Towards Adaptive and Integrated Management Paradigms to Meet the Challenges of Water Governance

by

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How to purposefully design and implement adaptive and integrated water management and governance systems?

1 Theory and Concepts

2 Methodology
   2.1 Participatory Model Building
   2.2 Management and Transition Framework

3 Conclusions
Management and Governance – What is the difference?

• Management refers to activities of analysing, monitoring, developing, implementing measures to keep the state of a resource within desirable bounds.

• Governance takes into account actors and networks that formulate and implement policy. The governance system sets the rules under which management operates.
Integrated Water Resources Management addresses the „resource system“, the „management system“ and the „governance system“.

Using management paradigms to analyze complex social-ecological systems

“A management paradigm refers to a set of basic assumptions about the nature of the system to be managed, the goals of managing the system and the ways in which these goals can be achieved” (Pahl-Wostl et al. 2011)

Management Paradigms as an encompassing concept that arranges compatible system elements into a meaningful whole
# Elements of Management Meta-Paradigms

<table>
<thead>
<tr>
<th></th>
<th>Prediction, control paradigm</th>
<th>Integrated, adaptive paradigm</th>
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</thead>
<tbody>
<tr>
<td><strong>Governance style</strong></td>
<td>Centralized, hierarchical, narrow stakeholder participation</td>
<td>Balance between bottom-up and top-down processes, broad stakeholder participation</td>
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<tr>
<td><strong>Information management</strong></td>
<td>Understanding fragmented by gaps and lack of integration of proprietary information sources</td>
<td>Comprehensive understanding achieved by open, shared information sources</td>
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<tr>
<td><strong>Infrastructure</strong></td>
<td>Massive, centralized infrastructure</td>
<td>Appropriate combination centralized and decentralized</td>
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(Pahl-Wostl et al. 2011)
Differentiation between **Meta Paradigms** and **Sub-system Paradigms**

**Sub-system Paradigms**

1. **System Perspective**: Related to specific sub-systems? e.g., agriculture sector, environmental system, ...
2. **Solution Strategies**: How are management problems solved? e.g., build dikes, allow for river-landscape flow, ...
3. **Risk and uncertainty management approaches**: How are uncertainties and risks perceived and handled? Reduce uncertainties; accept uncertainties; uncertainty dialogue

Sub-system management paradigms as **cultural-cognitive institutions**
### Sub-system specific management paradigms

<table>
<thead>
<tr>
<th>Name Dimension</th>
<th>&quot;Control Floods&quot; Paradigm</th>
<th>&quot;Adapt to Floods&quot; Paradigm</th>
<th>&quot;Community Involvement&quot; Paradigm</th>
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<td>Floodplain landscape</td>
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<td>Risk and Uncertainty Management</td>
<td>Reduction of uncertainty</td>
<td>Accept flood risk; Adaptive Management (through experimentation)</td>
<td>Uncertainty Dialogue</td>
<td>Build on the experience from the past</td>
<td>Reduce flooding risk and uncertainties</td>
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(Halbe et al., in prep.)
Methodology

1) Elicitation of sub-system specific management paradigms using participatory modelling

2) Analysis of management paradigms embedded in the overall management and governance system

3) Visioning of pathways towards adaptive and integrated water management

MTF Analysis

Diagnosis

Pathways

„Status quo“ „Future“

Elicitation of case and sub-system specific management paradigms

Step 1

Participatory Modeling Uncertainty Dialogue Literature Study Interviews

Step 2

Step 3
1) **Elicitation of sub-system specific management paradigms** using participatory modelling

(Sendzimir et al. 2007)
2) Analysis of management paradigms embedded in the overall management and governance system => Application of the MTF

„Action Situation“: a structured social interaction context that leads to specific outcomes.

„Operational Outcomes“: e.g., direct physical interventions such as the implementation of infrastructure; changes in societal characteristics such as increased societal awareness for flood problems.

“Institutions”: formal (e.g. legislation) or informal (e.g. social norms; management paradigms) rules governing the behaviour of actors.

„Knowledge“: meaningful information and experience.

„Action Arena“: an issue specific political arena focused on a societal function, characterized by ‘actors’ and a number of ‘action situations.’
Legend:

- Integrated Flood Management
- Hierarchical Management
- Protection of Values (Crops, Infrastructure, ...)
- Flood Control
- "Flood Management" Action Arena
- Control Floods
- Control Floods' Paradigm
- Intensive Agriculture
- Economics of Scale' Paradigm

(Halbe et al., in prep.)
3) Visioning of pathways

(Halbe et al., in prep.)
Conclusions

Methodology linking analysis of the governance system and participatory model building for:

a) Participatory analysis of **interlinkages of resource, management and governance system**

b) **Visioning** of sustainable management and governance systems

c) **Design of pathways** towards desired future system states
Future Research

Empirical research needed to evaluate the *applicability and effectiveness* of the proposed methodology in different water management contexts.

Examination of *concrete sets of management paradigms* that support *integrated and adaptive water resources management*. 
Thank you very much for your attention!


Conclusions

Methods and tools have to deal with complexity of water management and governance in order to avoid resorting to simplistic solutions or panaceas.

- Diagnostic approach by using the Management and Transition Framework (MTF)

Effective science-policy-community dialogues are needed to initiate learning processes between science, policy-makers and local communities.

- Action Research by using Participatory Model Building
Triple Loop Learning Concept

- Consideration of retention areas
- Increase dikes by 1m
- Setting new rules for the management system

(Pahl-Wostl 2009)
What are the properties of sustainable governance and management systems?

Diagnostic approach needed that

(1) allows for systematic analysis of management and governance systems
(2) takes uncertainties and complexity into account by including stakeholders

(Pahl-Wostl 2009)
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(Halbe et al., in prep.)
Design and implementation of adaptive and integrated water management and governance require learning of actors and changes in institutions…

Conceptual framework for water resources management (Pahl-Wostl et al., 2007)