their pandemic recovery plans. He therefore stressed the importance of mobilizing private capital for remediation and development projects. Finally, he encouraged a discussion on how to bridge the timing gap between debt financing that may be provided by the issuance of bonds and the fact that remediation takes time.

Chenghui Zhang, Former Director-General of the Research Institute of Finance, Development Research Center of the State Council, set the scene of soil remediation financing in China. The major funding sources for cleanups come from government fiscal revenues. The provinces have earmarked special funds from central and local governments for their respective soil remediation. Another financing option, based on government credibility, is fundraising from the financial market, including bank loans and government

bonds. A final financing alternative is to raise funds from private enterprises. However, the latter remains invariably the most difficult to achieve in practice, which raises the question of how to better mobilize the private capital to support soil remediation projects. Other challenges faced by private enterprises included difficulty in accessing special funds compared to their state-owned competitors.

The Chinese fund system for soil pollution was briefly introduced by **Lan Wang, Associate Professor of Law, East China Normal University**. Special financing for soil remediation in China is a relatively new approach. Before 2011, there were no special funds for soil pollution control there, and soil remediation was treated as part of general environmental projects. Since 2011, some national and local soil pollution control policies have started to appear, and a special fund system for soil pollution prevention and control has only existed since 2016.

In comparison, the financing of soil remediation in the United States is much more centred around private funds, according to **Kenneth Patterson, Director of the Regional Support Division, Office of Site Remediation Enforcement, U.S. Environmental Protection Agency**. U.S. polluted soils are governed by CERCLA (the Superfund law) mentioned in Session 1, which is a very comprehensive law imposing strict liability. This means that a company responsible for pollution must pay for its cleanup, regardless of whether it followed every applicable law at the time of operation or complied with all safety measures. In many cases, since the pollution was caused by multiple companies, there is a joint liability mechanism. In the United States, about 70% of the financial responsibility for cleaning up hazardous waste sites has been borne by the private parties that operated at contaminated sites (polluter-pays principle). Sometimes, it faces a similar challenge to China: the inability to find all the parties that had contributed to the site's pollution. In such cases, when there are limited resources, the most contaminated and dangerous sites need to be prioritized in the National Priorities List for governmental funding.

Ingvild Skumlien Furuset, Research Assistant at Norwegian Institute for Water Research, proposed that aside from the polluter-pays principle, alternative types of financing models might be needed in particular situations. International experience shows that the choice of a suitable financing approach can give good value for money and attracts private capital. For example, the potential value of land is important for selecting financing models. Consequently, the location of the property and its end use are crucial. For example, it is easier to mobilize private funding for remediation in urban areas, as this allows for more profitable developments compared to rural areas. However, some remediation projects do not offer any clear commercial opportunities and will not necessarily result in any revenue streams after restoration. Such projects require more public funding and philanthropic contributions, and both public-private partnerships and crowdfunding may be effective financing avenues in such cases.

The last speaker, **Thiago Chagas, Lead Legal Consultant at Climate Focus**, linked the problem of soil remediation with climate adaptation, highlighting the existence of a few approaches. One approach is ecosystem-based adaptation (EbA), which is essentially a set of actions that promote adaptation to climate change by leveraging ecosystem services and biodiversity and often attribute a stronger role to local communities in implementing those actions. He provided a brief overview of the existing financing mechanisms for EbA measures and how these funding sources could be backed by project developers, enterprises, non-governmental organizations, local communities, and governments themselves. In all the analyzed financing examples and modalities, public sources of finance were made available at the international level by multilateral funds such as the Green Climate Fund. In his view,

several interesting developments on finance for land and soil restoration are currently being developed. Today there is a gold rush for climate credits. Offsetting for soil carbon sequestration activities is gaining momentum, particularly in the United States. But there is also a carbon insetting trend, which refers to a company offsetting its emissions through carbon offset projects within its own value chain. Agreeing with previous speakers, he emphasized the importance of increasing the involvement of the private sector.

The discussions following the panel presentations centred around the financial gap. Worldwide, the extent of contaminated sites awaiting remediation is much greater than the resources available. **Chenghui Zhang** provided an example in China where there are 8,000 polluted sites from former mines in one single province. Similarly, in the United States, while there are approximately 1,300 sites on the National Priorities List, tens of thousands more also need investigation and cleanup throughout the country. **Mr. Patterson** therefore stressed the importance of incentivizing companies who are not responsible for the pollution to invest in contaminated sites. The EPA encourages such companies, ensuring that if they cover some remediation, they will not be held liable for all the pollution of the site.

An interesting concern was raised by **Mr. Gouett**, who asked to what extent the current legislation hinders or discourages private investment in contaminated soil for brownfields. In the United States, the strict liability scheme tends to discourage investment in properties, which are under-investigated because there is a risk that the site is much more contaminated than expected, and the investor would therefore be burdened by additional costs. Therefore, private parties prefer to invest in so-called “green fields.” This results in more sprawling uncontaminated properties, as opposed to cleaning up the contaminated ones. In turn, Chinese laws and regulations do not create barriers for private investors to invest in soil remediation; however, some technical difficulties tend to hinder the private capital (e.g., issues of land leasing; the cost of the bond issuance being higher than bank loans; bank loans being shorter than the long-term process of soil remediation). Panellists generally agreed that reinstating the tax could create a special fund for cleanup. At the same time, the panellists emphasized the importance of enhancing community engagement during the process. Finally, all the speakers agreed that enforcement of current regulatory laws is the best way to prevent the appearance of new contaminated sites.

Key takeaways:

- While there is increasing engagement of private investors in soil remediation projects (particularly those responsible for pollution) in the United States, in China, the vast majority of cleanup is still funded by government.
- Enforcement of current regulatory laws can ensure pollution prevention, which should be the priority.
- International experience shows that the choice of a suitable financing approach can offer good value for money and attracts private capital.
- Several interesting developments on financing for soil remediation are currently being developed, such as carbon credits and carbon insetting.
- Reinstatement of the tax imposed on the use of potentially hazardous substances to create a fund for cleanup and ensuring better community engagement have been proposed as approaches to sustainable financing for soil remediation.