Going down in fragmentation

Fragmented legal responsibilities and regulations to deal with land subsidence in China and The Netherlands

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NINGBO, CHINA: Yangtze Delta

Drivers: Groundwater abstraction for civil society (industry, drinking water)

Impact: Subsidence: 514.9 mm between 1964-2008/296.5 km², floods, city will disappear in the East sea by 2030 accident in 2012: collapse of a building

Solutions: Multi level and multisector regulations: from mono sectoral geological disaster regulation towards multi-sector, multi-level and multi-actor approach
SHANGHAI, CHINA: Yangtze Delta

Causes: Building for rapid urbanization (30%), groundwater abstraction (70%)

Impacts: Land subsidence (1921-1965: 1690 mm; 1966—2006: 230 mm), Economic loss: 24.6 billon RMB (3.8 billion US Dollars)

Solutions: Multi level and multisector regulations: from mono-sectoral geological disaster regulation towards multi-sector, multi-level and multi-actor approach
KOCKENGEN, NETHERLANDS: Rhine delta

Causes: Drainage for water safety, Natural subsidence, Water level management (more efficient land use and agriculture), Groundwater withdrawals / infiltrations

Impacts: Damages to buildings, sewers, roads, gardens, cables, pipes, environment, etc. Flooding during heavy rainfall and increasing flood risks from surface water

Solutions: Multi level and multisector regulations: no specific regulations or policies to address land subsidence
Land Subsidence Knowledge in China

• Cities with subsidence >50
• 79,000 sq km > 200mm

Three Main Regions
North China Plain:
• Around 6,200 sq km with the cumulative subsidence of 200mm

Yangtze River Delta:
• Around 10,000 sq km with the cumulative subsidence of 200mm

Fenwei Basin:
• Around 7000 sq km with the cumulative subsidence of 200mm
Land Subsidence in the Yangtze River Delta

Area: 26,830 sq km, 1/3 affected by an accumulative subsidence of more than 200 mm

<table>
<thead>
<tr>
<th>Stages</th>
<th>Substance Rate (mm/a)</th>
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<tbody>
<tr>
<td>Development (1921–1948)</td>
<td>24</td>
</tr>
<tr>
<td>Obvious development (1949–1956)</td>
<td>40</td>
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<tr>
<td>Dramatic development (1957–1961)</td>
<td>100</td>
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<tr>
<td>Slowing down (1962–1965)</td>
<td>60</td>
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<tr>
<td>Rebounding (1966–1971)</td>
<td>-3</td>
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<tr>
<td>Slight growth (1972–1989)</td>
<td>3.5</td>
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<tr>
<td>Slow growth (1990–2001)</td>
<td>16</td>
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Land Subsidence Knowledge in the Netherlands & Kockengen

Historische verlaging van het maaveld in Holland

Sea level rise 3 - 10 mm/year

Subsidence 6 - 100 mm/year

Gevolgen van bodemdaling nu

Heicop
Overige Dorpskern
Agrarische polder
Solutions: fitting within the SDGs
Solutions Ningbo: involve more authorities

Before 2008: geological disaster only: Land resource department
After 2008: multi sector governance: 14 departments involved

Solutions Ningbo: multilevel regulatory framework with particular attention for subsidence

- Regulations on disasters in general
  - Geological Disaster Prevention Regulations (2004)

- Yangtze River Delta region: Land Subsidence Regulation: Monitoring and knowledge and information sharing
  - Agreement on Yangtze River Delta Regional Cooperation
  - System of Provincial Joint Meeting of Yangtze River Delta Region for Land Subsidence Governance.

- Regional regulation (Zhejiang Province) specific for subsidence:
  - Zhejiang Provincial People's Government on strengthening the Prevention and Control of Land Subsidence
  - Zhejiang Province geological disaster prevention regulations (2010)

- Local regulations (Ningbo City)
Solutions Ningbo: a mix of policy instruments designed for subsidence

• Planning (three types, two levels)
  • geological disaster prevention and control planning;
  • land subsidence prevention planning;
  • geological environment protection planning
  • Land Subsidence Prevention Planning for Yangtze River Delta Region (2014-2020)
  • Ningbo city: two local planning documents> the Ningbo urban geological disaster prevention planning (2004-2020) and the eleventh Five-Year-Plan of land subsidence prevention for Ningbo (2006-2010)

• Designation of ‘no groundwater abstraction areas’
• Total ban on groundwater abstraction
• Surface water treatment to be able to recharge groundwater and water supply
• 2nd largest monitoring network (Shanghai 1st)
• Financial support for research projects
• Designate land subsidence management as an ‘administrative task’ (Chinese approach)
• After 2012: Replacing buildings in danger (2600 apartments)
• Launching of a public disaster insurance (definition of “disaster” expanded in the way that it includes building collapse)
Solutions Shanghai:
involve more authorities including 2 provinces

General: geological disaster only: Land resource department
Specific: Multi level and sector governance
Solutions Shanghai: a mix of planning and zoning instruments designed for subsidence

Planning: see Ningbo slide

Zoning Management

Zone II

• Scope: secondary prevention and control zone (less severe)
• Target: control the subsidence lower than 6mm by the end of 2015.

Zone III

• Scope: general prevention and control zone (the subsidence is not a big problem except some of them are being affected by neighboring provinces)

Groundwater Management Zoning Measures

Forbidden-Development Zones

• e.g. 0.5 to 1 kilometer from both sides of the highways and maglev railways

Restricted-Development Zones

• e.g. the ratio between extraction and recharge must be maintained at 1:2.
# Financial Arrangements in China designed for subsidence

| Central government: | - the investigation and evaluation of the land subsidence in the major regions (e.g. the Yangtze River Delta),
|                    | - the monitoring network construction in the major engineering areas,
|                    | - the fundamental research and investigation of the water-transfer projects which cross different river basins. |
| Local governments: | investments in additional prevention engineering projects |
| Private parties:   | “who triggers who pays” |
| Unclear:           | maintenance cost and the damage costs |
China/Yangtze delta:
right to information in theory (+) and practice (-)


Theory: People are entitled to land subsidence information, and the legal protection of the right to information is sufficient.

Practice: Information is not available

Ningbo:
Land subsidence management in Ningbo is mainly dealt with by the government, and information generated is not totally open to public. Most of the public only have a general idea of land subsidence, but they don’t know the specific situation of the region where they live.

Even for research objectives an open website of land subsidence data is still not available. Data can only be collected from research reports. Land subsidence is more related to industry and government regulation, individuals are hardly involved.

Need: information and raising awareness of the public is vital important
China/Yangtze/Zhejiang/Ningbo: theory (+) and practice (-) related to the right to participation

• Provisional Measures For Public Participation In Environmental Protection (2015)
• Provisional Measures for Administrative Procedure of Zhejiang Province (2016)

• **Practice:** public participation in land subsidence management is almost missing:
  • Practical problems:
  • Scientific uncertainty.
  • Experts and the government are taking care of it
  • Individuals know little and do little about it, although participation may improve city planning and project planning.

• **Legal problems:**
  • The way to participate and to give feedback is not mandatory.
  • For the participation methods the government relies on public hearings and advises from the public, but other methods like stakeholder advisory committees, citizen juries, or facilitated mediation are not used.

• Because the feedback after public participation is often lacking, there are hardly incentives for the public to participate again in the future.
Shanghai: practicalities related to the right to information and public participation

General legislation: see Ningbo slides

Stakeholder involvement mainly at the governmental level:
Departments of land and natural resources, water resources, financial, housing and urban-rural developments, agriculture, environmental protection, transport, railways, earthquake administration, industry and information, the development and reform commission, and the legislative office (at all administrative levels).

Societal level: e.g. land subsidence exhibition centers, private partners

General Public: e.g. 70% of the public in Shanghai has no knowledge on land subsidence
1. The owner of the property has the responsibility to take care of the building.

2. In case a land subsidence problem is noticed, it is the owner’s obligation to issue an application to the local housing security accreditation bodies for an investigation. Without this step taken, there is no duty of care for the government to take action.

3. **Causes: bad city planning or granting administrative license**

   Possibilities:
   - Challenge the unlawful granted administrative license.
     - Problem: proving the causal relationship between granting a building permit and land subsidence and subsequent damage
   - Challenge inappropriate city planning (but lawful granted administrative license)
     - Problem: no chance to hold the government liable for bad city planning and no administrative compensation can be claimed.
   - Civil compensation from the companies who designed, constructed, or invested in the buildings can serve as a last resort, as they may have a (sometimes shared) responsibility.
   - Finally it can also be the residents themselves who are responsible to pay compensation, in those cases they have caused harm to buildings themselves.
Solutions Kockengen: adaptation
multiple authorities but subsidence hardly addressed

Fragmented public tasks, responsibilities and competences: multilevel governance, no specific focus to mitigate or even adapt to subsidence

• Municipality: spatial planning, duty of care for sewage, rainwater, groundwater
• Water Board: manage groundwater and surface water (water levels) and dykes
• Province: licensing large groundwater abstraction/infiltration

Shared responsibility: cooperation / coordination between authorities is required

Hardly mitigation, mainly adaptation, no strategy is also a strategy
Solutions Kockengen:
Mix of policy instruments but trade-offs not addressed

Technical/Practical Measures (short term solutions over and over again/adaptation):

• For instance: incrementing of soil, recovery and separation of sewer systems, repair of foundations, drainage, additional regional water storage capacity, less hardening of soil, prohibition of cellars, prescribing a minimum floor level for building constructions, adjusting crops that are more resilient to higher water levels

Who is responsible?
• Government, owner or both?

Awareness raising: communication of responsibilities
Solutions Kockengen: Mix of policy instruments but subsidence and trade-offs not addressed

**Legal instruments** to manage subsidence problems:

very general, not related to land subsidence

Instead function/land use follows water levels we still work the other way around: water management (and subsidence governance) follows societal functions and land use

- Provided by law aimed at specific interest/public task prescribed by law
- Passive management: regulation of human activities (municipalities, water boards and provinces): general rules or licenses in the field of water governance and land use, water quantity levels
- Active management: taking active measures by government by plans, decisions, expropriation, obligations to tolerate government measures by landowners (municipalities and water boards)
Netherlands
Financial arrangements not suitable nor fair to address subsidence

State budget
- flood protection
- research

Regional and local taxes or charges for
- water management (water boards)
- waste water management (municipalities)
- urban development (municipalities including ‘grondexploitatie’)
- research

Local and regional taxes are only slightly related to who causes subsidence (or in who's interest the ongoing subsidence exists). The same goes for the state budget investments

Private parties: no system related to: “who triggers who pays”
Netherlands: high level of information, participation, access to justice

**Information:**
- Available active and passive right to information based on environmental legislation, administrative law legislation (Awb, Wob)
- Easy access to governmental and policy documents (paper and internet)

**Participation:**
- Well organised in law (environmental legislation, Awb) and practice

**Legal protection:**
- Fragmented and complex procedures
- Access to administrative courts only in case of specific decisions (not plans and general rules)
- Affordable procedures and court decisions in short time

**Compensation of Damage** (caused by government actions or negligence to manage negative consequences of subsidence)
- Liability for subsidence related damage: many possible causes of damage, different actors responsible
Comparison: Similarities

• Land subsidence is a serious problem, with huge impacts

• Fragmented competences in different levels of government, policy fields, regulations spread over different authorities/departments with different policy instruments and procedures hampers solutions

• Many interests, stakeholders and policy areas involved. Balancing interests in policy and decision making process

• Coordination and cooperation between authorities needed

• Insufficient knowledge

• Lack of awareness

• Developing integrated solutions for multiple environmental and societal problems might improve legitimacy and effectiveness of solutions.
Comparison: Differences

• China acknowledges the problem, in The Netherlands there is a lack of urgency and awareness, very political sensitive issue as it requires a huge change in land use

• China: investments in knowledge related to soil subsidence

• China develops specific polices and instruments and focusses more on mitigation than adaptation
  NLD: business as usual, short term solutions. Economic and societal impact is leading

• In the Netherlands (compared to China) right to information, participation and access to justice relatively well regulated and organised and open ‘for all’
Conclusions related to the SDGs

- Reduce inequalities by
  - raising awareness,
  - taking action in all neighbourhoods and
  - for all parties involved (not only those who are most relevant from an economic point of view)
  - Distributive justice

- Address subsidence in different policy fields (drinking water, groundwater use, land use planning, building requirements, agriculture) and use a smart toolbox of policy instruments

- Build on strong institutions with
  - appropriate competences,
  - sufficient and fair finances,
  - good coordination mechanisms between governmental levels, policy fields and public and private actors
  - providing easy and understandable information, participation and access to justice to all: procedural justice

FUTURE DELTA’S:
Develop sustainable integrated science-based, technical, legal and governance solutions for multiple environmental and societal problems to improve legitimacy and effectiveness of policies