Brownfields in China: How cities recycle industrial land

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September 23, 2013
What is Brownfield?

- **Definition of brownfields** (USEPA): Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

- Types of brownfields:
  - abandoned industrial and railroad facilities, or traditional manufacturing plants
  - small commercial lots (e.g., gas stations or laundry businesses)

USEPA: United States Environmental Protection Agency
Brownfield Redevelopment Process in the U.S.

Image by MIT OpenCourseWare.

Urban Expansion of Beijing

1983

2000

Image by MIT OpenCourseWare.
2010
6,421 sq km
population: 11,741,000

Aerial map of Beijing removed due to copyright restrictions.
Source: Beijing, 2010 from Berkeley’s Global Metropolitan Observatory.
Statistics of Industrial Relocation in Beijing

<table>
<thead>
<tr>
<th></th>
<th>1996-2000</th>
<th>2001-2005</th>
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</thead>
<tbody>
<tr>
<td>Enterprises relocated within the five years (unit)</td>
<td>59</td>
<td>142</td>
</tr>
<tr>
<td>Vacated land (acre)</td>
<td>420</td>
<td>2,175</td>
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</tbody>
</table>

Source: compiled by author from various years of Beijing Five-Year Plans.
City plans removed due to copyright restrictions.
Proposed Industrial Land Location in Beijing (2020)

City plans removed due to copyright restrictions.

Source: Beijing Master Plan (2004-2020)
The Big Question

• During a brownfield law deficient period, in what ways has land contamination been taken into account during the redevelopment process?
Land Banks in the U.S.

- 1960s
- Public authorities
- Vacant, abandoned or foreclosed properties
- Revitalize blighted neighborhoods

Examples: The Indy Land Bank; Genesee County Land Bank; Guyahoga Land Bank
Land Banks in China

- 1996  Shanghai
- 1997  Hangzhou
- 2001  Beijing
- Over 2000 cities and counties
Purposes are to...

- Enhance government intervention
- Circumscribe land speculation
- Increase local revenue
Local Revenues from Land Sale, 2010

- **Beijing**
  - Total revenue: 235 billion ($37 b)
  - 30% of total revenue
  - 70% Land leasing

- **Shanghai**
  - Total revenue: 287 billion ($46 b)
  - 47% of total revenue
  - 53% Land leasing
Structure of Revenue from Land Sales, Beijing

- **2009**: 709 (Industrial: 183, Commercial: 38, Residential: 38)

162 Billion ($26 billion) 93 Billion ($15 billion)

Image by MIT OpenCourseWare.
Unintended benefit

- Solve land contamination problem
Land Banking System Contributes to Two Institutional Changes

- Land market reform

  State-led ➔ Promote ➔ Non-state actors

- Environmental governance

  Command-and-control ➔ Collaborative
Property Rights

Political cartoon removed due to copyright restrictions.
Land Market Reform

- Before 1988, administrative allocation
- Since 1988, paid transfer of land use rights (LURs)
- 2004, land banking system
Land Use Rights (LURs) Transfer, 1988-1995

The primary land market...Change of land ownership and LURs leasing

The secondary land market...Entire transfer of LURs

The tertiary land market...Partial transfer of LURs

Source: Tian and Ma (2009)
Land Use Rights (LURs) Transfer

- The primary land market
  - Municipal gov’ts
  - State-Owned Enterprises (SOE)

- The secondary land market
  - State-Owned Enterprises (SOE)
  - Real estate developers

- The tertiary land market
  - Real estate developers
  - Final users
Land Sale through Negotiation

Political cartoon removed due to copyright restrictions.
Tender-Auction-Listing strictly enforced for all land sales since 2004

The primary land market

The secondary land market

The tertiary land market

State-Owned Enterprises

Land Center

Real estate developers

Auction

Sell
Political cartoon removed due to copyright restrictions.
Question

How is the land banking system conducive to solving contamination problems in the redevelopment process?
Location of the Chemical Plant

Source: Modified from Beijing Studio, MIT 2008
Capital Iron- and Steel-Making Plant, Beijing

- The 2nd largest steel producer
- Large scale--District wide
- Land area: 7 square kilometers

Taken in January 2008 by Xin Li
Beijing Chemical Plant
2009 Auction of the Chemical Plant Site

Photograph from auction removed due to copyright restrictions.
• 2002    Plant closed

• 2010    New construction started
Stakeholder Analysis

• Who are the stakeholders in the redevelopment process?
  – Who affects the redevelopment?
  – Who is affected by the redevelopment?

• In what way can these stakeholders influence the environmental outcome?
Data

• Interviews

• Government documents

• Newspapers
Stakeholder Typology

Source: Mitchell et al. (1997).
# List of Stakeholders

<table>
<thead>
<tr>
<th>Stakeholder Type</th>
<th>Attributes</th>
<th>Stakeholder Representation</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Power</td>
<td>Legitimacy</td>
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<tr>
<td>1 Dormant</td>
<td>X</td>
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<td>2 Discretionary</td>
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<td>X</td>
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<tr>
<td>3 Demanding</td>
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<tr>
<td>4 Dominant</td>
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<td>X</td>
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<td>6 Disruptive</td>
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<tr>
<td>7 Definitive</td>
<td>X</td>
<td>X</td>
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Delayed Redevelopment Process

- **2002** Plant closed

- **Land Center owned LURs**
  - **2003** LURs transfer to the land center
  - **2004** Site sold through public listing, unsuccessful
  - **2006** Site cleared, but not cleaned
  - **2008** A citizen reported buried chemicals
    - Environmental agency involved
    - Cleanup procedure set up
  - **2009** Site auctioned
    - Disclosure of contamination information
    - Cleanup responsibility
    - Public commenting on rezoning request

- **2010** Construction started
Findings

• The land center is more responsive to public concerns
• Increased awareness of contamination risks
• Improved public participation in brownfield redevelopment
Timeline: United States versus China

1960s-1970s
- Deindustrialization
  - plants closed
  - job loss
  - reuse of industrial land
  - weak regulation
  - environment incidence

1980s
- Stringent regulations
  - plants abandoned
  - local economic depression
  - high crime rate

1990s
- Regulation modification
  - economic revitalization
  - liability release
  - gov’t supports (financial and technical)

2000s
- Flexible liability regulation
  - financial incentives
  - institutional setting to ensure healthy brownfield redevelopment

Deindustrialization happened in China
<table>
<thead>
<tr>
<th>Stage One</th>
<th>Outburst of environmental problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>Clean air act passed</td>
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<tr>
<td>1972</td>
<td>Federal water pollution control act passed</td>
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<td>1974</td>
<td>Safe drinking water act passed</td>
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<tr>
<td>1976</td>
<td>Resource conservation and recovery act (RCRA) passed</td>
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<td></td>
<td>Toxic substances control act passed</td>
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<td>1978</td>
<td>Love canal showcases toxic waste threat</td>
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<thead>
<tr>
<th>Stage Two</th>
<th>Stringent regulation</th>
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<tbody>
<tr>
<td>1980</td>
<td>Comprehensive environmental responses, compensation and liability act (CERCLA) passed</td>
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<td>1986</td>
<td>Superfund amendments and reauthorization act passed</td>
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<thead>
<tr>
<th>Stage Three</th>
<th>Flexible liability regulation and financial incentives</th>
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<tbody>
<tr>
<td>1993</td>
<td>EPA creates Brownfields Economic Redevelopment Initiative</td>
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<tr>
<td>1995</td>
<td>EPA develops Brownfield Action Program</td>
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<td>2002</td>
<td>Small Business Liability Relief and Brownfields Revitalization Act passed</td>
</tr>
</tbody>
</table>

China’s Brownfield-Related Legislation

<table>
<thead>
<tr>
<th>Stage</th>
<th>Outburst of environmental problem</th>
<th>1986 Land Management Act, revised in 2004</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1989 Environmental Protection Act</td>
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<td></td>
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<td>1994 Real Estate Management Act</td>
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<td></td>
<td></td>
<td>1995 Solid Waste Polluting Environment Protection and Remediation Act, revised in 2004</td>
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<td></td>
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<td>1995 Environmental Quality Standard for Soils</td>
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<td>1998 Construction Project Environmental Protection Management Regulation</td>
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<td></td>
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<td>1999 Environmental Quality Risk Assessment Criteria for Soil at Manufacturing Facilities</td>
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<tr>
<td>Stage</td>
<td>Stringent regulation</td>
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<tr>
<td>Two</td>
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<tr>
<td>Stage</td>
<td>Flexible liability regulation and financial incentives</td>
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<td>Three</td>
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Source: modified from Kang and Hua (2007)
Key Components of Brownfield Redevelopment

**Government's Responsibilities**
- Contamination standards
- Liability specification
- Technical assistant on remediation
- Financial support
- Monitoring
- Evaluation

**Development Procedure**
- Site assessment
- Risk and liability assessment
- Evaluate remedial options
- Develop Implementation Plan
- Fund-raising
- Obtain development permit
- Remedy Implementation
- Begin Redevelopment Activities