Niclas Hjerdt

Modelling tools

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Why models?

~330 hydrological stations
~27,000 water bodies

How to characterize water bodies without observations?

→ Modelling tools!

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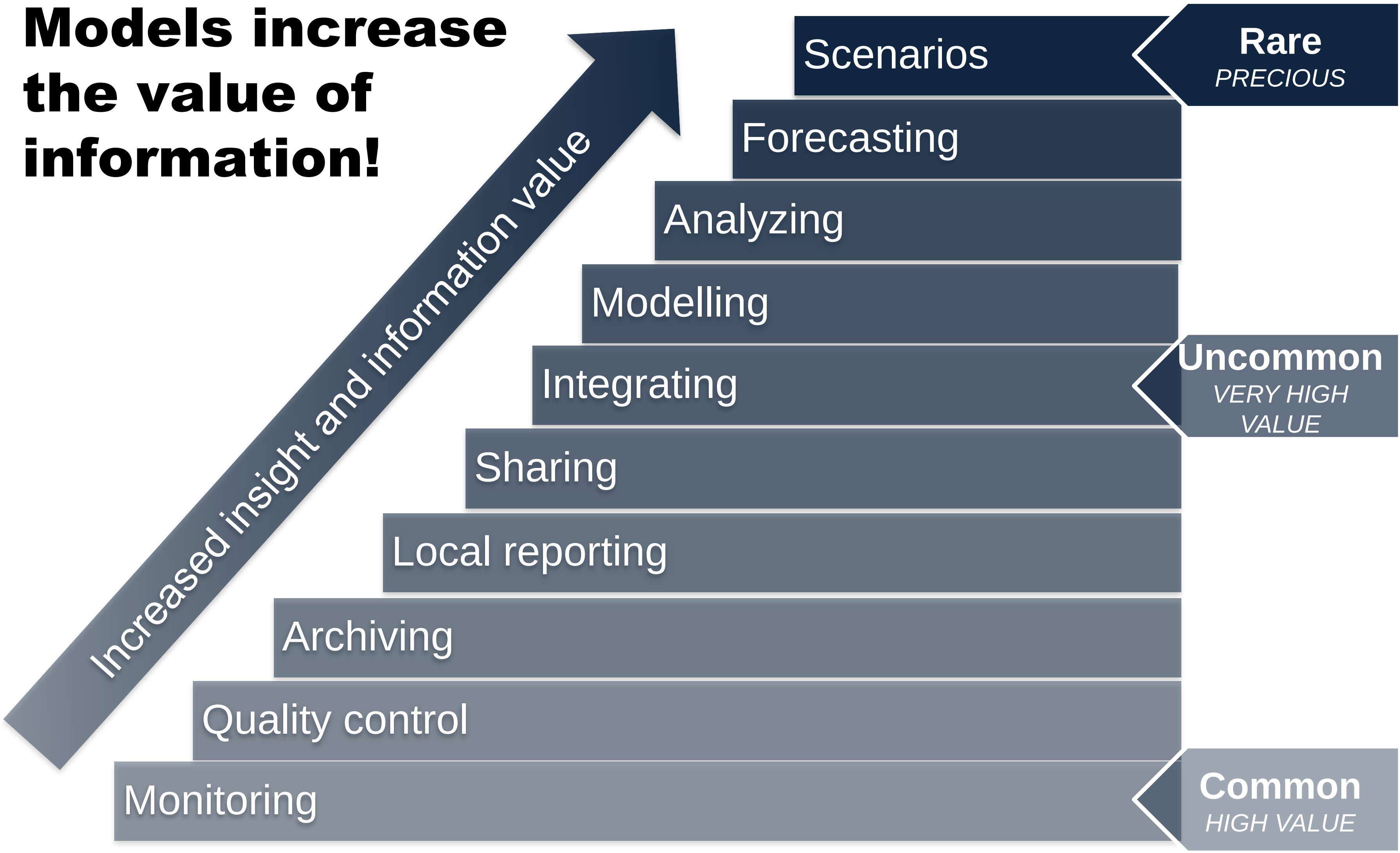
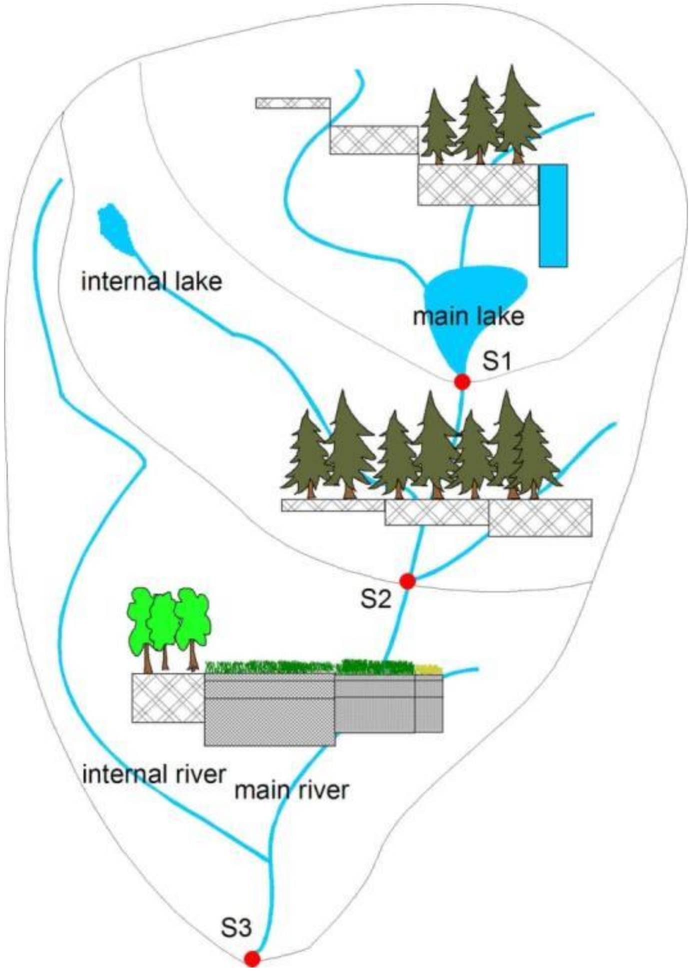
Models increase the value of information!



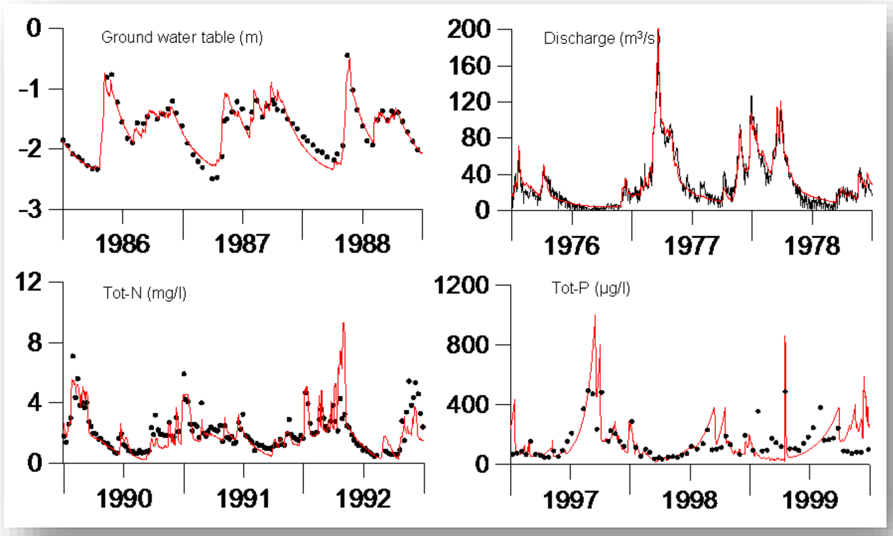
Modified after Robert Argent, BoM Australia

Model complexity:
Which model can fly?

HYPE: HYdrological Predictions for the Environment



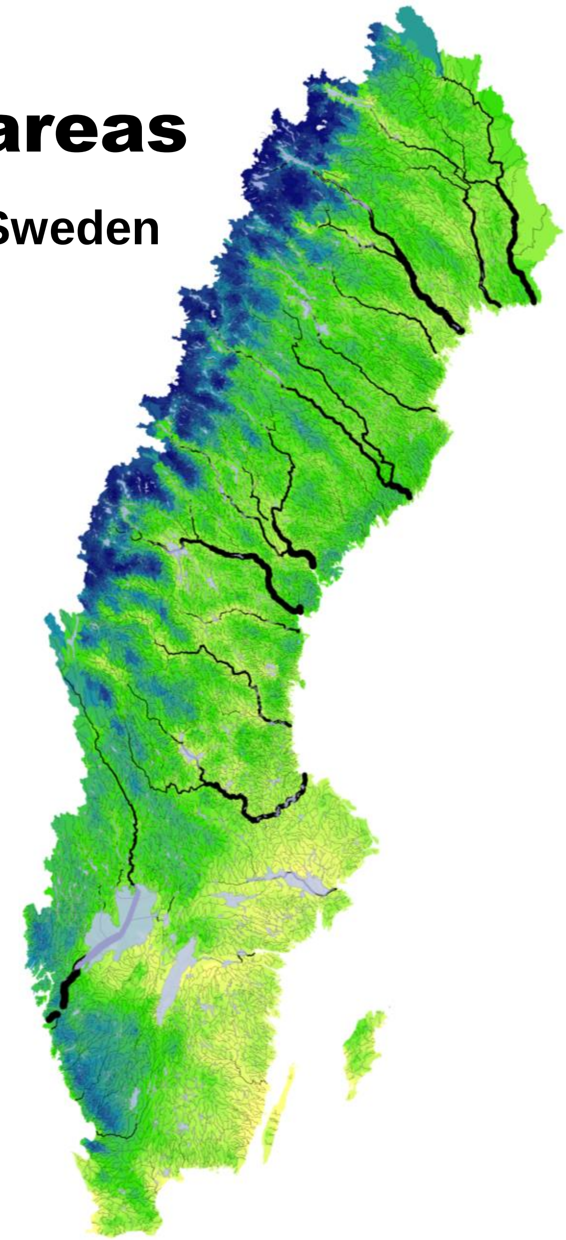
- Conceptual model with flow path description.
- Simulates water *and* solute transport.
- Model parameters are linked to land use and soil type instead of area.
- An OpenSource model (2011)



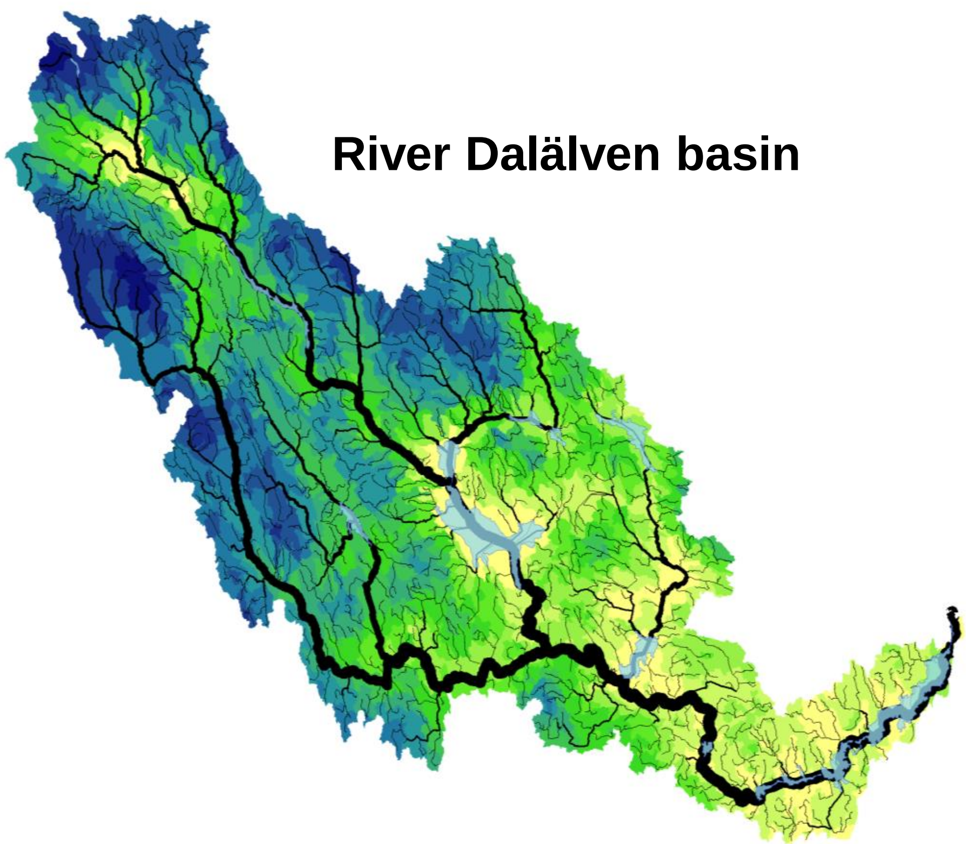
S-HYPE produces detailed water information over large areas

- Specific runoff 1981-2010 (colour)
- Total discharge 1981-2010 (black)

Sweden

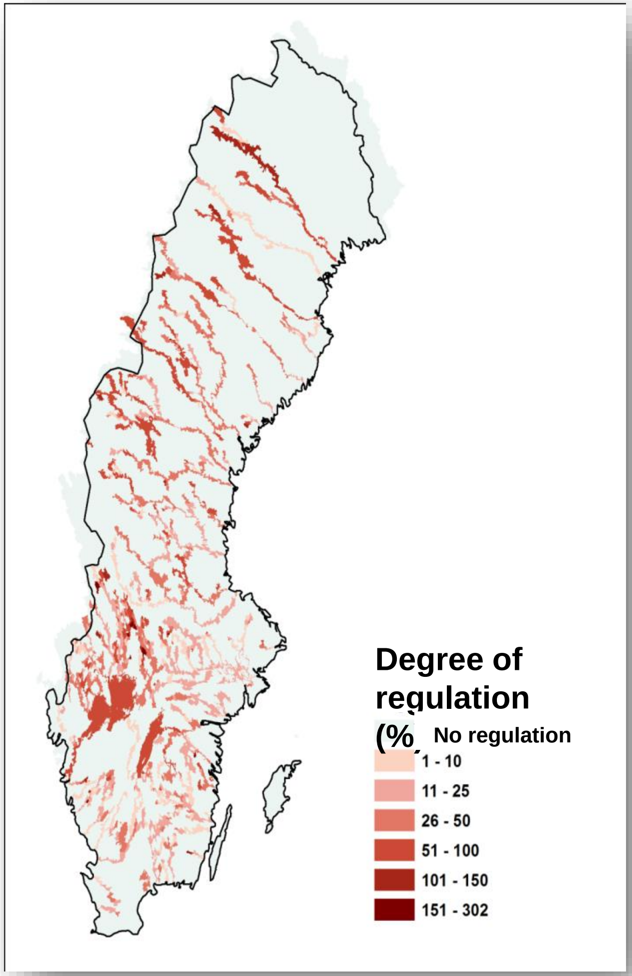


River Dalälven basin

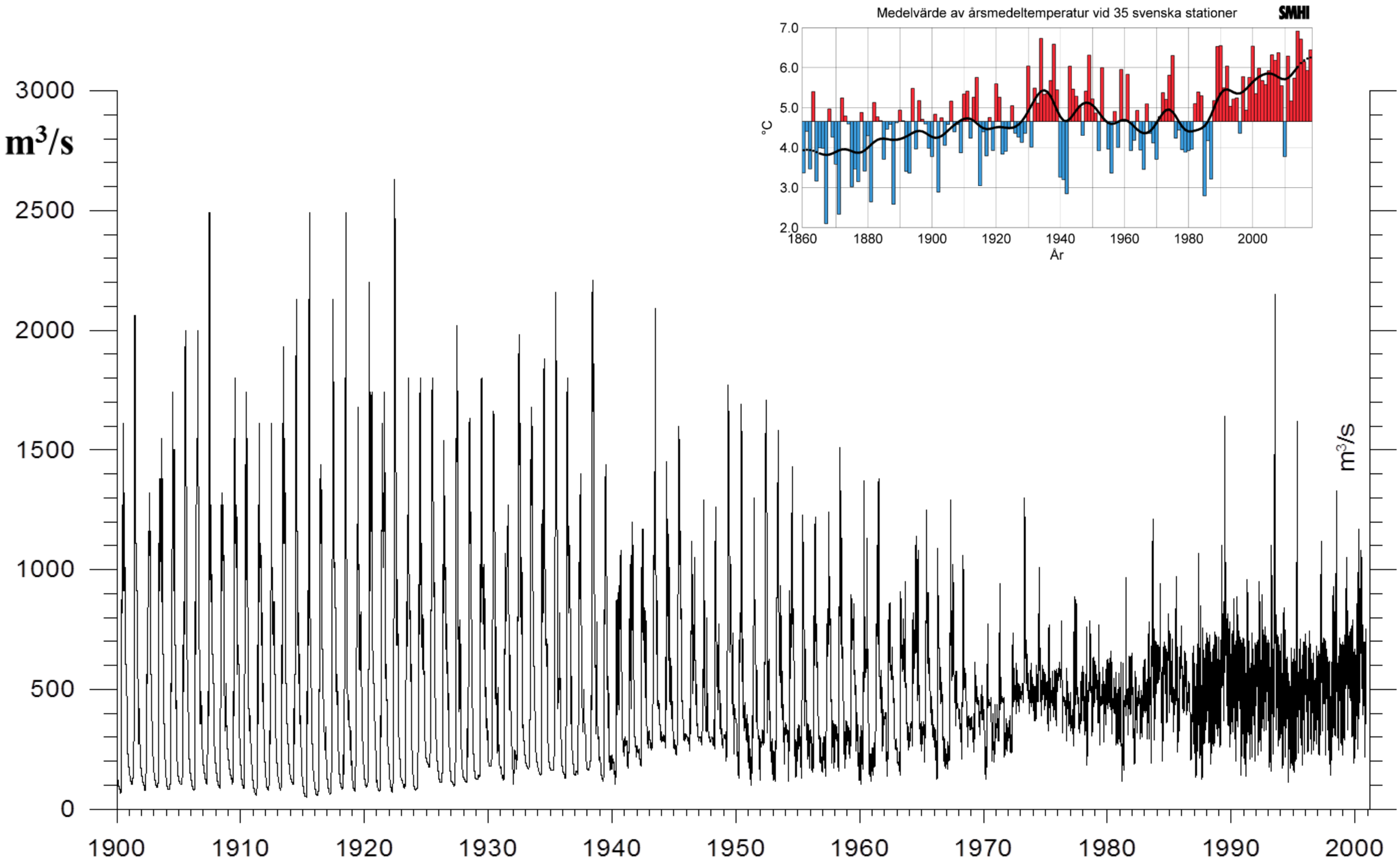


Example: Modelling reference conditions in regulated rivers

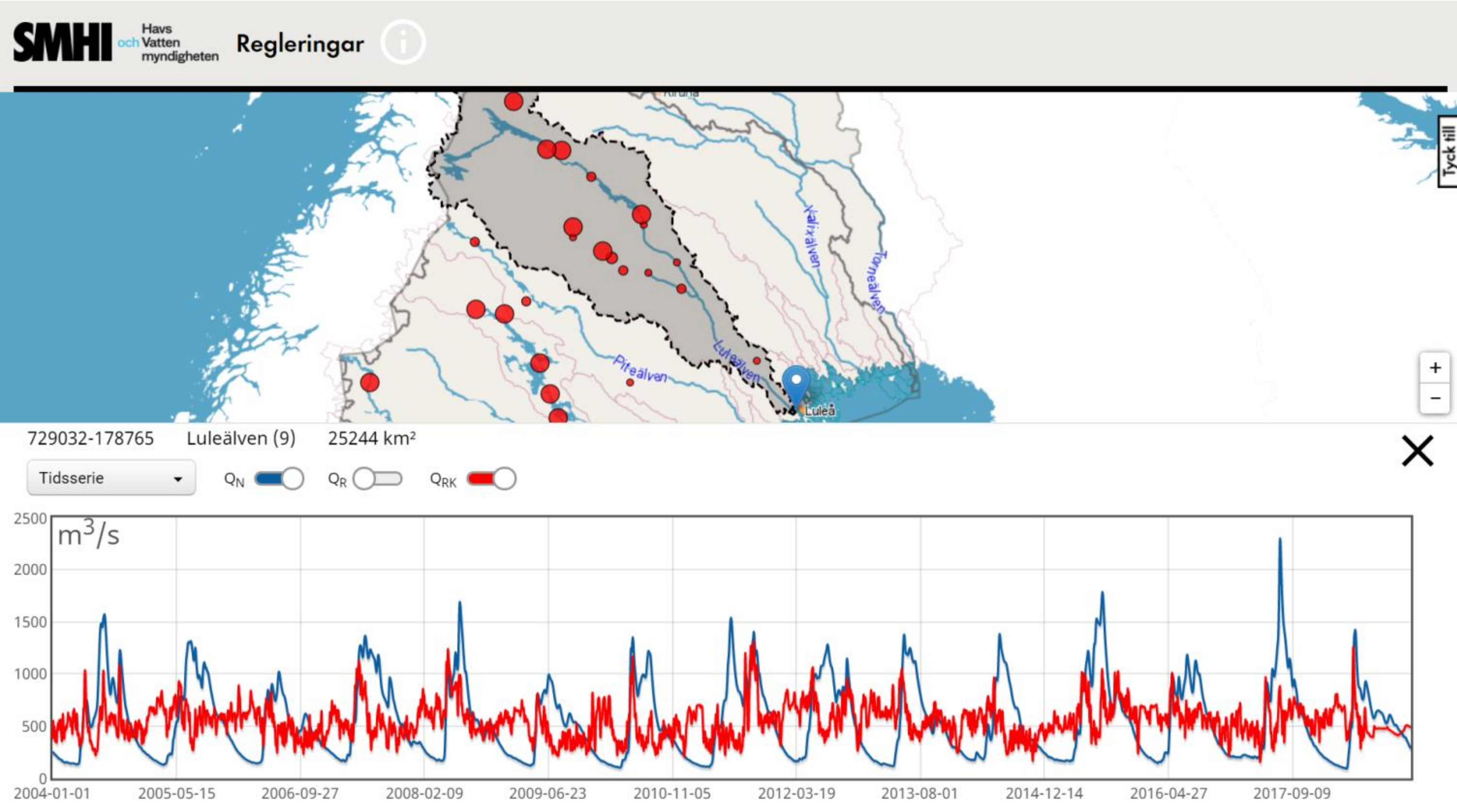
- S-HYPE is used to simulate both regulated and unregulated river flow.
- The time series are compared to classify hydrological regime of regulated rivers.



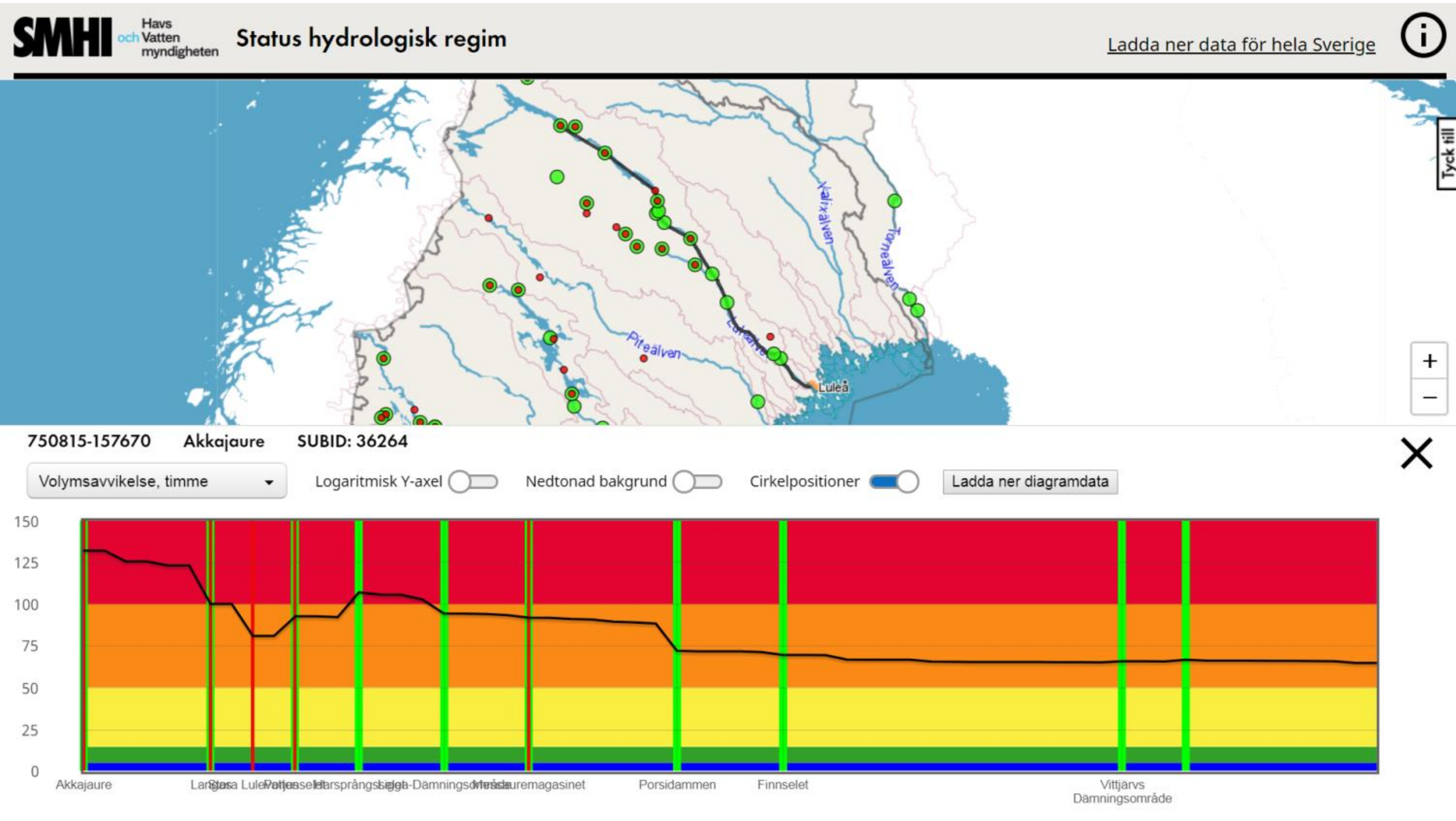
Luleälven river flow 1900-2000



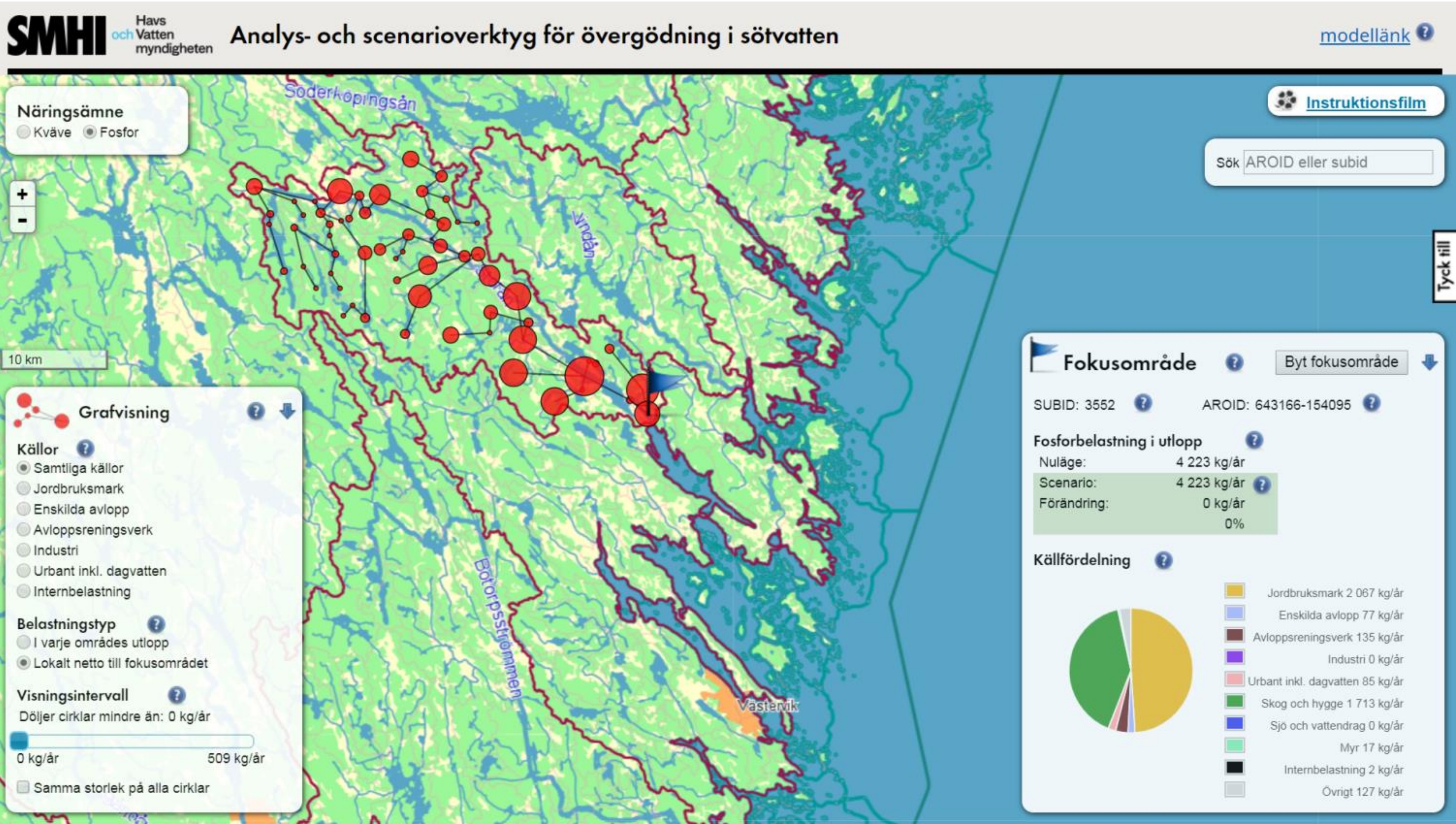
Luleälven: Regulated vs unregulated flow



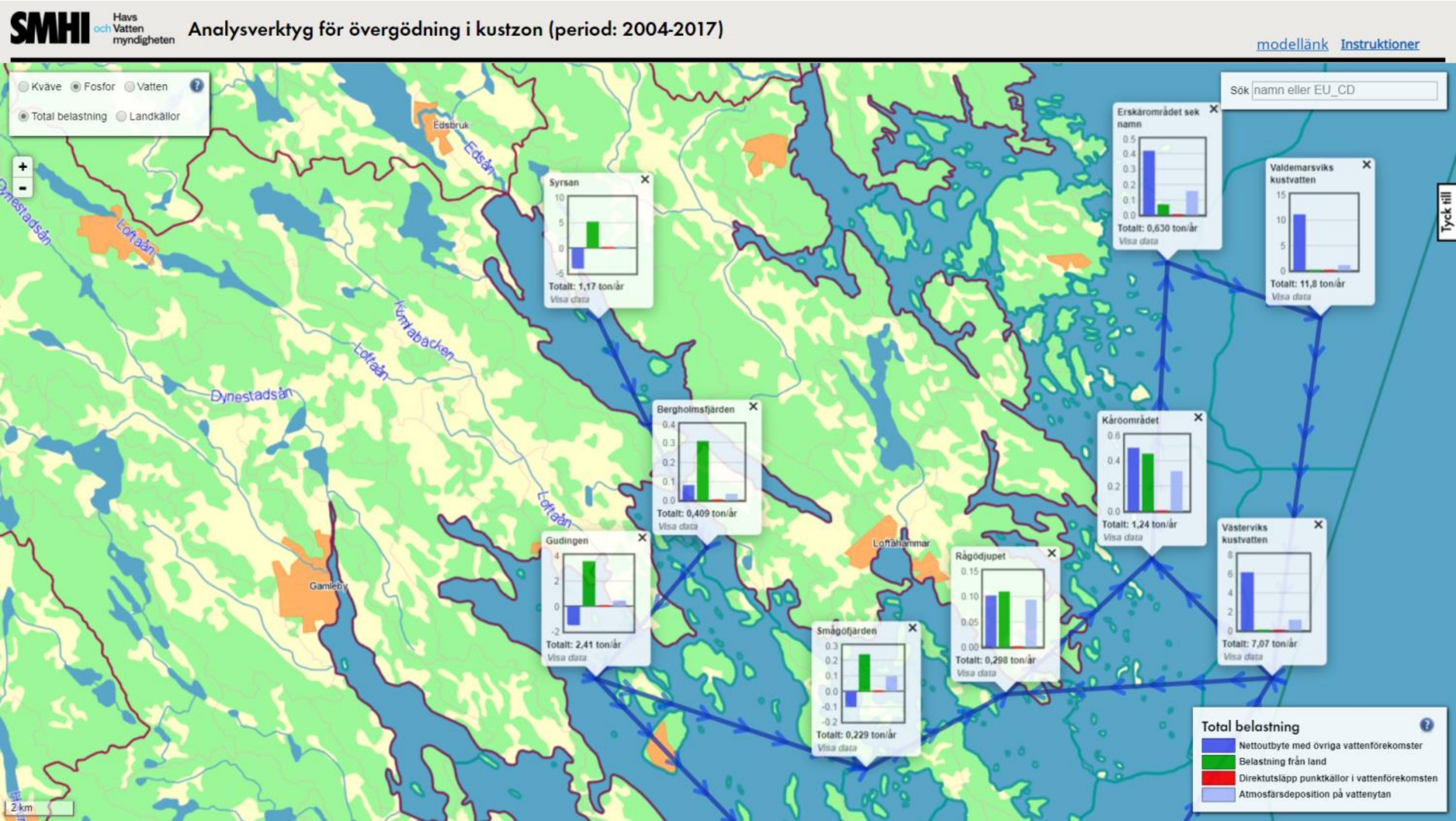
Luleälven: Hymo status classification



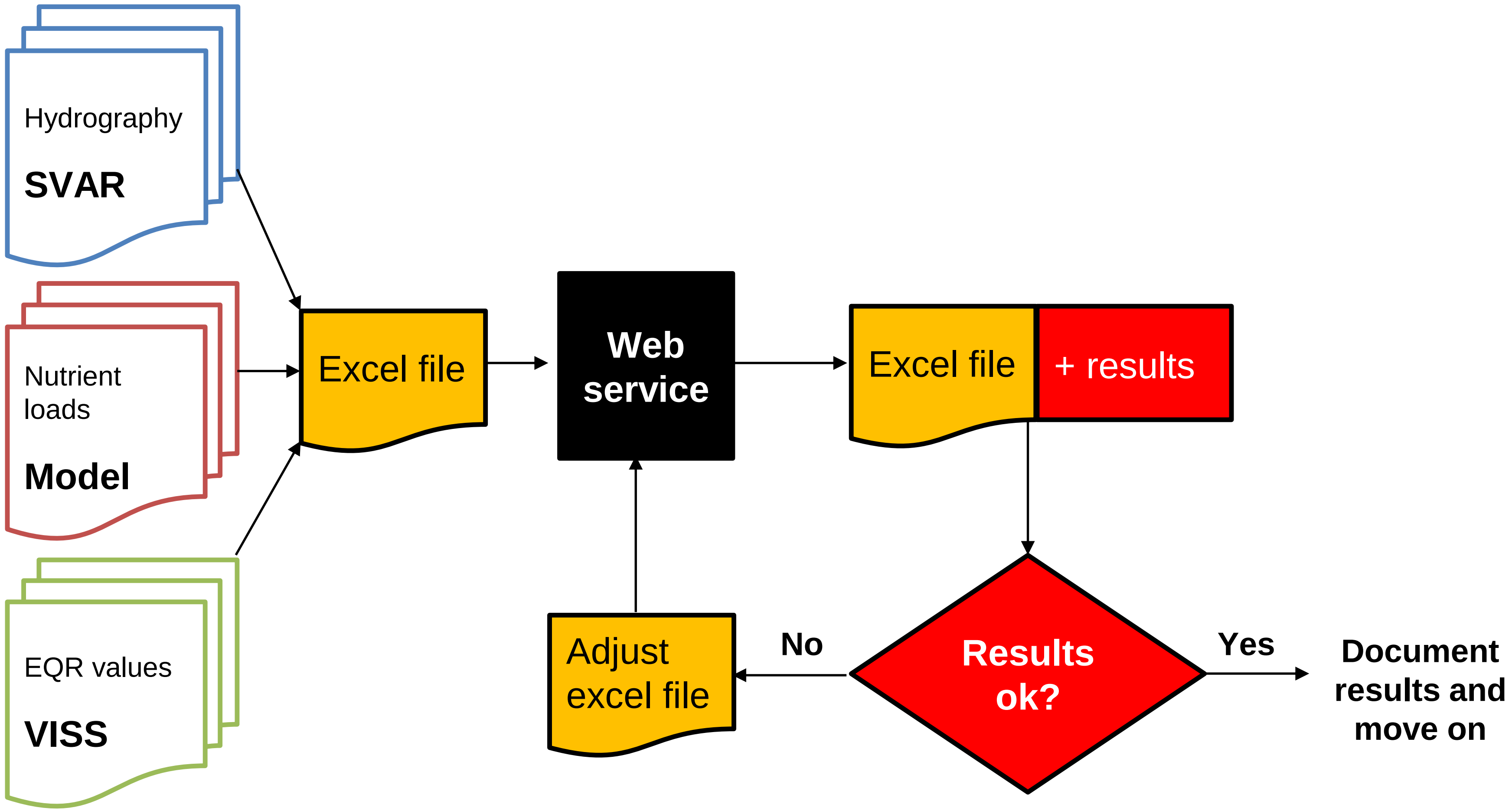
Example: Source apportionment of nutrients in inland waters…



…and the transport, mixing, dilution and retention of nutrients in coastal areas

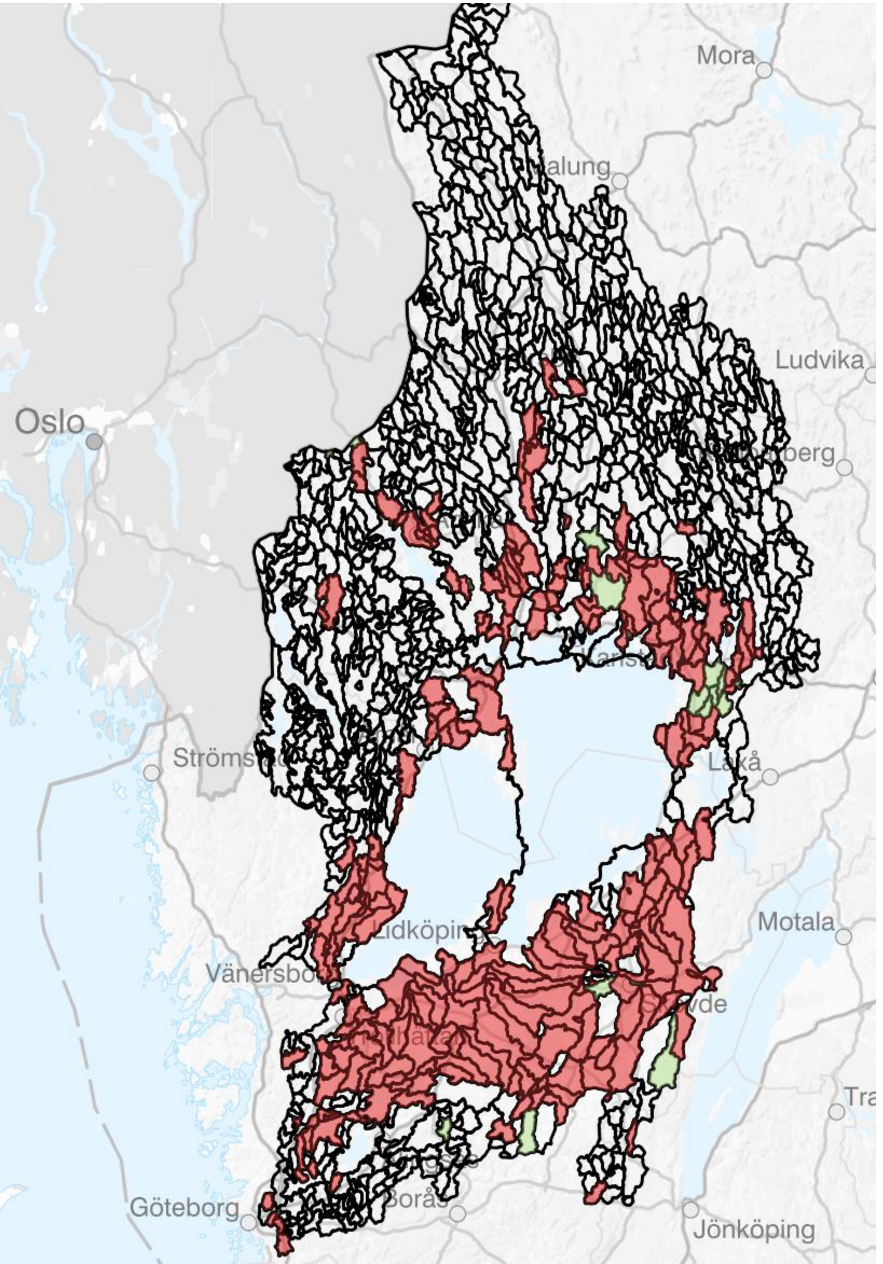


Example: Allocating phosphorous load reductions



Allocating P reductions in Göta älv

- **1623** surface water bodies
- **299** water bodies with EQR for phosphorous.
- **21** water bodies with good or better status (EQR ≥ 0,5)



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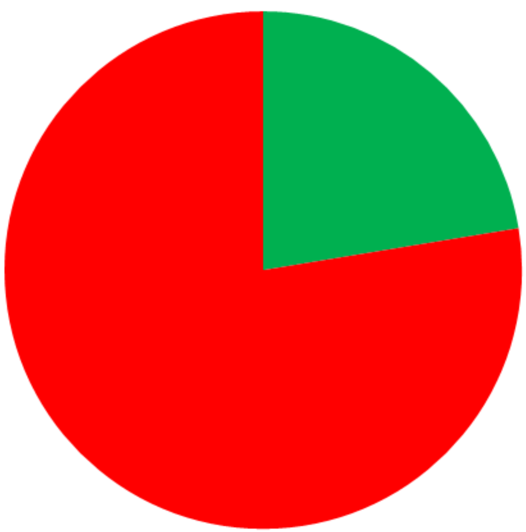
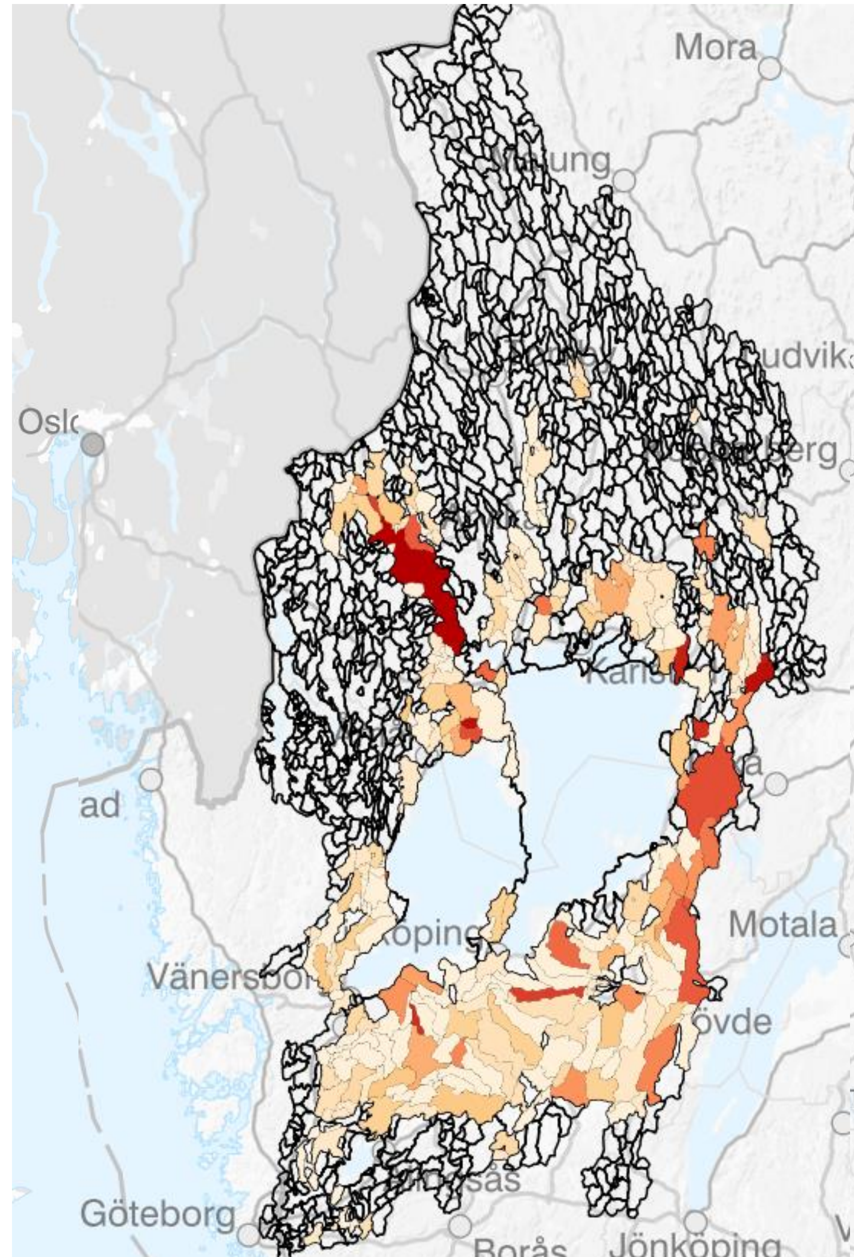
After first iteration...

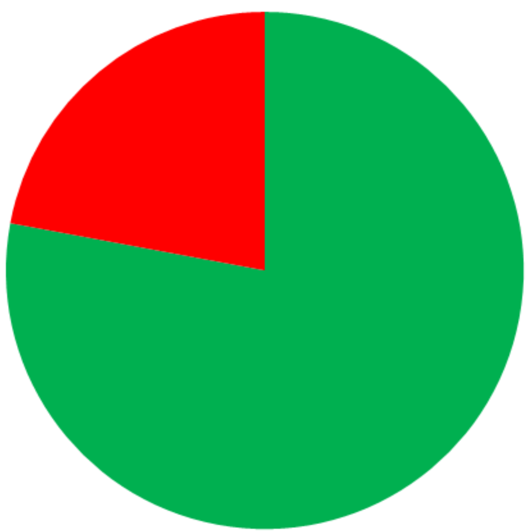
- **67** water bodies with good or better status (EQR ≥ 0,5)
- **327** water bodies with allocated phosphorous reductions

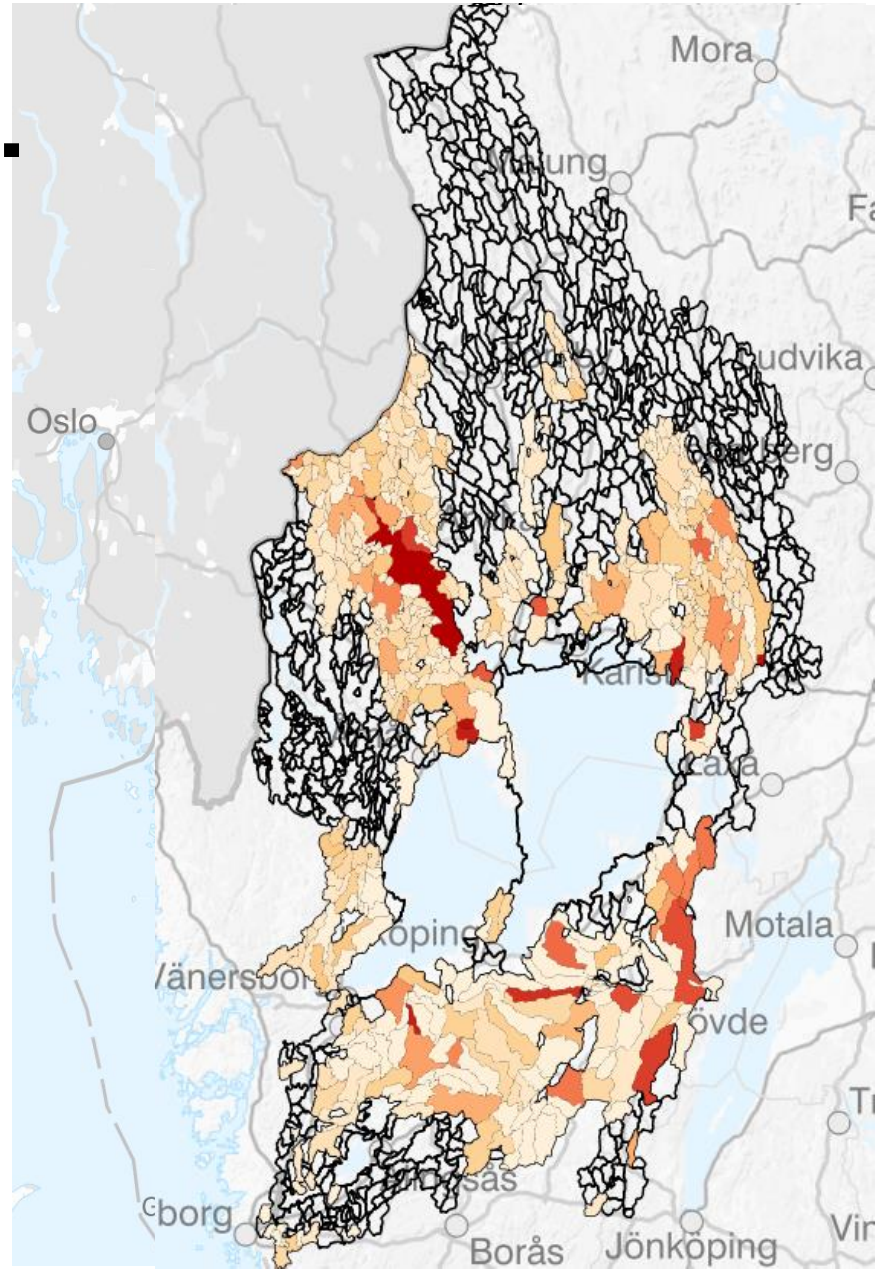




After second iteration…

- **233** water bodies with good or better status (EQR ≥ 0,5)
- **582** water bodies with allocated phosphorous reductions





Models already offer ways to

- ✓ Fill gaps in space and time,
- ✓ Identify faulty measurements,
- ✓ Characterize reference conditions,
- ✓ Calculate source apportionment of emissions,
- ✓ Allocate nutrient load reductions,
- ✓ Quantify effects of climate change,

...but why not use models to

→ **Group water bodies** according to hydrological similarity (climate, soils, land use, pressures, etc.)


Thanks for
your attention!
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