A co-evolving frontier between land and water: dilemmas of flexibility versus robustness in flood risk management

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Outline

• From flood protection to flood risk management
• Flexibility versus robustness
• The concept of resilience: balancing flexibility and robustness
• Discussion and conclusion: co-evolution as a perspective that bridges the socio-spatial and the natural-physical system
The need for flexibility

uncertainties and complexities cannot be mitigated through modelling or further research

socio-spatial considerations

upstream activities

relational uncertainty due to multiple actors

changing conditions in water system

technical infrastructures

climate extremes and climate change

spatial developments
Robustness in spatial planning

essential for functioning of society

... but

• changing designation difficult

  lock-in situation

• uncertainties
Resilience

need for flexibility (changing flood risks)  

need for robustness (spatial development)  

balance?
Resilience

traditionally

natural-physical system
‘water’

flooding
Resilience

... however

<table>
<thead>
<tr>
<th>natural-physical system</th>
<th>socio-spatial system</th>
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<tbody>
<tr>
<td>‘water’</td>
<td>‘land’</td>
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flooding
Resilience

... however

natural-physical system 'water' co-evolve socio-spatial system 'land'

flooding
Resilience

RESISTANCE
traditional flood protection

INFLUENCE

RESILIENCE
co-evolutionary flood risk management

WATER
flood risks

LAND
spatial developments
Conclusion

balance between flexibility and robustness

co-evolution: a perspective that can

– help understanding what is happening
– frame flooding issue more realistically
– lead to more integrated solutions

e.g. risk = probability (water) x damage (land)

variables are dependent (interaction)
Discussion

What does this mean for policy?

– consider interactions between flood management choices and society
– detect when co-evolution is heading towards lock-in
– spatial planning: not only remedial approach
– water management: not only technical approach
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