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Building trust in water governance through intelligent water infrastructure

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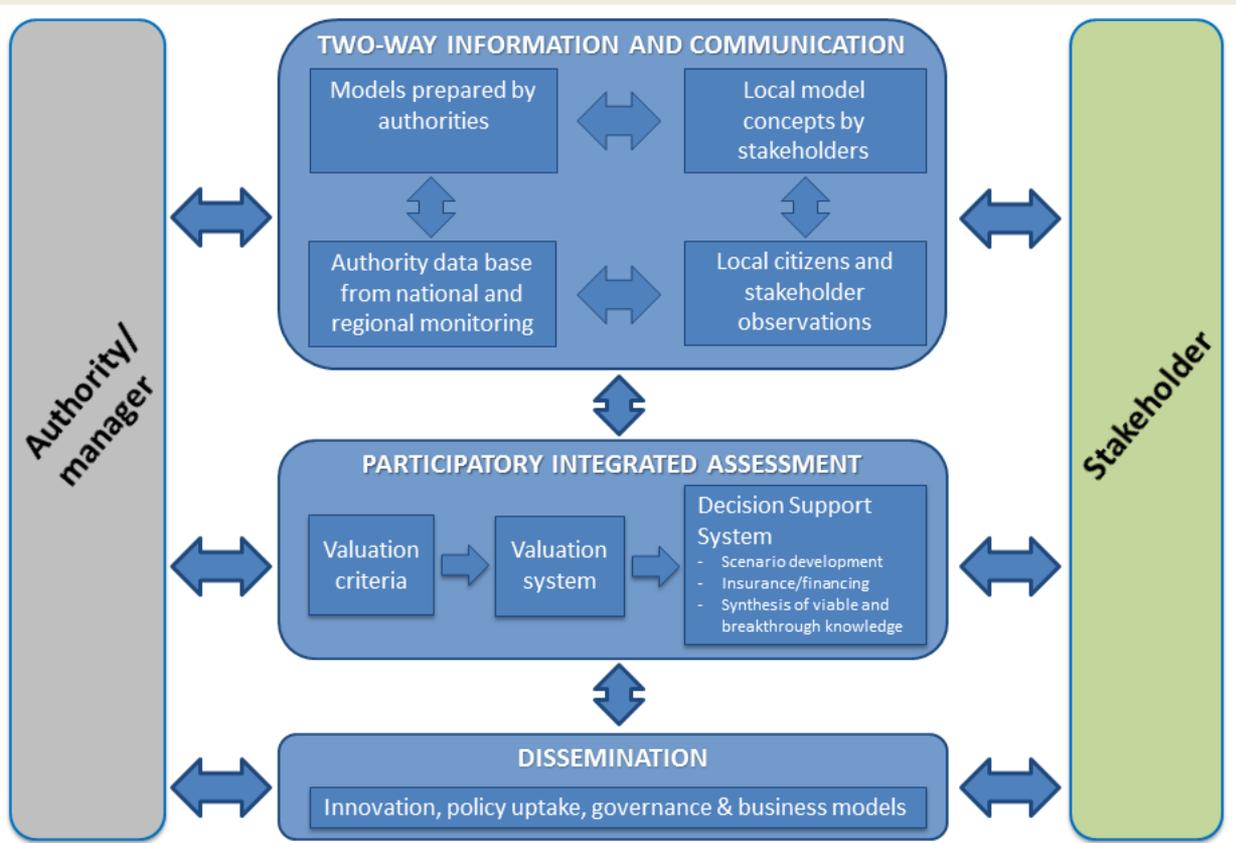
Definitions of trust

Two expectations are essential to a trusting relationship: (1) That an **individual adheres to moral codes** and will show respect for others values, and (2) that an **individual is technically capable** and able to perform well (Barber 1983)

A network of trusting bonds among individuals and between individuals and the agency creates a positive environment, where individuals feel comfortable interacting and participation is encouraged. Such **networks of trust facilitate coordination, communication, and dispute resolution, while cultivating a collective identity** (Paxton, 1999)

Trust is integral to social life because it is the **foundation of a vibrant community, social participation, effective governance, economic productivity and managing risk** (Wheeler et al 2017)

Trust can be established on different levels: in addition to the institutional level, **participatory monitoring also requires fostering trust** among individual members, as they are key players (Verbrugge et al 2017)



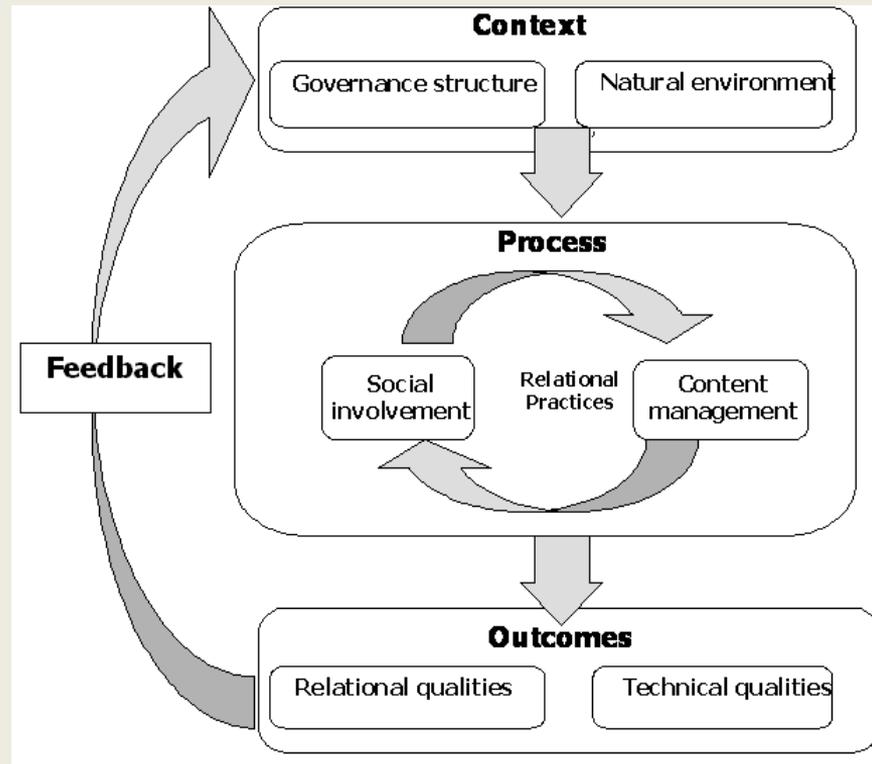
Water management decisions are usually based on data bases, models and information systems.

These systems are traditionally constructed by the competent water authority, while stakeholders typically are informed and sometimes consulted.

Economic assessments are often provided without considering externalities related to social and ecological sustainability.

Working hypotheses – 1

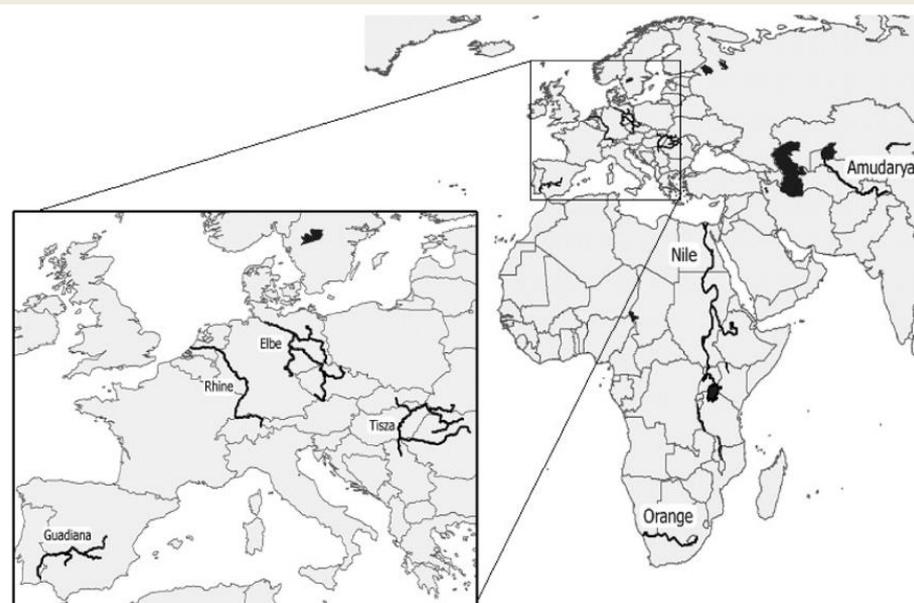
- Social learning requires **integration of complex technical task** (modelling and monitoring) and dealing with **relational issues** (trust and place attachment)
- Participatory modelling and monitoring can **support stakeholder dialogue, risk communication and quality of decision making process** (values, beliefs)
- Trust building (or erosion) **should be monitored and explicitly dealt with** in the stakeholder dialogue in order to deal with multiple 'ways of knowing'



Working hypotheses 2

- **Advanced physical based models are required** in order to understand, manage and meaningfully communicate societal risks related to complex systems (floodplain, groundwater, urban areas etc.)
- **All uncertainties (including multiple ways of knowing)** should be addressed, and forecast (and hindcast) model based scenarios with various DRR/CCA measures, can provide more efficient social learning and system innovation, and in longer term support (UN) sustainable development goals (SDG, resilience and sustainable societies)

NeWater (EU FP6 project)



- Seven case studies focusing on large river basins in Europe, Africa and Central Asia have been developed to explore the potential of adaptive management.
- Decisions should be evaluated by the cost of reversing them. This might imply monetary costs but also the loss of trust (NeWater policy brief).
- In NeWater, adaptive management has been portrayed as a *systematic process for improving management policies and practices by learning from the outcomes of implemented management strategies (Pahl-Wostl 2007)*
- *Commitment to uncertainty means that uncertainty is addressed openly in a transparent and accountable manner.*

How do NORDRESS build on trust?

- “We want NORDRESS to be a network,” stated Dr Pétursdóttir, Director of the Institute for Sustainability Studies at the University of Iceland. **“My ambition is for you to build a framework for trust, mutual benefit, and fruitful cooperation across different fields,”** she continued. The various activities under the Centre have gotten off to a good start during the first year of operations, and next year we will be even more active, she promised.



Let's build ties.

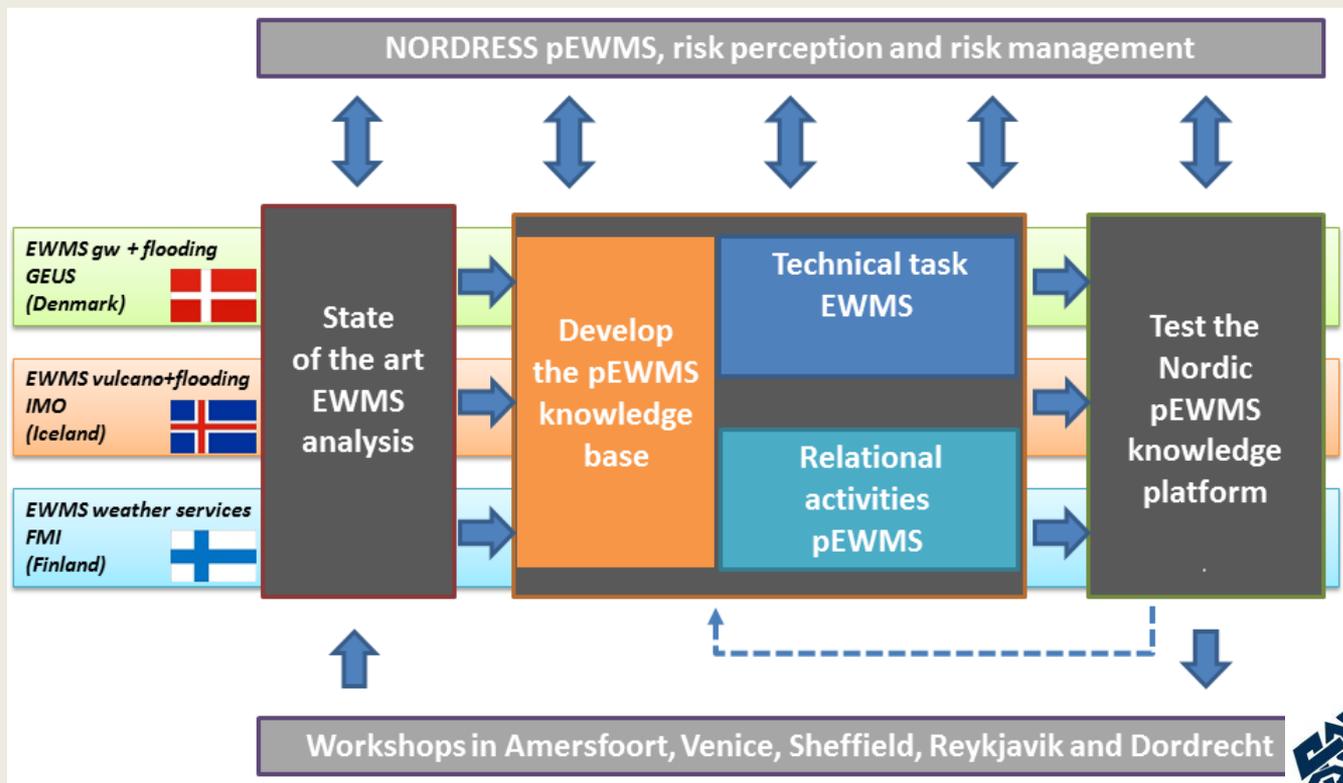
(Nordforsk 23.05.2016 Copenhagen annual meeting)

Ongoing participatory early warning and monitoring system (pEWMS) in NORDRESS



Overview of the pEWMS approach

- Review of different participatory early warning and monitoring systems
- Workshops in Europe and Nordic countries



Denmark: New vision for Hydrological Information and Prognosis system (HIP)

The screenshot shows a ScienceNordic article from January 5, 2016. The article title is "New model can help predict flooding two days in advance". The author is Catherine Jax. The article text discusses a new model for monitoring groundwater in real-time to improve flood warnings. It includes a photograph of a flooded street with a red triangular "Flood" warning sign. The article also mentions that the model will help local weather forecasters predict where and when the next flood will strike.

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New model can help predict flooding two days in advance

January 5, 2016 - 06:25

A new model can monitor underground water in real-time and will help to improve early flood warnings.

Keywords: Climate, Flood, hydrology

by Catherine Jax

When it comes to predicting when and where the next devastating flood will strike, meteorologists and town planners need more information than simply the weather forecast for that week.

They also need to know what is happening underground. How high is the water table? And how wet is the soil? But many flood-forecasting models do not include this information.

Wow, a group of Danish

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Norwegian Institute for Water Research (NIVA)

Research Manager
Norwegian Institute for Water Research (NIVA)

Environment - partner news

How are we going to store the problem gas CO2?
News from Gemini, SINTEF

- Historical data and real time observations
- Nationwide hydrological simulations and forecast
- Calculated hydrological indices
- Copernicus Emergency Management Services (event data, remote sensing)
- Two-way information system platform (upload of photos etc., valuation, local knowledge)
- Web-based interface for exhibiting and download of data and model results

ScienceNordic article January 5, 2016



Why care about trust issues?

Investigating HIP methodology for modelling of groundwater and river flooding in two Danish catchments (Odense å and Storå)

Background: Most agricultural land in Denmark is drained by tile drains and deepening-/straightening of water courses. Due to subsidence of organic soils in drained lowlands and climate change induced flooding of agricultural land has dramatically increased during the last years causing considerable economic losses. Claiming that this is due to lack of proper watercourse maintenance, farmers request authorities to give higher priority to drainage as the key function for water courses. According to green organisations and authorities intensified drainage will, however lead to reduced quality of freshwater ecosystems.

With the increased pressure on water resources, and the challenges faced with the implementation of the existing regulatory framework, **we experience a growing lack of mutual trust between water stakeholders**. For example, farmers often do not trust models and analyses used by authorities to assess the environmental status of water bodies and the potential impacts of measures.

Discussion (1)

- Farmers (and citizens) risks have increased in the past decade, due to globalisation, neo-liberalism, rural community de-population, environmental problems and climate change, making trust a more difficult but also a more necessary attribute for implementing effective policy (Wheeler et al. 2017).
- Real time management of flood risks require paradigm shift, transition and social learning.
- 2-way information systems building on participatory early warning and monitoring (pEWMS) can provide more transparency, more efficient system innovation and trust

Discussion (2)

- In order to develop trust within rural regions the following arrangements appear to be successful (Daniell and Barrateau 2014):
 - Incorporating socioeconomic characteristics
 - Including affected parties in governance arrangements
 - Greater coupling and coordination of people and institution (e.g. champions)
 - Constant adaptive governance
- Trust should be explored on both sides. Trust takes time to build, but can be lost immediately. More research is needed on "trust dynamics"

Conclusion

- Improved and shared information on the sustainable management of water resources builds trust and ownership among stakeholders, and effective participatory water management.
- There is a need for development of technologies to facilitate the active participation of local stakeholders in the development and use of shared knowledge base, building trust, and models for the integrated management and governance of land, soil and water targeting the optimum use of resources at catchment scales.
- Hereby, integrating social and economic dimensions into the sustainable management and governance of water resources can be enabled

More information

- NORDRESS: www.nordress.hi.si
- National Water Resource Model (GEUS - DK model): www.vandmodel.dk
- IDRIM 2017: <http://www.idrim2017.com>
- Geological Survey of Denmark and Greenland, GEUS: www.geus.dk