



UNDER THE SURFACE: Remediation is going to be big business with so much land to decontaminate and is crucial to China's urbanization

Credit: Lee Woodcraft

Ground wash

With a fifth of its arable land contaminated China can't afford to look the other way, but the country is struggling to put the incentives in place to start cleaning up

Sweeping problems under the rug can make them disappear from sight for while. Chinese leaders, like their developed world peers, have felt a good grip on the broom for years. However, as they start to do more house cleaning of the economy, many nasty surprises are in store.

In this latest stage of development the heavy industries such as power generation and steel that created huge economic zones on the east coast are heading inland. As those factories move away, they leave with them a legacy of torrid environmental degradation. Poor agricultural practices from the overuse of pesticides have also laid waste to much terrain.

According to a major recent official survey, up to 16% of soil is polluted and almost 20% of arable land is contaminated,

About 8 million acres has been declared polluted beyond agricultural use – an area roughly the size of Belgium. With China supporting a fifth of the world's population on only around 8% of its arable land, the country needs every last bit of farmland it has to feed its people. Land must also be cleaned up to accommodate new homes and residential communities springing up across the country in the wake of a frenzied pace of urbanization.

Beijing is waking up to this prob-

lem and realizing it can't overcome it alone. The state is responding with new policies and increased investment, attracting foreign companies with much needed experience and advanced solutions. But the domestic soil remediation industry is not only lacking in terms of technology, there is an absence of rules and regulations: The required policy simply does not exist yet. Until that is done, and ways are found to get more private and public money into cleaning farmland, major social and health risks will stick around.

An invisible disaster

To most observers the filthy air that

clogs major cities and rafts of dead fish cluttering waterways are the obvious signs of three decades of break-neck development. Toxic sludge pits are pretty illustrating as well. By contrast, soil pollution is often invisible – and in many ways worse.

Damaging contaminants have leaked into the soil across much of China. Among the most often found in tests is cadmium, which is known to cause lung and liver disease and may increase the risk of cancer. Pesticides from agricultural production are another major pollutant.

China's food supply is under threat. Contaminants leech into rivers and aquifers, tainting the water supply. Cadmium doses in the soil are highest in regions that house mining and smelting industries, which often happen to be major agricultural regions too, Greenpeace noted in a recent report. Last year the government of Guangdong province shocked the public by declaring that 44% of rice samples had excessive levels of cadmium. Greenpeace warns of "arsenic rice."

Acknowledging the severity of the problems is the first step for the government to come up with viable ways to tackle them. The official survey, conducted jointly by the environmental protection and land resources ministries, went some way to doing that. Never before had they publicly released data on this field that could be classified as a "state secret."

Then there are signs that greater policy support for action is in the works, a key trigger for things to get done. Environmental authorities in March passed a plan to tackle soil pollution. But it's still far too soon to expect brown fields to turn green in the near future.

Technical challenges

Soil pollution is not only hidden from the eye; it's hard for advanced equipment to detect and even worse to map. The degree of contamination can differ dramatically from one square meter to the next, requiring extensive testing to understand a single site, experts said.

The sheer scale of China complicates the viability of solutions. "The

average [remediation] project size in China is estimated to be about 150,000 tonnes [of soil]," said Stephen Clarke, vice president of business development at West Mountain Capital, a Canadian firm specializing in pesticide contamination that is working on remediation projects in China. "The largest site to have ever been remediated in Canada... was 125,000 tonnes. And there was only one of those."

There are estimated to be 300,000 contaminated sites of widely varying size in China, said Clarke, who has seen proposed projects that exceed one million tonnes.

Treating this problem is simply beyond China's current capabilities in a way that potentially inflates the problem. Soil remediation can be done on-site or off-site. Chinese companies usually go with the former, which involves digging up all the soil, trucking it somewhere, and typically burying or burning it. At minimum, this involves moving tens of thousands of truckloads of dirty soil, which invites spillage accidents. Burying may simply result in moving the problem, and while burning can be done safely under the right controls, it can easily dump pollutants into the air if not managed correctly.

Foreign companies with decades of experience cleaning up their own homes first come with a different solution. Typically they either excavate, process and replace dirty soil on site, or undertake in situ treatment without displacing the earth at all. West Mountain Capital's current project in Hangzhou, which is remediating the site of a former pesticide plant slated for urban development, involves on-site excavation. The company is importing customized machines to do the job. While Clarke maintains that it's tough to know what a standard project looks like in such an infant industry, the Hangzhou site is certainly not uncommon.

The inability of China to clean up its own mess is a boon for international operators. The country already represents more than 90% of revenue for West Mountain Capital. Demand is only going to grow, and if Beijing

pumps more cash into it, the returns could look even better. Separate estimates from Japan's environmental agency and the state-run *China Securities Journal* value the Chinese remediation market at around US\$18-19 billion per year by 2020.

A localized problem

Cleaning up the soil will require more from foreign firms than just shipping over machines, however. They need to dig in for the long haul to have any real impact.

The technical challenges posed in China mean that a company has to develop its local operations on a project-by-project basis. Every soil remediation project is essentially a local project: Soil and pollutants differ from site to site, and continent to continent. "There is a need to develop specific solutions because the soil and the land is different," said Oliver Wu, president of Liaoning Huafu Group. Huafu is working on a pilot remediation project with a Canadian firm.

Being forced to work on the ground has its benefits – it could lower the chance of intellectual property theft. This is particularly relevant to industries such as remediation that require advanced proprietary technology and equipment. Major international manufacturers of trains, autos and solar panels have seen local firms overtake them after copying their technologies used in joint projects.

"The intellectual property rests on how the remediation strategy is applied and managed, and how the unexpected is addressed. That's critical," says Bengt von Schwerin, Asia Pacific managing director of environmental services for AECOM, a leading global company in soil remediation. "It's the experience that makes the difference. From a remediation perspective, that's the difference between making money and losing the company."

Von Schwerin also emphasized that implementing the all-valuable experience itself depends on a high degree of cooperation with Chinese firms and experts. Local players already understand the indigenous soil characteristics as well as the business and political scene – necessary >>

>> components to a profitable project.

All this impacts the way companies do business in this space. AECOM's offices operate as a wholly foreign-owned enterprise in China, but projects are often done as partnerships. At times AECOM takes the lead, at other times it assumes a supporting role. As von Schwerin says, it's "horses for courses," and in fact not all that different from doing business elsewhere in the world. Companies should adapt to the local conditions, soil and otherwise.

Only the largest foreign firms will have the resources to get through such a process. And yet despite their scale they have nowhere near enough capacity to take on an area the size of a small European nation, which some experts see as only the tip of iceberg of contamination.

More policies, please

China is not alone in facing the challenges of a major post-industrial economy. The US, Canada and Australia, at least in terms of geographical scale, faced similar problems.

"If you take the US Superfund mechanism for example, initially it created a lot of money for lawyers, but didn't really remediate any sites," said von Schwerin, referring to a program set up in the 1980s that allows the authorities to clean up polluted areas and also force responsible parties to act. "China has the benefit of understanding what getting it wrong

up front means."

Whether policymakers are learning from those historical lessons isn't clear. China still lacks a solid policy framework to cover remediation. The cleanup plan presented by the Ministry of Environmental Protection earlier this year still has to be approved by the State Council. Until it is there are only patchwork policies in place in addition to vague promises by officials. Beijing has been pledging to clean up the environment since the late 1980s. Critics are still waiting.

Some industry insiders are more optimistic. Von Schwerin sees remediation guidelines being developed and applied for rigorously in the next five years, and more strict enforcement happening in the next ten – seemingly a long time, but much shorter than the decades it took to build adequate systems in other countries. Until then, firms are free to try their hand at cleaning up.

"There aren't that many clear barriers from the government right now, just a lot of encouragement," notes Huafa Group's Wu.

Such freedom won't do much to help address soil pollution through a systematic process, which is really what is needed. Under-regulated sectors are prone to breaking rules. Clarke from West Mountain Capital pointed out that companies can offer a variety of remediation services in China across different price points. But without set standards it is hard

to know whether a site that has been cleaned up is in fact actually safe for end use – especially when "safe" differs considerably from land that will support apartment blocks to land that will support crops.

The money flow

Without policy and financial support from Beijing it will be a challenge to direct investment in remediation to agricultural land. But in order for that to happen, some serious conflicts that already exist between the central and local governments will need to find resolution.

As industry is pushed away from urban centers, land is being freed up for other use, mainly luxury and commercial development in cash-strapped cities, says Charlie Welsh, founder of XportReporter, an intelligence company. Local governments rely heavily on sales of land-use rights for their income. Overall, the economy is unhealthily dependent on property.

"There is a profit motive for them to actually invest there and get that land properly treated, as opposed to believing that 'we must improve the farmland'," said Welsh. "Anything that results in improving somebody's bottom line is where you see the real investment taking place."

The importance of tackling residential development sites shouldn't be underestimated, especially given the continued push for urbanization. But fixing up farmland is a bigger public health issue, one that will need to be fixed, at least initially, with government cash and not private investment.

Who pays is debatable. Amid all the talk of state support for the sector there is little clarity on where the burden lies. Local authorities already shoulder much of China's social welfare spending and can hardly afford to carry more.

Yet some public financing is starting to trickle through, says von Schwerin, although like any other major funding program it takes time to get to the actual remediation.

"It is a constant battle between land use and financing," said Clarke. "The challenge is large enough to be considered generational." ♦



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