Improved resilience with for multiple objectives : combining discharge control and natural features in Lake Saimaa

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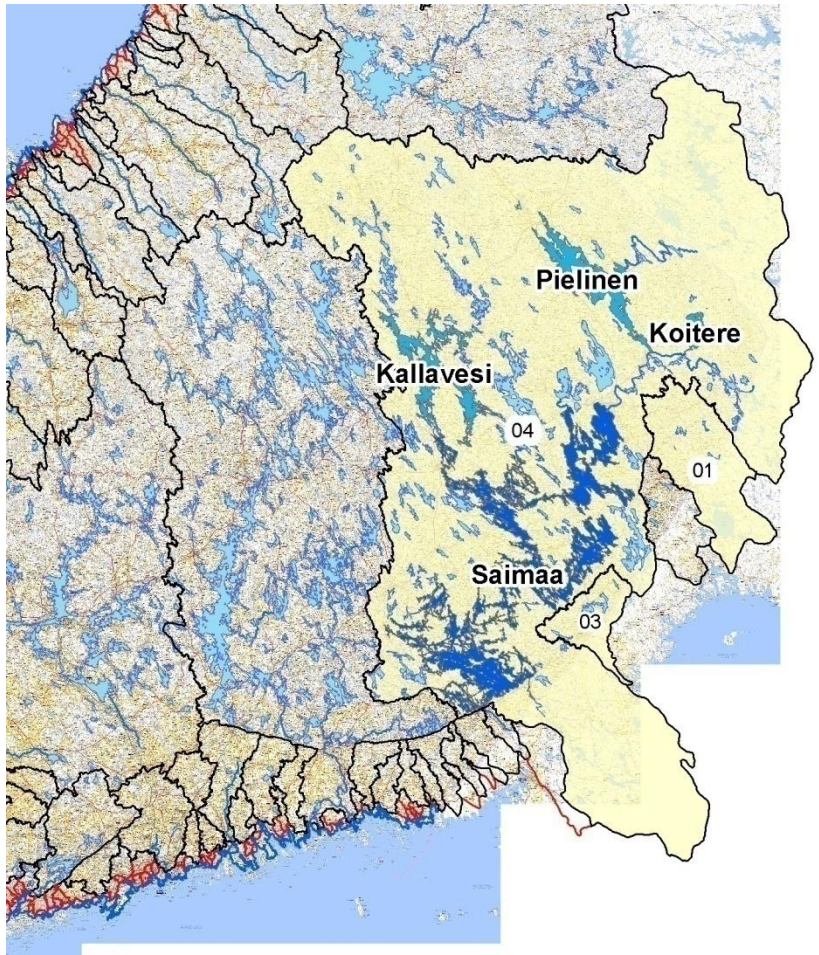
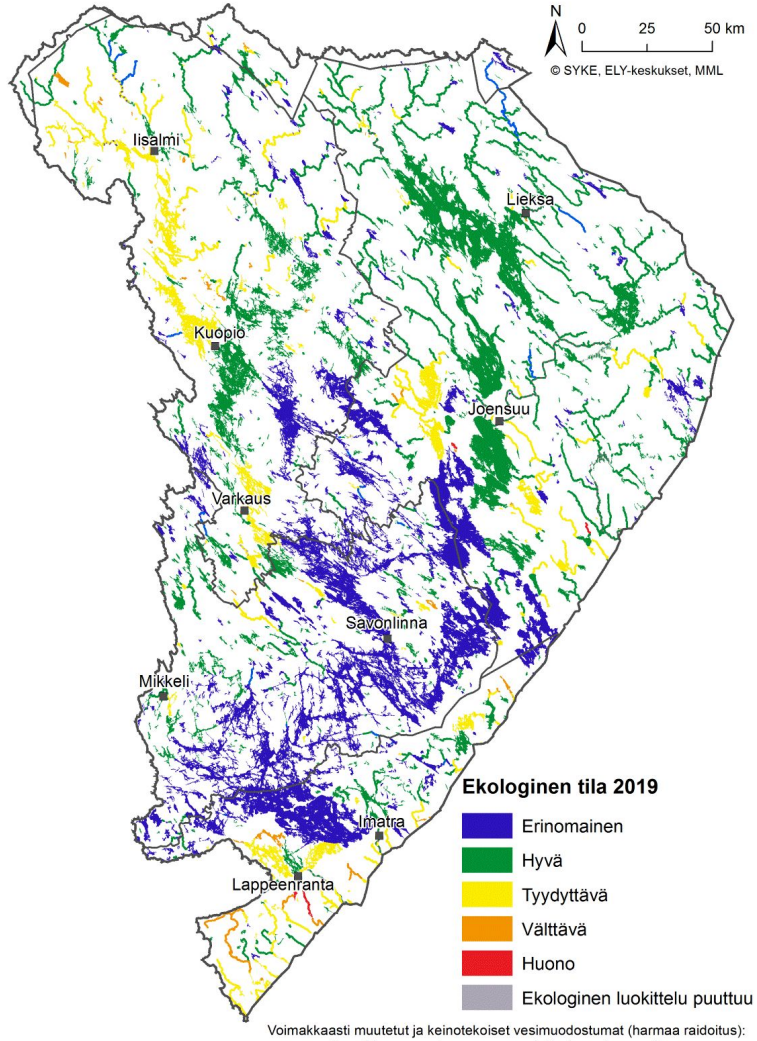
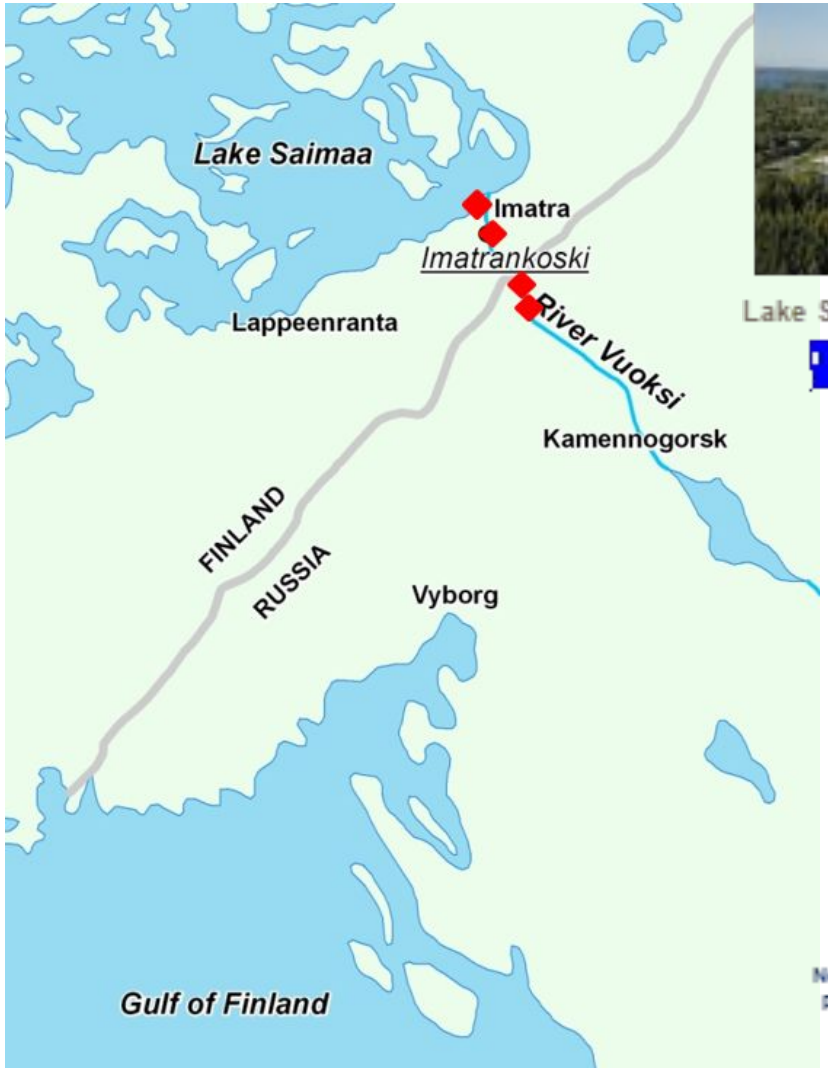
The Vuoksi River Basin, including Lake Saimaa



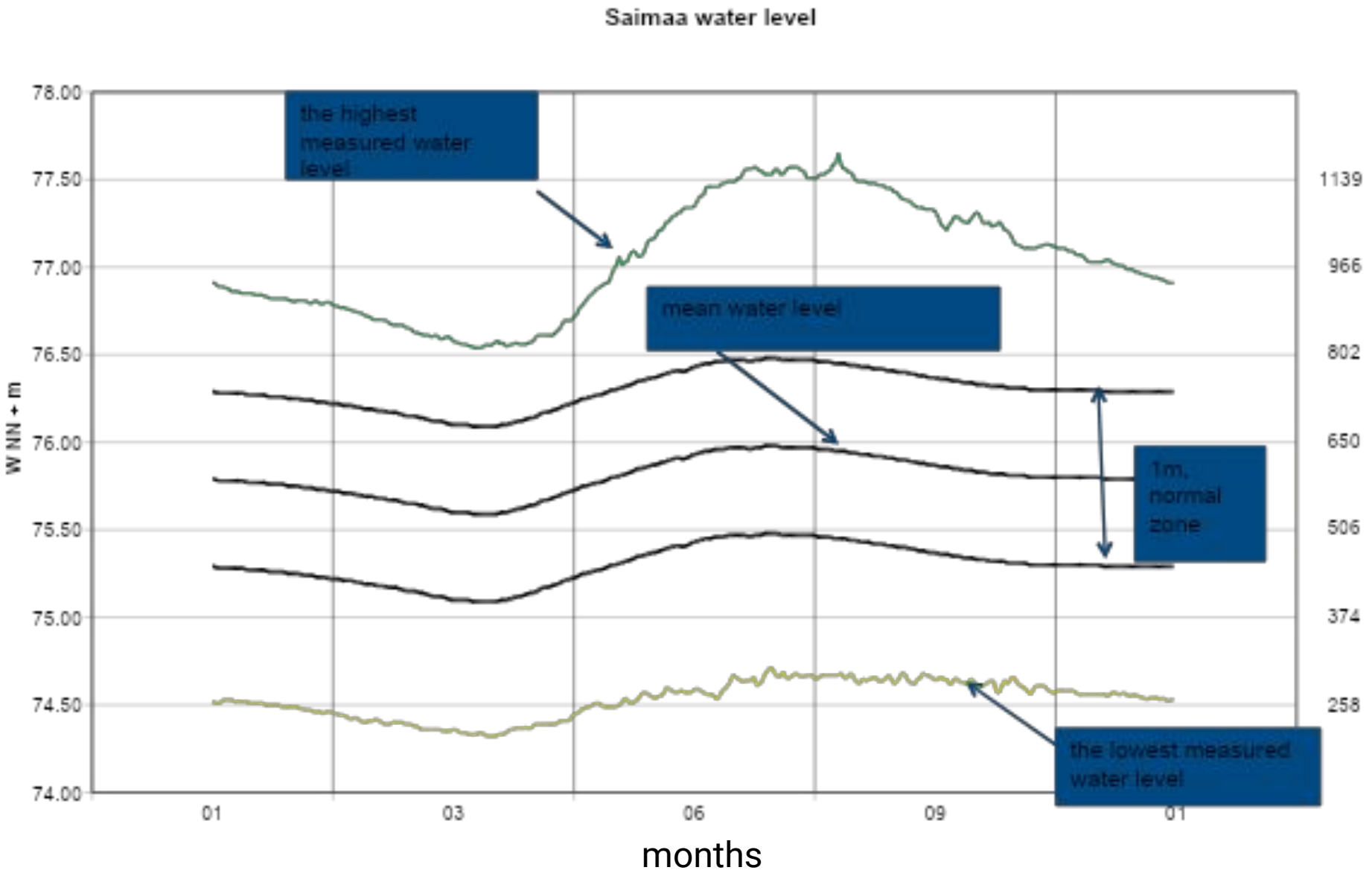
Catchment area	68.500 km^2
Lake Saimaa	4.400 km^2
Lake percentage	19,78 %
Annual precipitation	775 mm
Annual evaporation	420 mm
Average discharge (MQ)	600 m^3/s
-mean minimum discharge (MNQ)	339 m^3/s
-mean maximum discharge (MHQ)	781 m^3/s
-normal hydropeaking in River Vuoksi (hourly altering within a week)	200 – 850 m^3/s



The profile and power plants of the River Vuoksi



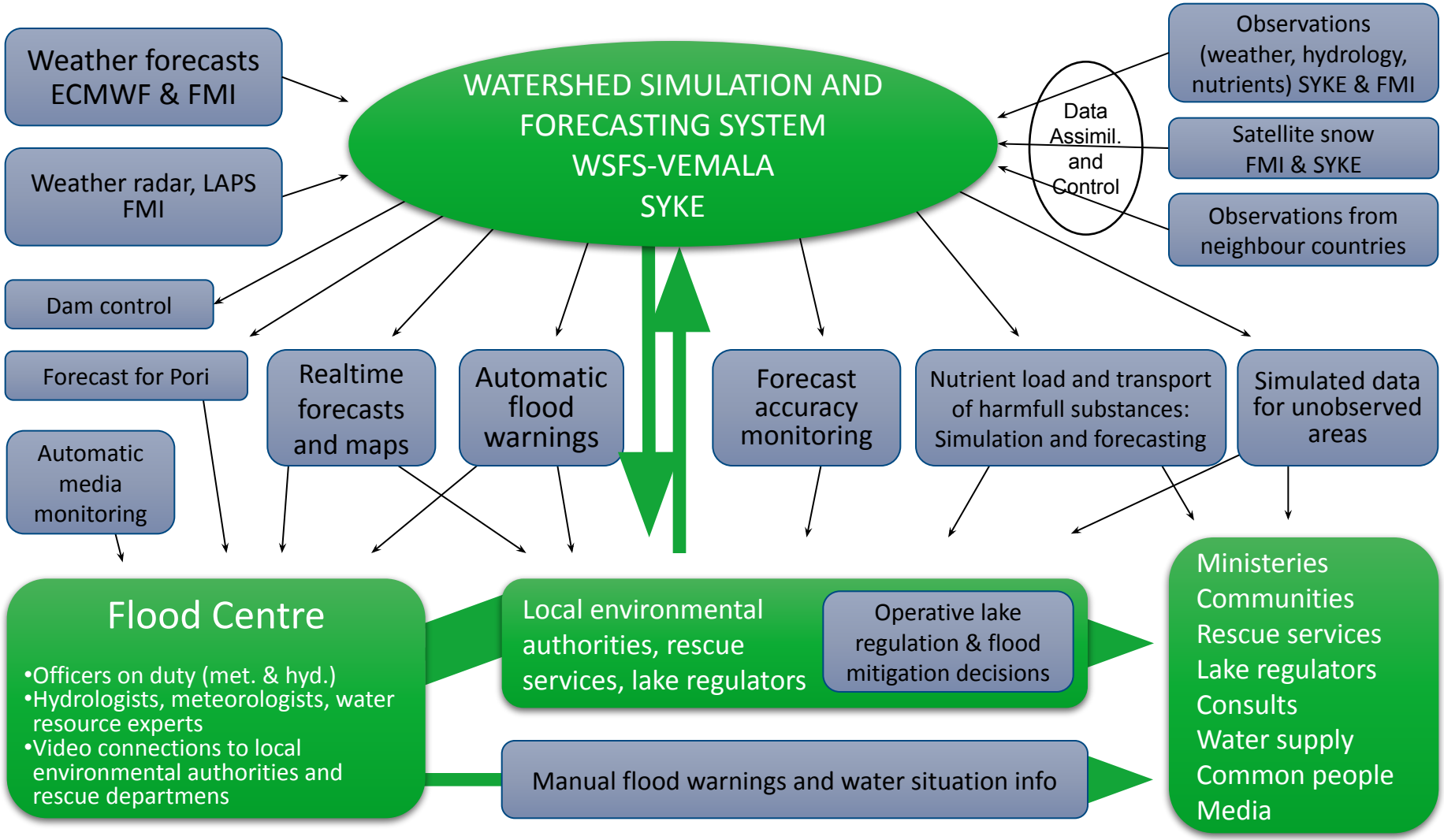
The Lake Saimaa and River Vuoksi Discharge Rule



- Discharge rule regulates the release of water from Lake Saimaa to River Vuoksi
- The goal is:
  to maintain the natural water level in Lake Saimaa

  to prevent damages caused by high and low water level and flow on both sides of the border
- The goal is not to maximise the production of hydroelectric power

Integrated use of weather, climate, water quantity and quality expertise in hydrological services in Finland



R & D

Climate change

1-hour timestep model

Process models: water quality, lakes, soil moisture, ice, frost & snow, corrected precipitation, evaporation

Adaptive outflow calculation

Tailored modelling solutions

International examples

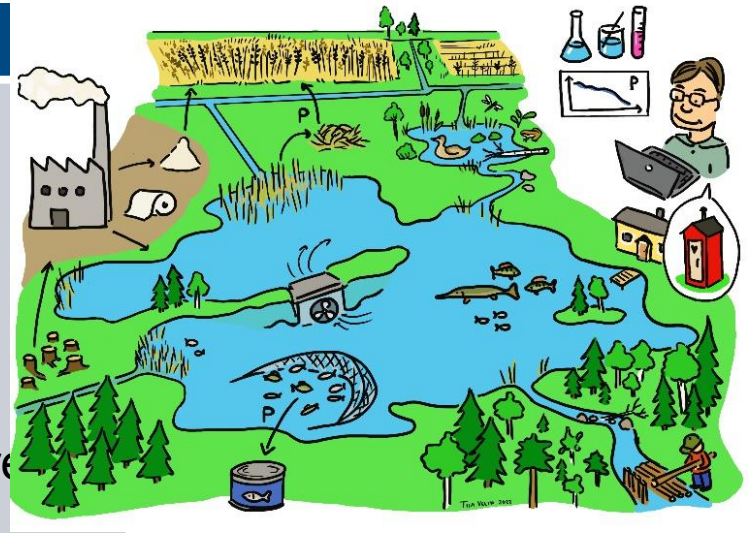
Water balance for mines

Planning & design floods

Water restoration in Lake Saimaa area: issues & actions

- Eutrophication (common) mainly due to increasing phosphorus: external loading and internal loading (lack of oxygen in the sediment)
- Sources of nutrient load: agriculture and forestry actions, run-off water; loading from industry & sewage has decreased significantly. Diffuse nutrient load in focus.

Actions	
Enhancing water quality by recycling water •Diluting nutrient concentrations by pumping water between smaller and larger water bodies Reducing internal load in the water bodies, enhancing recreational environment and improving diversity •Selective removal cyprinids by fishing •Removal of excess aquatic macrophytes (water plants) •River restoration	<u>Retention of nutrients in catchment</u> Retaining nutrients in fields by enhancing the quality of soil Appropriate buffer zones Slowing down water flow to catch nutrients •Constructed wetlands with agriculture and forestry •Appropriate areas for flooding Increasing diversity Collecting and sharing relevant information •Good practices in agriculture and forestry •Good practices on reducing & handling sewage in households and summer cottages



Saimaa Water Protection Association

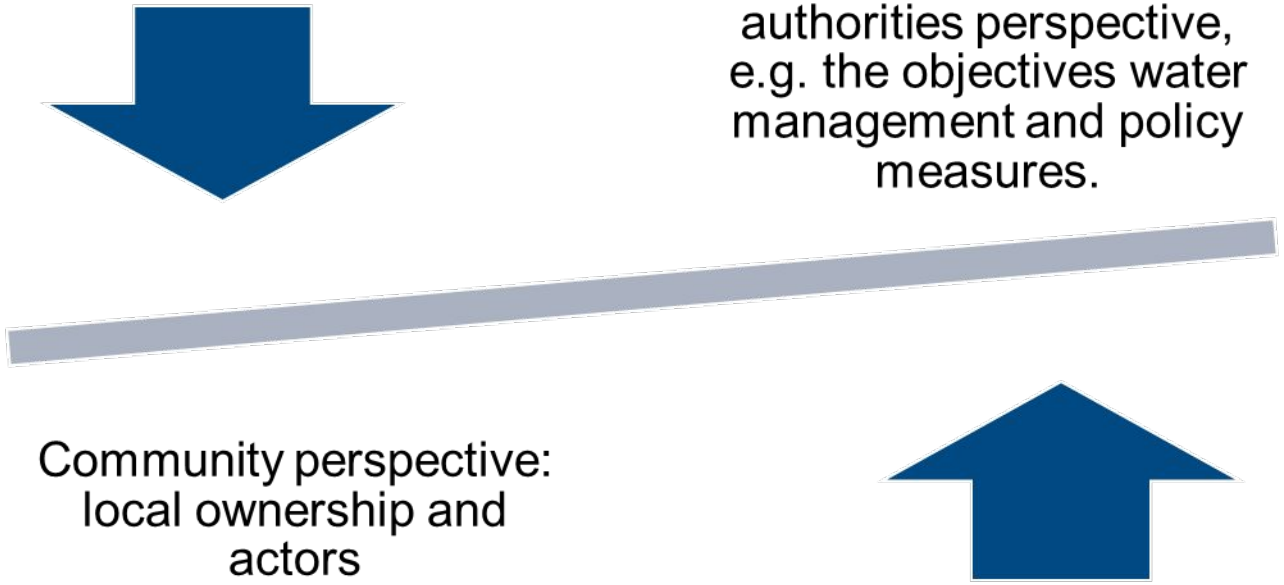
Insights from the Saimaa region

- **Reducing flood peaks and low water** periods by increased discharge from Lake Saimaa to River Vuoksi through dams has brought **important benefits as reduced damages**. Natural storage capacity capitalized on and close to natural lake level is maintained: no modification of discharge when the level within the normal zone, <0.5 m from the mean for the season.
- A prerequisite: good **hydrological modelling and hydro-meteorological prediction system** which supports anticipation – earlier adjustment of the discharge. Important with the predicted climate variability.
- A **wide range of practical nature based measures** have been identified to improve water quality locally and to slow down water flow from catchment area, and collection and dissemination of information and experience are important for replicating them. **Civil society organizations** like associations for protection of waters can play a helpful role in communicating, awareness raising and advising local actors.

Photo: SVSY/Water Protection Association of Saimaa

Seeking a balance in water visions

Finland is pioneering and experimenting with a vision based planning of water management to complement established formal WFD-based processes and water visions are referred to in e.g. Water Resources Management Strategy 2030. The visions and their preparation processes bring up topical and challenging themes. They involve e.g. joint action across sectors, foresight and futures thinking.



Highlighting and mainstreaming multiple benefits of NBS

- **Structured multi-objective frameworks** can significantly improve participatory planning and decision-making, while increasing knowledge and acceptance of novel NBS. Processes like water visions as well as damming and discharge studies provide for consideration of and visibility to NBS along with revisiting (and making adjustments to) how major infrastructure is operated.
- **Hydrological models** are needed to identify potential and effective places for NBS and to better understand e.g. their impacts in different flood situations types.
- NBS have potentially a valuable role in achieving an **improved resilience, reduced impacts and water quality improvements at a local scale**. Demonstrations from research and pilots are useful references but **upscaling** NBS for more impact requires going beyond individual projects.

Information & experiences: Climate resilience with Baltic Sea co-operation - management of flooding and droughtInformation & experiences: Climate resilience with Baltic Sea co-operation - management of flooding and drought looked into plans and solutions aiming to adapt to extremes in the coastal Baltic Sea states. In Finland, city and municipality level application of NBS: TASAPELI project