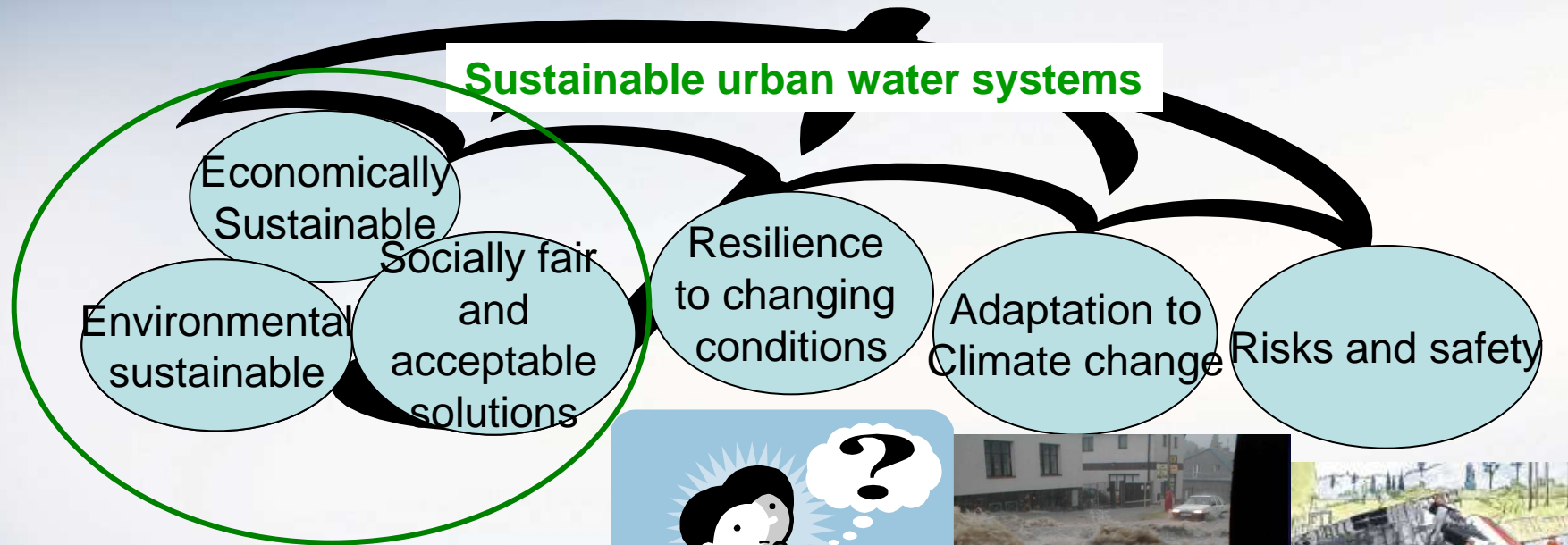




# **Sustainability framework for urban water systems**

Annelie Hedström

# What do we mean with sustainable?



# Drivers for changing management

- Urbanization
- Climate change
- Sustainability thinking

# Urbanisation

- Impacts
  - Water quality changes (pollutions)
  - Run-off changes
  - Climate changes (local scale ex radiation balance – hydrological cycle)
  - Reduced biodiversity

# Climate change

- Adaptation to changing climate conditions and its consequences
  - Less or more water
  - More intense and irregular storms
  - Flooding – impacts on water catchments used for water supply
  - Quality changes (ex brownish water)



# Certain Barents conditions

- Climate change

- Changing precipitation patterns
  - Rain on snow
  - More intensive
- Warmer seasons
  - "New" bacteria and parasites



Flooding, changing water quality due to changing run-off patterns from forests and agriculture areas – "Brownish water"

- Tourism

- Mountain regions
  - Higher pressure on water resources (water supply, Artificial snow...)
  - Wastewater management

- Intensified mining activities

- Urbanization process
- Pollution risks
- Geohydrological impacts

# Brownish water

- With changing climate
  - Increased colour of water due to more intensive transport of humic substances from land to water and higher concentration of dissolved organic compounds from degrading organic matter
- Consequences on water supply and ecosystems (and ecosystem services)
  - Water resources for water supply threatened
  - Increased chemicals needed (ex 4 times increase of precipitation chemicals)
  - Maybe changing water catchment area

# Integrated water catchment management for sustainable development

- Interdependencies of water resources if intensively is used/ threatened  
⇒ integrated water management

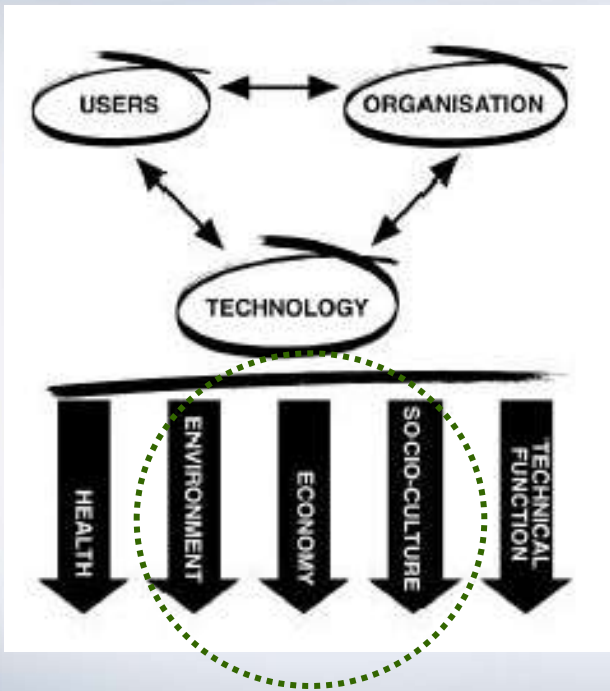




# Integrated catchment management

- Widening the water management planning process
  - Water must be an important issue in the master planning
  - Water use in relation to land use and ecosystems
  - Future and resilience perspectives

# Water management system

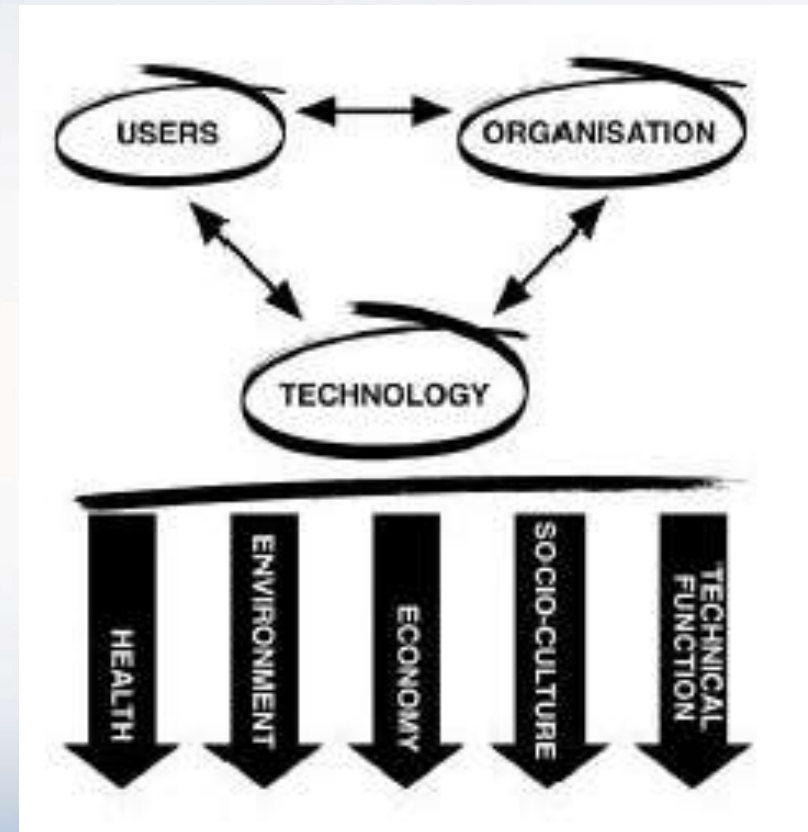


- Dealing with sustainability - the whole management system has to be included
- Sustainability criteria
- Sustainability indicators

From Research programme:  
"Urban water"

# Sustainability criteria and indicators

- Methodology to measure sustainable development
- Quantitative or qualitative indicators
- Examples:
  - Health: Risk of water related infections (no of infectious diseases/year)
  - Environment: Toxic compounds to water: (kg Cd/year)

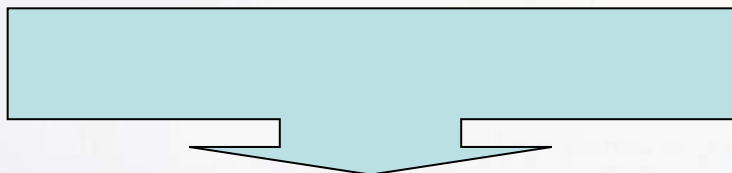


# Switching from supply management to demand management

- Supply management
  - Prospect for new water resources
    - But water resources are limited
- Demand management
  - Adjust the water consumption to available water resources
    - Water saving actions in households, communities and industries
    - Identifying water leakages
    - Use the limited water resource in sectors where the yield/benifits are high(est)  
(tourism-agriculture)

# Risk and vulnerability analyses

- Identifying potential risks for water supply
- Today and in the future



- Action plan

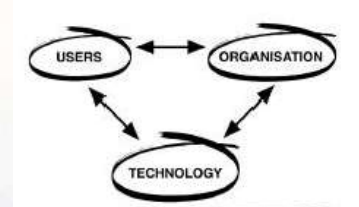


# Resilience thinking

- Adaptation to future and known and unknown changes
- Trying to predict future conditions and their uncertainties
- Develop systems that are resilient to changes
  - Robust systems
  - Adjustable systems

# Summary

- When working with developing sustainable urban water systems the approach should include:
  - considering local conditions
  - integrated catchment management
  - the whole water management system
  - a switch to demand management
  - risk and vulnerability analyses
  - resilience thinking



Sustainable Urban water systems

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Future generations have access  
to "good" water supply

Quantity and Quality