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Nature-based Solutions for reducing flood and drought risks:

What do we need to take into account?

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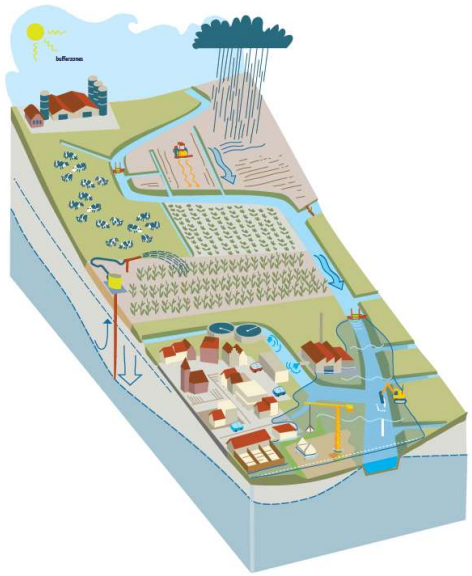
Why talk about sponge functioning?

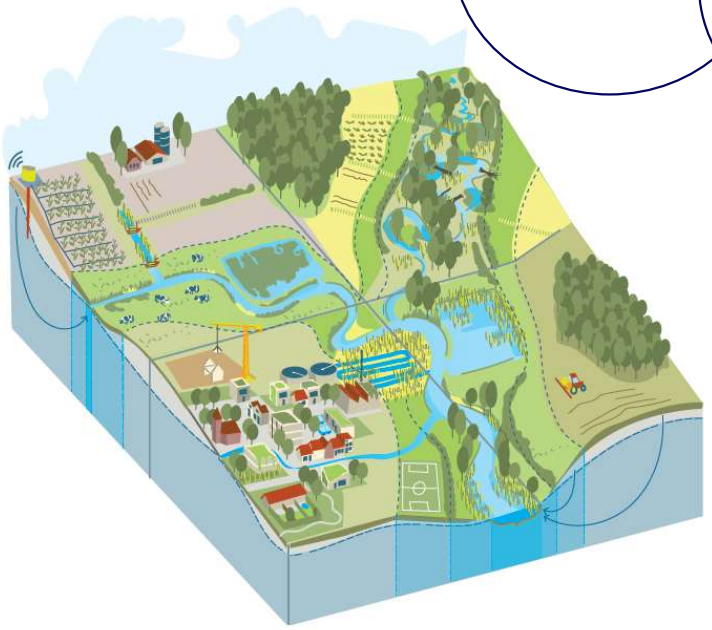
Droughts

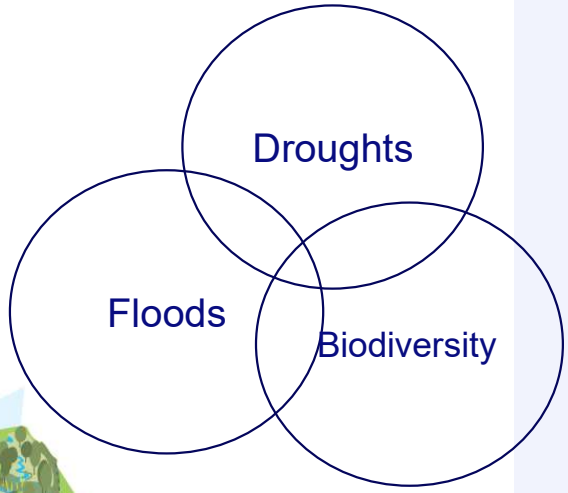
Floods

Biodiversity



Nature-based Solutions





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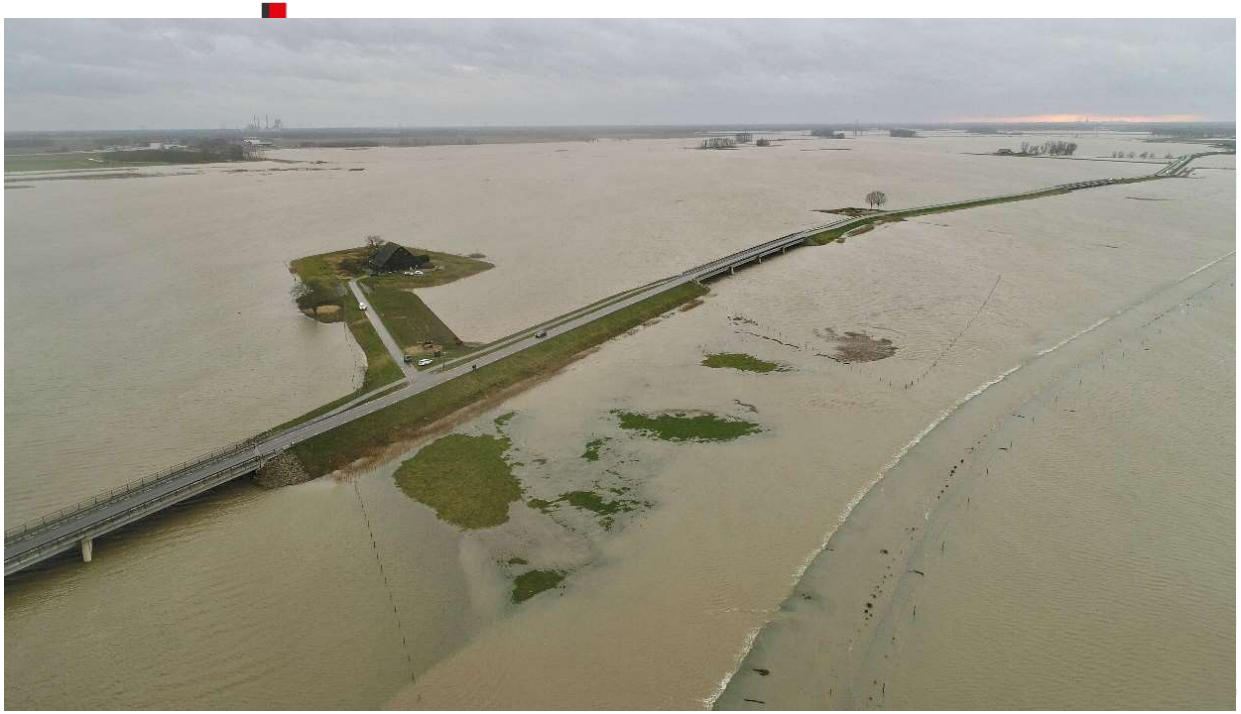
Natural Water Retention Measures

- Reduce & mitigate floods AND droughts
- Spread water availability through time (sponge)
- Which measure where depends on spatial lay-out & system characteristics (climate, soil, land-use, topography, geology)
- Many types of measures: surface water, soil, groundwater

http://nwrm.eu/measures-catalogue

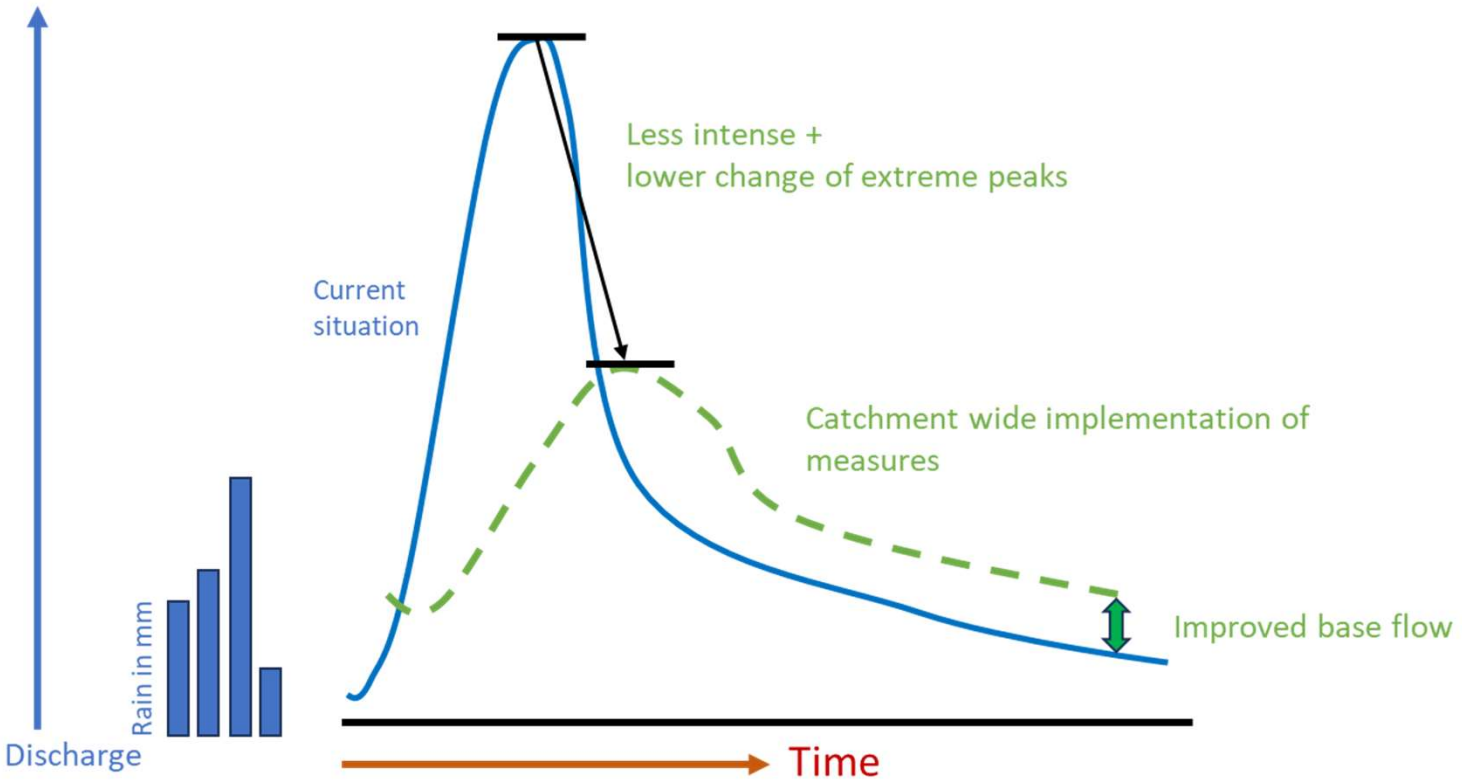
Room for the Rivers

- Strategy for the entire river system
- 30 years national project
- Co-design and co-selection of measures with local stakeholders
- Focus on floods and natural system restoration



Source Silva, W., Klijn, F. and Dijkman, J.P.M. Room for the Rhine branches in the Netherlands, what the research has taught us

Can Nature-based Solutions help reduce disaster risks?



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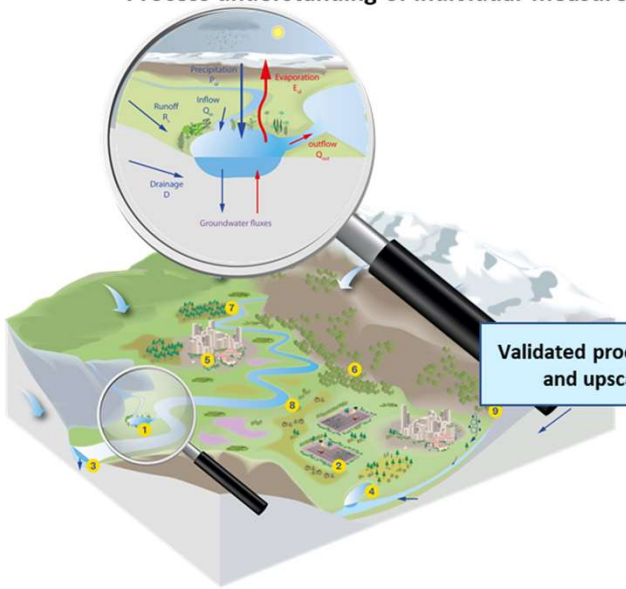
SpongeScapes:

Evidence and Solutions for Improving SPONGE Functioning at LandSCAPE Scale in European Catchments for increased Resilience of Communities against Hydrometeorological Extreme Events

Evidence base:

Process understanding of individual measures



Validated proces parameters and upscaling rules

Upscaling:

Assessing sponge functioning at landscape scale now and in the future

Objective baselines for co-designing strategies

Mainstreaming:

Co-design of sponge strategies with stakeholders

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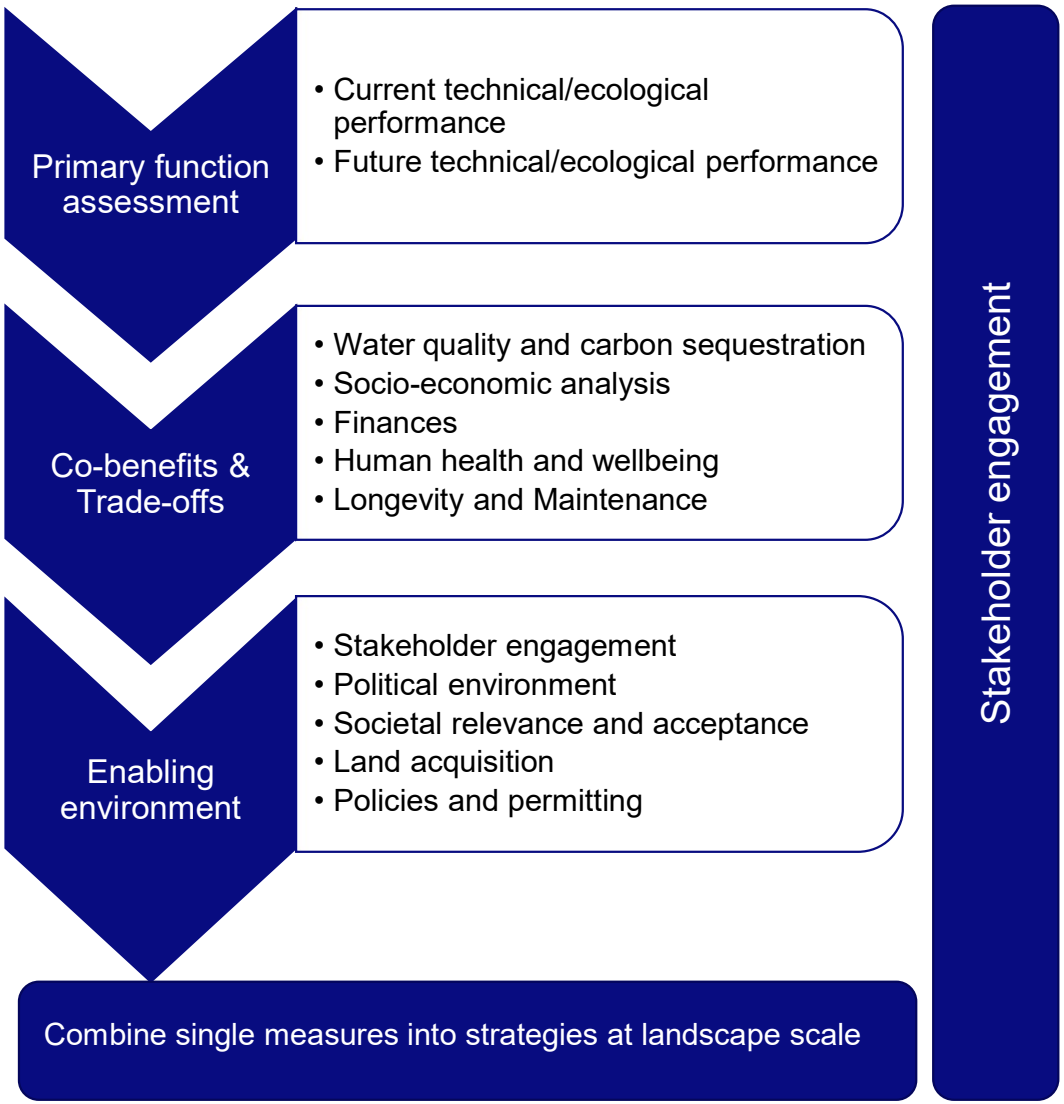
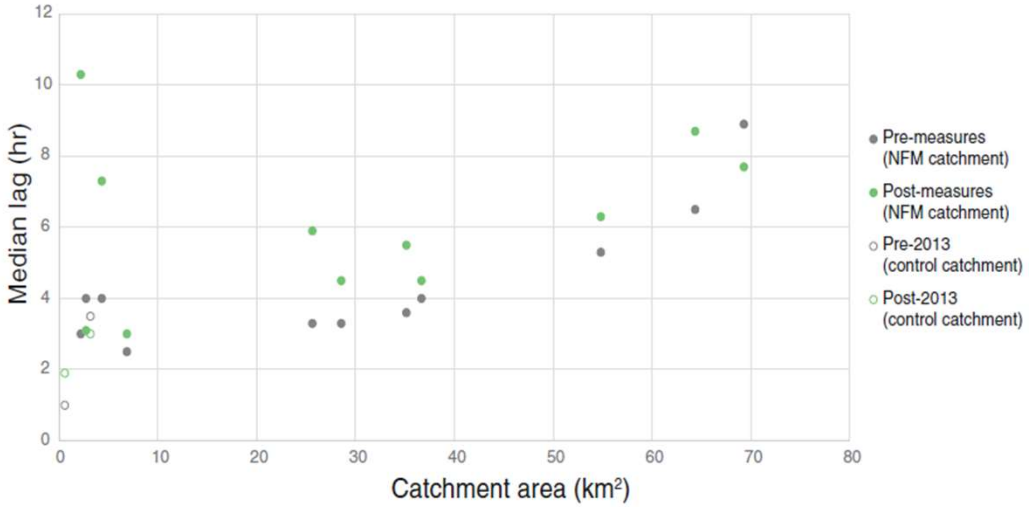
This project has received funding from the European Union's Horizon Europe research and innovation program under grant agreement n° 101112738

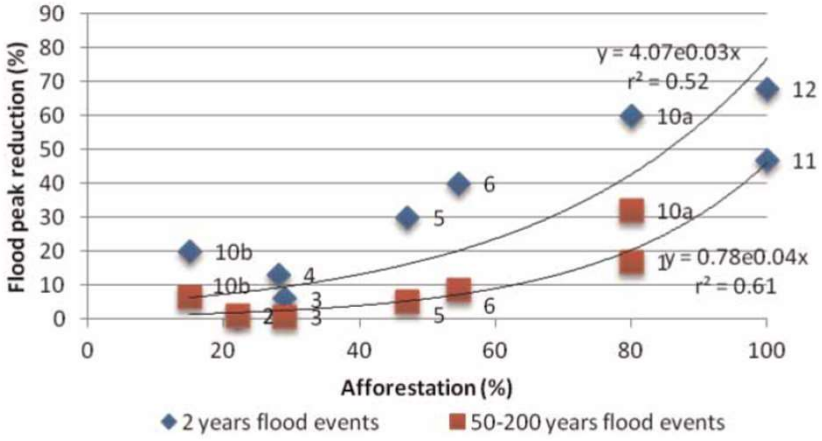


(Penning et al, 2023 – in print- Water)

How about the evidence?



Black et al 2020 - DOI: 10.1111/jfr3.12717



Iacop et al 2014 doi: 10.2166/nh.2014.184

Many NBSe examples for floods,
Evidence both using modelling and empirical studies

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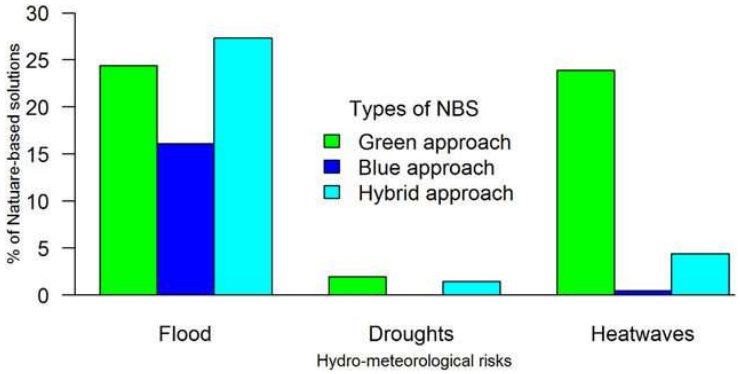
NbS for drought and evaluation on multiple goals are rare



(Sahani et al 2019 https://doi.org/10.1016/j.scitotenv.2019.133936)

database	#cases	F&D	F&D&B	F&B	D&B
Nwrm.eu	140	8	5	18	7
World Bank	72	12	7	23	9

http://www.nwrm.eu/
https://naturebasedsolutions.org/projects

(Penning et al, 2023 – in print *Water*)

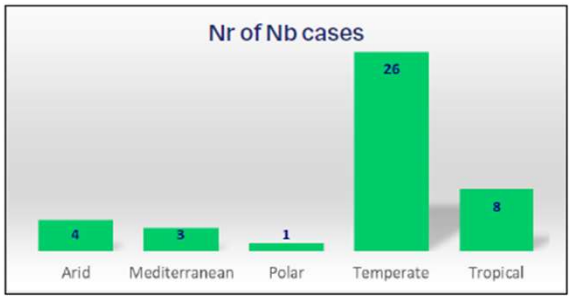
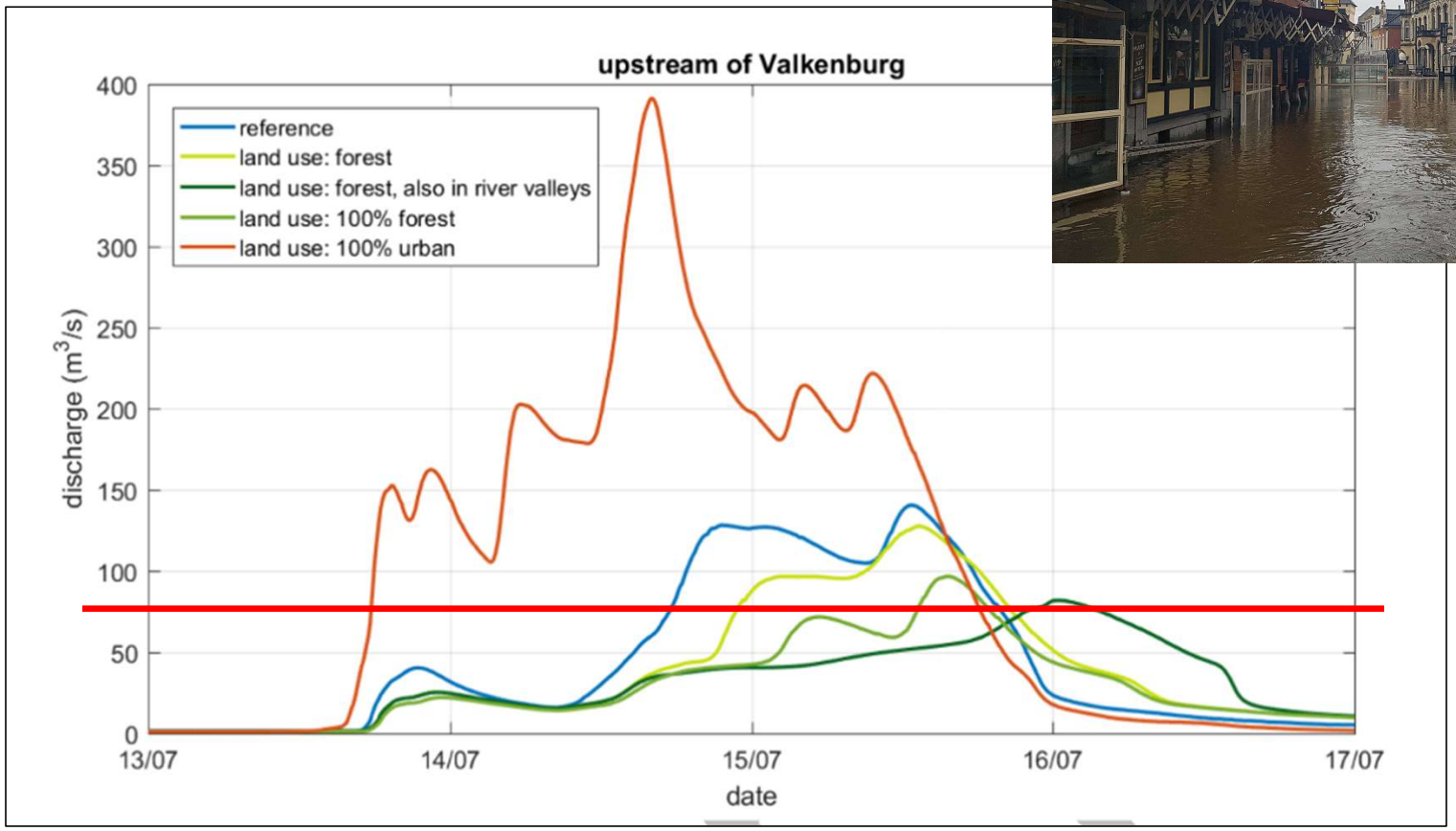


Figure 3. Number of published NbS cases with positive effects on climate change impacts (reduced water availability, drought, desertification) implemented in different major climate zones (N = 42 cases). Data obtained from the Nature-based Solutions Evidence Platform of the University of Oxford[4].

https://justdiggit.org/what-we-do/landscape-restoration/techniques/

Modelling tools for system understanding:

Limburg july 2021 event (ca. 130mm/48 hr)

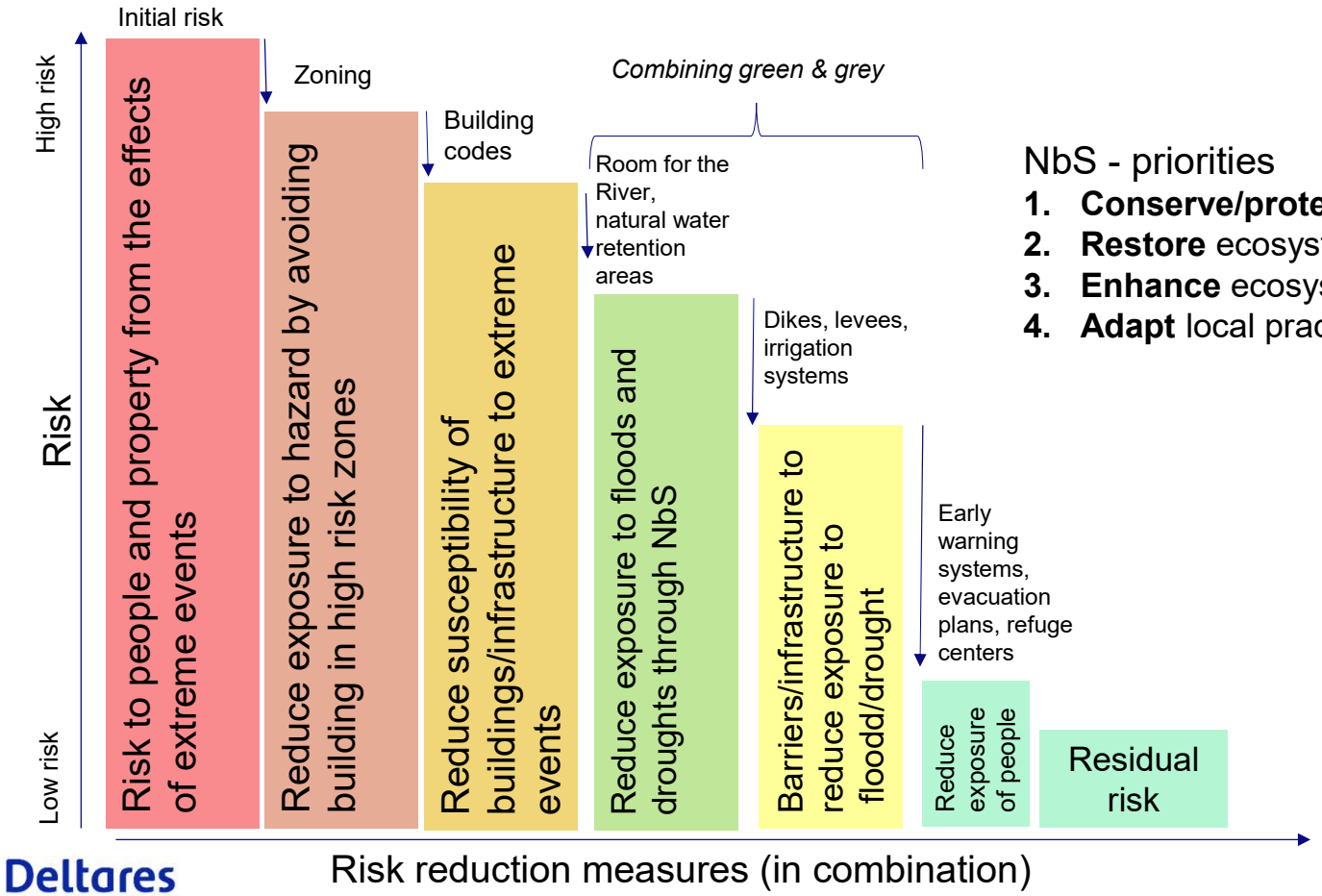


WFLOW_SBM + SOBEK (RAT Study Geul, 2022)

Importance of a realistic narrative in chosing DRR solutions

- What events can a solution still cater for?
- Are other types of events & scenario's also evaluated?
- Are co-benefits and costs also evaluated?
- What is needed in terms of maintenance to ensure longevity of the solution?
- How does a solution affect upstream-downstream interactions?
- Manage expectations through co-creation, co-desing, co-management!

Where do Nature-based Solutions fit in?



NbS - priorities

1. **Conserve/protect** ecosystem functioning and services
2. **Restore** ecosystem functioning and services
3. **Enhance** ecosystem functioning and services
4. **Adapt** local practises/use of ecosystem services

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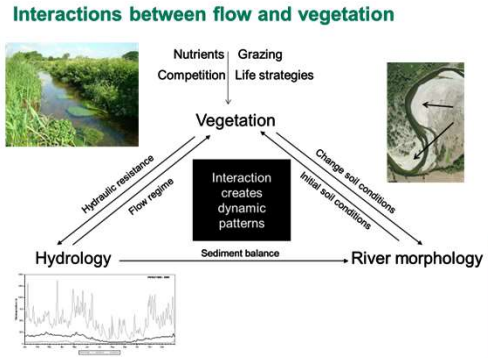


Technology and system knowledge

Multi-stakeholder approach

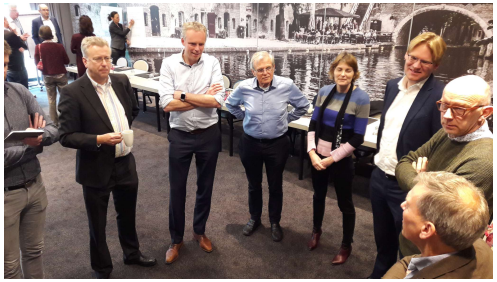
Management, monitoring and maintenance

Institutional embedding

Business Case

Capacity building

https://www.ecoshape.org/en/enablers/



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