Enhancing Sino-UK policy convergence, technical co-operation and business opportunities in soil and groundwater management and remediation under rapid urbanisation

This project has received funding from the Foreign Common Office’s Prosperity Fund programme (project 15SU32)
A wide team of collaborators and advisors across China and UK

Quadruple Helix Innovation

Government, Academia, Industry and Citizens collaborating together to drive structural changes far beyond the scope of any one organization
Core team

- **Government**: DEFRA, Environment Agency, DCLG,
- **Universities**: Aberdeen, Nottingham, Oxford, Reading, Brighton
- **Private/Public sector**: Arup, Atkins, AECOM, BSR, CL:AIRE, Ecologia, RAW ltd, British Geological Survey, Knowledge Transfer Network
- **City**: Manchester (for now – pilot city)

- **Government**: MEP, ACCA-21
- **Universities**: South University of Science and Technology of China, Tsinghua University, Chinese Research Academy of Environmental Sciences (CRAES), Institute of Soil Science Chinese Academy of Sciences (ISSAS), CAEP, Research Centre for Eco-environmental Sciences (RCEES, CAS), CEES
- **Industry**: CECDADI (China Energy Conservation DADI Environmental Remediation Co. ltd)
- **City**: Liuzhou (for now – pilot city)
Project deliverables - Overview

Informing and guiding China’s policy on con land management

Establishing UK-Sino demonstration centres to create business opportunities between UK and China

Engaging public and professional audience in China and UK

Training to raise awareness and ensure long term impacts
Executive Summary
Submitted in Environment International
Website supplemented with 1st case studies
Geochemical mapping of England and Wales

Survey

Joint China-UK report – 1st Draft report

Joint China-UK report – release and way forward

Workshop Beijing
Manchester City visiting Liuzhou and way forward for UK Innovate bride project
Training
Project closure

Developing urban contaminated and brownfield land management policies in China: learning from and adapting the UK experience
Project context

China's rapid urbanisation and the contaminated land: land use change
- rehabilitation of contaminated post-industrial urban sites
- clearing up of legacy mining and industrial sites outside cities
- decontamination of farmland

China's developing prioritisation and policies for soil and water protection and management
- 13th five-year plan 2016-2020
- 12th five-year plan 2011-2015
- Soil Environmental Protection Law drafting
- China's first nationwide soil quality survey (MEP, 2014)

China's soil regulatory framework: needs for comprehensive legislative framework and funding systems

China's developing technical guidelines and risk-based approaches for managing contaminated land
- Contaminated land characterisation
- Contaminated land assessment
- Contaminated land remediation
- Land remediation verification

International technical collaboration and knowledge exchange in the development of risk-based approaches and management systems
- Model for Redevelopment of contaminated sites
- International Cooperation Platform
- Common framework to protect human health and the environment
- Connecting research, field applications, and industrial investment to maximise and sustain contaminated land management and redevelopment

Learning and adapting
- Collaborating
- Learning
- Adapting
Evolution of contaminated land management

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Ignorance</th>
<th>Recognition</th>
<th>Increasingly understanding (and expectation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>Apathy</td>
<td>Outrage</td>
<td>Increasingly objective response</td>
</tr>
<tr>
<td>Remediation</td>
<td>None</td>
<td>Complete removal</td>
<td>Risk-based</td>
</tr>
</tbody>
</table>
## Process of managing land contamination

### Policy

1. Part 2a EPA 1990 and associated **Statutory guidance**
2. Planning Policy Statement
3. CL:AIRE **Industry Code of Practice (CoP)**

### Tool: Risk Assessment

- **Tier 1:** Preliminary Risk Assessment
- **Tier 2:** Generic Quantitative Risk Assessment (GQRA)
- **Tier 3:** Detailed Quantitative Risk Assessment (DQRA)
Why risk-based approaches are necessary?

- It’s a huge potential problem - very many activities have the potential to affect soil and groundwater and many places are already polluted;

- We do not have the resources (money or people) to deal with everything at once;

- There is huge technical and scientific uncertainty about the sub-surface environment;

- In addressing the need for, and scale of, action to be taken, the text in UK legislation refers to:
  - “the significant possibility of significant harm”;
  - “take account of sustainability and cost benefit”.

Requirements for risk assessment

(after, DETR et al, 2000)
Understanding the risk assessment review process

**Available Data**
- Little site data
- Extensive site / receptor characterisation

**Uncertainty**
- Large uncertainty bound, wide range potential std
- Less uncertainty, more specific

**Include Risk Management**

**Soil / Groundwater / Sediment Concentration**
- Generic standard
- Site specific standard
- Risk Managed Standard

- Tier 2: Generic RA
- Tier 3: Detailed RA
## UK regulatory regimes for dealing with land contamination

<table>
<thead>
<tr>
<th>Domestic Legislation</th>
<th>Requirements</th>
</tr>
</thead>
</table>
| **Environmental Protection Act 1990 : Part 2A**  
Contaminated Land Statutory Guidance 2012  
Introducted as a means of dealing with the legacy of contaminated land arising from the historical use of land. | - **Local Authorities** are under a duty to **inspect their areas** to identify contaminated land causing pollution or significant harm.  
- Require action to **make land suitable for current use** using an agreed strategy. This can be **voluntary or through an enforcement** notice or carried out by regulators. |
| **Town and Country Planning Acts and Regulations 1990**  
Planning and Development Control | - **Contamination is a planning consideration** and conditions can be imposed requiring assessment and remediation as part of the planning conditions.  
- **Developers responsibility** to address contamination |
| **Environmental Permitting Regulations 2010**  
Permits require the prevention of contamination and clean up to a high standard. | - Allows regulators to set permit conditions and enforce them.  
- Permits can require remediation and a site may be required to be returned to a satisfactory state.  
- Remediation activities may need permitting.  
- Requires the **prevention of hazardous substances being discharged** to the **groundwater** causing pollution. |
| **Environmental Damage Regulations 2009**  
Aim to prevent environmental damage. | - Preventing new land contamination that will damage water or health.  
- If damage does occur, comprehensive clean-up will be required (often to **pre-incident conditions**) to species, habitats, water environment and land.  
- Can also include for compensation. |
Guidance

1. Technical risk management framework for dealing with land contamination in the UK
   - Part 1: Details the process for risk assessment, options appraisal and implementation of remediation
   - Part 2: Technical information to support the process
   - Part 3: Sources of further information and guidance

   - The document provides generic guidelines for the assessment and management of environmental risks.

3. Replaced by the guidance on Risk assessments for your environmental permit (1st Feb 2016)
Lessons learnt from the UK system

- Waste legislation has had a major impact on the way the UK has approached the remediation of land contamination.

- Once particularly challenging area has been the definition of waste.

  - Materials are considered to be waste in accordance with European legislation if they are discarded, intended to be discarded or required to be discarded, by the holder. Once discarded, they remain a waste until fully recovered.

  - For many years, this definition of waste led to confusion as to whether excavated soils would be considered as waste, and the position of the environmental regulators was not consistent.

  - There were a number of waste exemptions that could be applied for, particularly if materials were to be used as construction materials, that ensured compliance with the regulations, but these were not uniformly applied.
Lessons learnt from the UK system

- An industry initiative was co-ordinated by CL:AIRE to develop a recognised **Code of Practice** to provide clear guidance.

- The **Definition of Waste: Development Industry Code of Practice** (DoWCOP) enables
  - Direct transfer and reuse of clean naturally occurring soil materials between sites
  - Conditions to support the establishment/operation of fixed soil treatment facilities
  - Reuse of both contaminated/uncontaminated materials on their site of origin and between sites within defined **Cluster** project.

The principles for the reuse of material as non waste are:
- Protection of human health and the environment
- Suitability for use, without further treatment
- Certainty of Use
- Quantity of Material

March 2011
Adopting sustainable remediation (SuRF-UK)

SuRF-UK is the United Kingdom’s Sustainable Remediation Forum – an initiative set up in 2007 to progress the UK understanding of sustainable remediation.

Guidance based on multilateral inputs from different practitioners and stakeholder interests (CL:AIRE 2010).

SuRF-UK operates via a Steering Group who have overseen a series of meetings and projects.

SURF UK is coordinated by an independent charity, Contaminated Land: Applications in Real Environments. [www.claire.co.uk/surfuk](http://www.claire.co.uk/surfuk)
SURF-UK roadmap

Framework & guidance
- SuRF-UK Framework and Annex 1 - Indicator Set
- SuRF-UK Indicator Report

Executing sustainable remediation
- Sustainable Management Practices
- Project Framing and Planning a Sustainability Assessment
- Tier 1 - Qualitative Assessment
  - SuRF-UK Briefcase
- Tier 2 - Semi-quantitative Assessment
  - Links to guidance
- Tier 3 - Quantitative Assessment
  - Links to guidance

Supporting materials
- Illustrative Case Studies, reports, information sources
- SuRF-UK case studies and bulletins, Journal paper, SuRF-UK webinar
Manchester and Liuzhou cities: case study and pilot partners
China’s soil and groundwater management challenges: lessons from the UK’s experience and opportunities for China

Frédéric Coulon¹, Kevin Jones², Hong Li², Qing Hu³, Jingyang Gao³, Fasheng Li⁴, Mengfang Chen⁵, Yong-Guan Zhu⁶, Rongxia Liu⁷, Ming Liu⁸, Kate Canning⁹, Nicola Harries¹⁰, Paul Bardos¹¹, Paul Nathanail¹², Rob Sweeney¹⁰, David Middleton¹³, Maggie Charnley¹³, Jeremy Randall¹⁴, Martin Richell¹⁴, Trevor Howard¹⁵, Ian Martin¹⁵, Simon Spooner¹⁶, Jason Weeks¹, Mark Cave¹⁷, Fang Yu¹⁸, Fang Zhang¹⁹, Ying Jiang¹, Phil Longhurst¹, George Prpich¹, Richard Bewley²⁰, Jonathan Abra²¹, and Simon Pollard¹
Lessons from the UK’s experience and opportunities for China

Key concepts covered
1. China’s rapid urbanisation and the contaminated land debate
2. China’s developing prioritisation and policies for soil and water and the scale of the challenge
3. Setting the soil regulatory framework, key to defining management of contaminated land
4. Learning from and adapting the UK’s experiences

Joint actions suggested
1. Establishing channels for mutual learning and understanding on con land management issues
2. Creating a constructive broad-based partnership involving civil society, regulators, the scientific community and business interests
3. Promoting the development of a framework connecting research, field applications, and industrial investment
4. Building upon existing work to create a progressive alliance with a view to attain policy and practice convergence and joint action
5. Promoting business opportunities between China and UK along with technical cooperation
Key output 2 – online survey

The aim of the survey is two-fold:

1. understanding how the UK and China can cooperate more widely in the remediation of Chinese contaminated land

2. understanding the barriers (real or perceived) for UK collaboration in the wider Chinese contaminated land remediation market place.

Follow this link to the Survey: Take the survey

Or copy and paste the URL below into your internet browser: https://cranfielduniversity.eu.qualtrics.com/SE/?SID=SV_3qsnRvWsbFolgI5
## Key output 2 – online survey

<table>
<thead>
<tr>
<th>Theme (Drivers)</th>
<th>Principals (questions/ descriptors)</th>
<th>Criteria (answers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic</td>
<td>Series of questions that challenge market entry for UK companies/ barriers to realisation of market</td>
<td>Market segmentation/ sector opportunities/ partnerships/ etc.</td>
</tr>
<tr>
<td>Sustainability</td>
<td>Questions aimed at understanding the business drivers to protect the environment / opportunities in contaminated/ remediated land</td>
<td>Access to finance/ barriers to implementation</td>
</tr>
<tr>
<td>Environment</td>
<td>Maintain regional and global environmental quality</td>
<td>How to make best use and ensure efficient use of available resources</td>
</tr>
<tr>
<td>Governance</td>
<td>Demonstrate sustainable and ethical / industry and government governance</td>
<td>The level of political risk</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Understanding of market segmentation/ opportunities in agriculture/ food production</td>
<td>Efficient production systems</td>
</tr>
<tr>
<td>Market entry</td>
<td>Understanding of perceived and real barriers to technology adoption, political/ cultural etc.</td>
<td>Future legacy</td>
</tr>
</tbody>
</table>
Barriers to undertake contaminated land remediation projects in China

The diagram illustrates the impact of various factors on the ability to undertake contaminated land remediation projects in China. The factors include:

- Culture differences (e.g., language)
- Availability of investment
- Ability to return a profit because of local/international restrictions
- Local governmental licensing and permitting
- National government policies and procedures
- Availability of local expertise/specialist
- Health and Safety culture
- Local specialist equipment

The graph uses different colors to represent the level of impact:
- Red: Somewhat a barrier
- Green: Moderate barrier
- Purple: Strong barrier
- Blue: Not a barrier

The diagram shows that culture differences (e.g., language) and health and safety culture are significant barriers, while availability of investment and national government policies and procedures are less of a concern.
What type of information would you need to increase the level of work in China?

<table>
<thead>
<tr>
<th>Priority 1</th>
<th>Priority 2</th>
<th>Priority 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>research funding</td>
<td>knowledge transfer funding</td>
<td>partnership for projects</td>
</tr>
<tr>
<td>Regulations</td>
<td>contractual information</td>
<td>Skills required</td>
</tr>
<tr>
<td>Understanding the market and clients</td>
<td>details on regulatory drivers</td>
<td>general information on trading in China</td>
</tr>
<tr>
<td>Regulations</td>
<td>Funding</td>
<td>Event facilitating tendering</td>
</tr>
<tr>
<td>Regulatory framework changes</td>
<td>Skills required</td>
<td>Funding</td>
</tr>
<tr>
<td>Mechanisms to enter the market</td>
<td>Clear legislation</td>
<td>Favourable commercial environment</td>
</tr>
<tr>
<td>Evidence of hard opportunity</td>
<td>Evidence of commitment of Chinese partnerships</td>
<td>Clarification of financial exposure</td>
</tr>
<tr>
<td>Clear opportunities</td>
<td>Certainty in outcomes</td>
<td>Reliable collaborators</td>
</tr>
</tbody>
</table>
Important factors when considering contaminated land projects in China

- **Impact on local redevelopment**
- **Impact on local human health**
- **Impact on your organization’s profitability**
- **Impact on the local environment**
- **Impact on the local economy**

The survey results indicate the following importance levels:

- Not important
- Somewhat important
- Neither unimportant nor important
- Important
- Very important
Key Output 3 - Joint report

1. Overview
2. Current land status affected by contamination in China - challenges and ambitions
3. Reuse of Brownfield Land in the UK
4. UK Regulatory Framework and Guidance
5. Financing and Delivery of Brownfield Development in the UK
6. Sustainable Land Use
7. Further Reading
1. The land contamination challenges and ambition – status quo in UK & China

2. Regulatory frameworks for land contamination and opportunities for policy convergence

3. Land contamination, remediation and redevelopment

4. Recommendation for a Sino-UK Innovation Alliance for Soil and Groundwater: Learning from and adapting UK experiences

Developing comprehensive risk-based and incentivized contaminated land management in China under fast urbanisation
Getting involved and contributing to the project

• Consultation and review on draft report March and April 2016
• Policy development with DEFRA and MEP
• Business/technologies opportunities with BIS/MoST
• Feeding Sino-UK website
• Contributing to questionnaire to understand to what extend UK companies have engaged in China (barriers, opportunities, and what is really transferable from UK to China
• Supporting/contributing application from UK partners and linking to our project
Contaminated Land Management

China's fast urbanisation, along with huge expansion of its manufacturing industry, have brought great wealth and transformed the lives of Chinese people. As cities continue to expand, many older industrial facilities are being relocated or closed, leaving behind derelict, underused and abandoned land contaminated by the former industrial activities.

This project has received funding from the Foreign Common Office's Prosperity Fund programme (project 1SSU32)

Foreign & Commonwealth Office

VISIT OUR WEBSITE

HTTP://CNUKCONTAMINATEDLAND.COM/UK/
Thank you for listening, collaboration and comments/questions