Nature-based Solutions for Flood Risk Management

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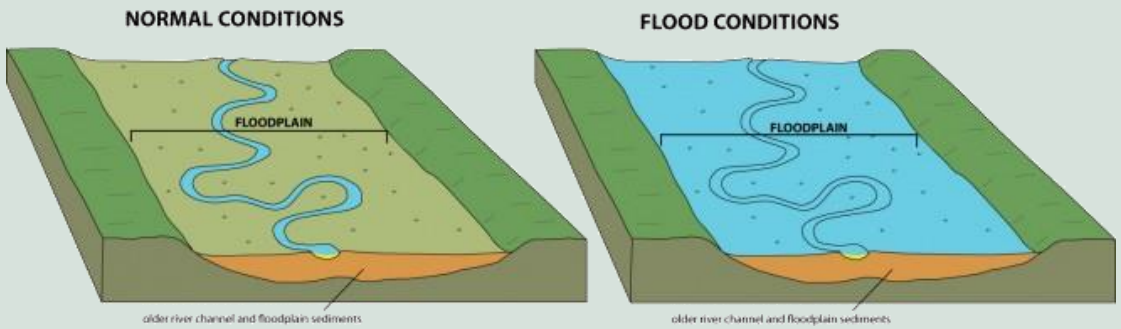
RECONECT

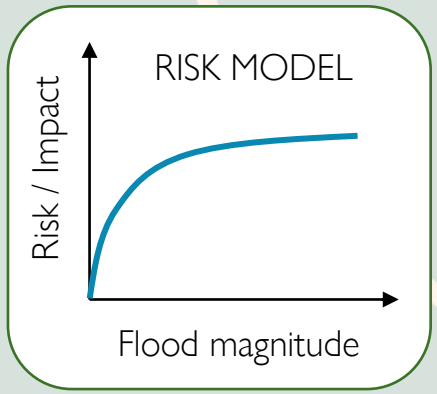
Objectives

Learn how large-scale nature-based solutions can reduce risks from floods and provide co-benefits for water, nature and people

Floods

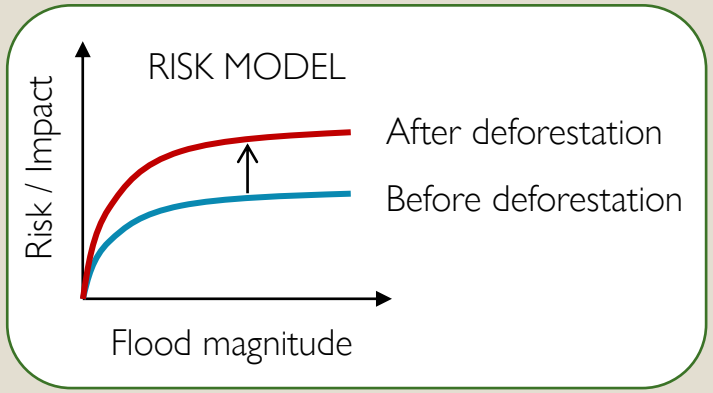
- Floods occur because of excessive rainfall or snow melt (natural process).
- During floods, water flows out of river channels into the *floodplains*.
- The floods can cause serious damage to people and their property.
- Risk (potential impact) from floods is greater for greater flood magnitude.





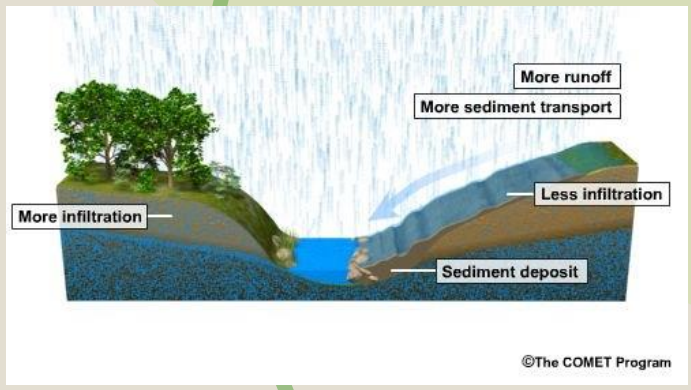
Human influence on floods

- People change natural paths of water by
  - urbanisation: building more impervious areas prevents infiltration of water into the soil and increases quantity and speed of water runoff
  - deforestation: less water is captured by vegetation and more water flows into the rivers
  - dumping of garbage into rivers: water flow is obstructed, bridge openings are clogged, and local flooding occurs
  - excessive quarrying (stone and gravel extraction): makes the land bare and increases and accelerates water runoff
- Consequently, risk from flooding increases



Influence of urbanisation on runoff

Influence of deforestation on runoff

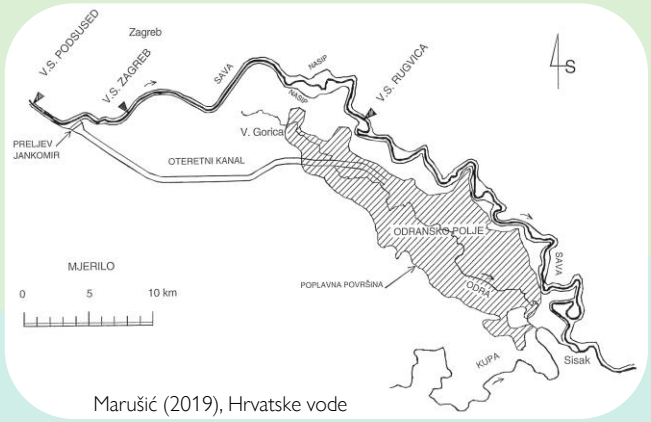


Traditional measures for flood risk reduction

Sava at Zagreb

Levees (dikes) along the river prevent flooding behind them

Jankomir weir, Croatia



Marušić (2019), Hrvatske vode

Diversion (bypass) channels evacuate excess water from main channel

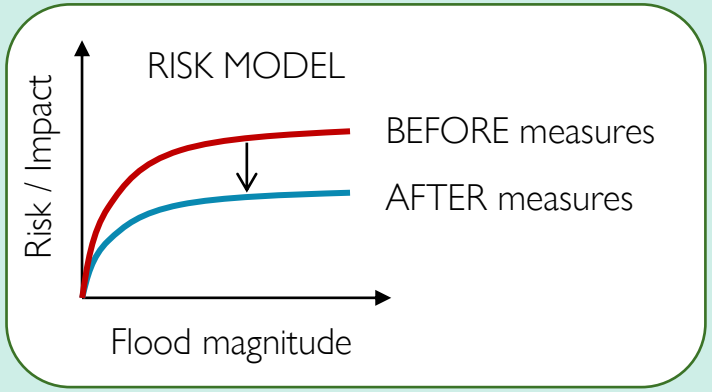
Rovni reservoir, Serbia

Storage facilities (reservoirs, detention ponds or retention ponds) store water and release it slowly

Culverts and pipes convey water under the roads or railway

Lim at Prijepolje

Emergency barriers (mobile equipment) are used as temporary structures during floods



MAIN GOAL IS TO REDUCE RISK FROM FLOODING

Nature-based solutions for flood risk reduction

SOME EXAMPLES

FLOODPLAIN RESTORATION

RE-MEANDERING

WETLAND RESTORATION

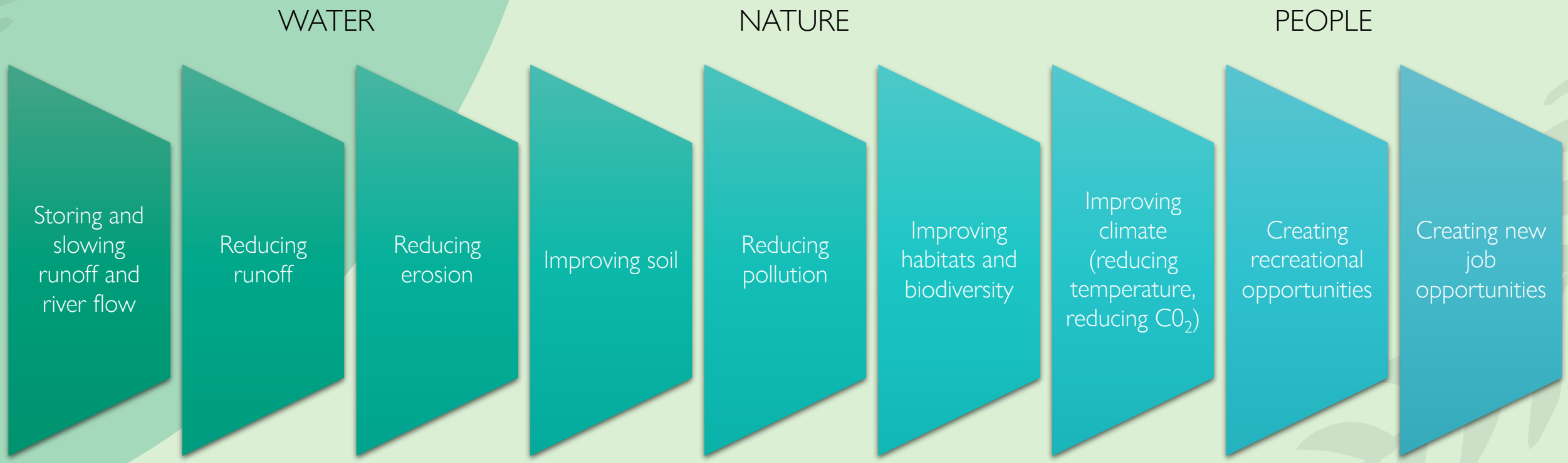
RETENTION PONDS

RIPARIAN BUFFER STRIPS

AFFORESTATION &
FOREST CONSERVATION

Benefits and co-benefits of large-scale NBS

Large-scale NBS reduce risks and have many other benefits and co-benefits.



Storing and capturing water also reduces risk from droughts.
Reducing erosion and improving soil also reduces risk from landslides.

Benefits and co-benefits of large-scale NBS

☝ HIGH ☞ MEDIUM 👇 LOW

Benefits & co-benefits	Floodplain restoration	Re-meandering	Wetland restoration	Retention ponds	Riparian buffer strips	Afforestation & forest conservation
Storing and slowing runoff and river flow	☝	☞	☝	☝	☞	☝
Reducing runoff	☞	☞	☞	☝	👇	☝
Reducing erosion	☝	☝	👇	👇	☝	☝
Improving soil	☝	☞	👇	👇	👇	☞
Reducing pollution	☞	☞	☞	☞	☞	☝
Improving habitats and biodiversity	☝	☝	☝	👇	☞	☞
Improving climate (reducing temperature, reducing $C0_2$)	☞	☞	☝	👇	☞	☝
Creating recreational opportunities	☝	☝	☞	☝	☞	☝
Creating new job opportunities	☞	☞	☝	☝	👇	☝

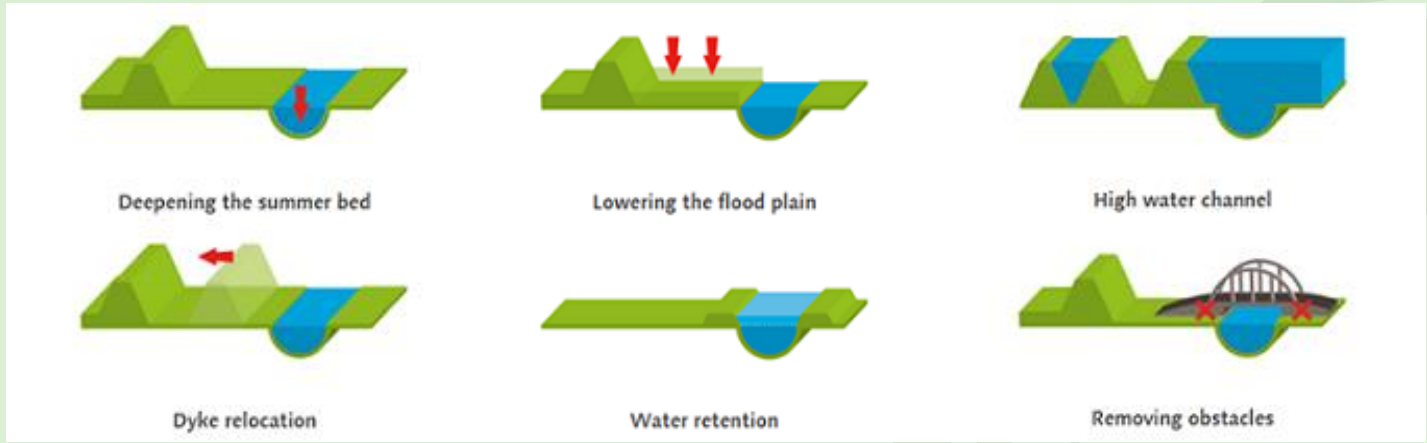
Two examples of large-scale NBS

Room for the River (The Netherlands)

https://www.dutchwatersector.com/news/room-for-the-river-programme

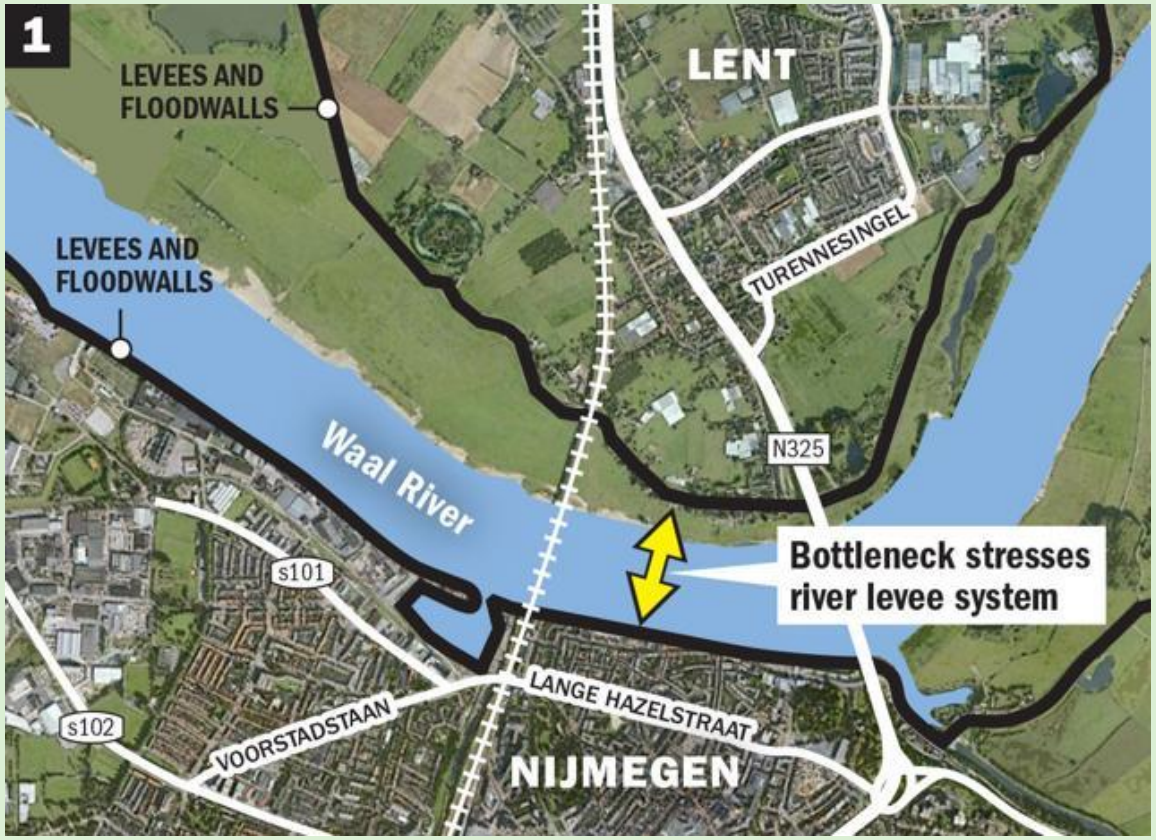
Room for the River (The Netherlands)

- Initiated after great floods in 1993 and 1995 when 250,000 people were evacuated from their homes
- Main goal:
  - expand room for the rivers during high water by restoring natural floodplains, and use the space for other purposes between the floods
  - improve the environment for nature and people
- Interventions at 39 locations



Room for the River (The Netherlands): Nijmegen

BEFORE



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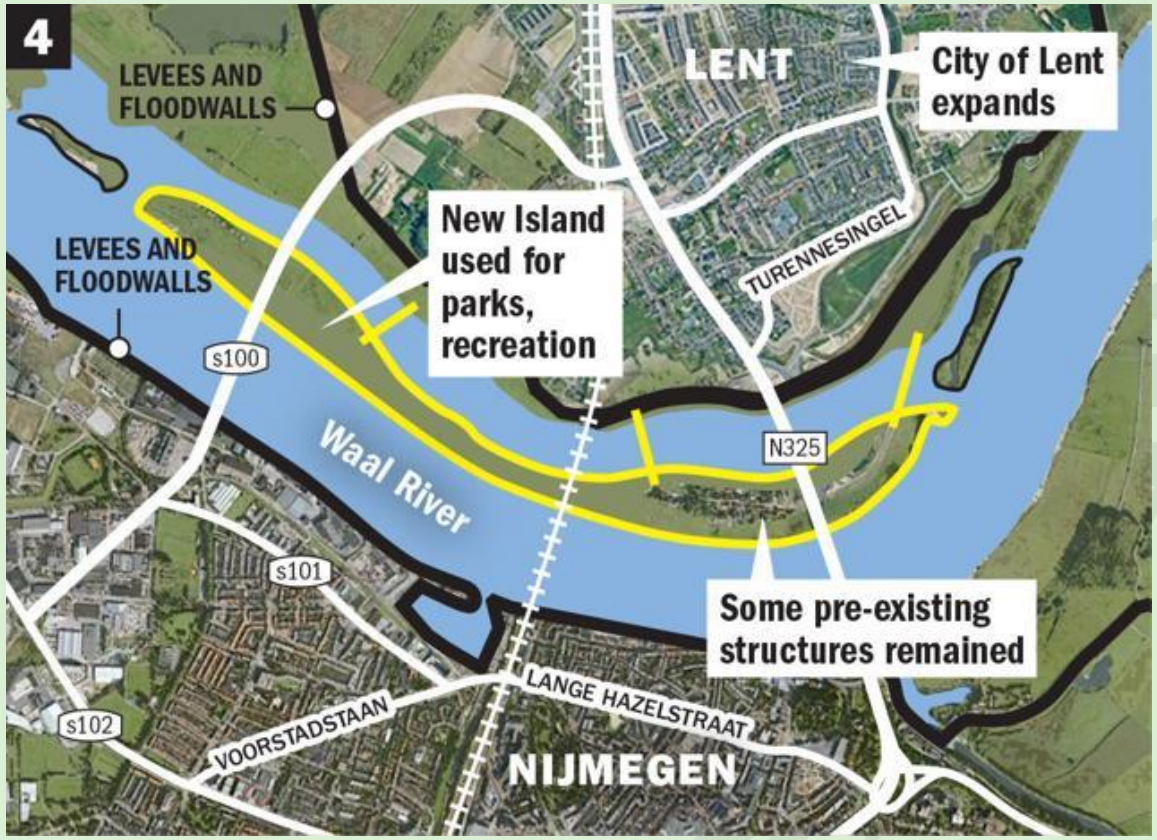


Room for the River (The Netherlands): Nijmegen

DURING HIGH WATER

DURING LOW WATER

Room for the River (The Netherlands): Nijmegen

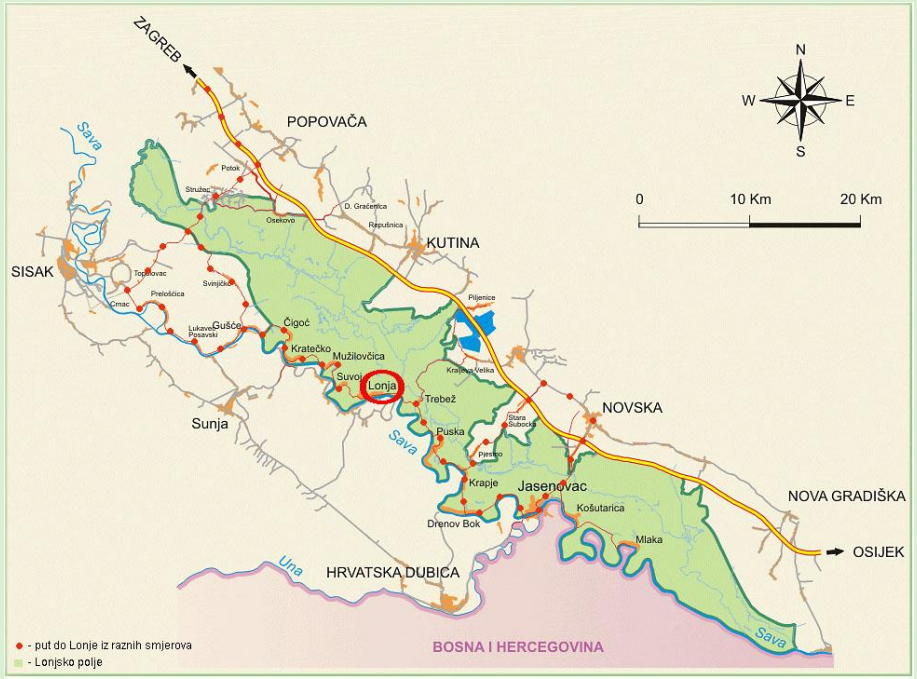
RECREATIONAL AREA & ARCHITECTURAL AMENITIES

NBS in Sava River Basin: Lonjsko polje

https://pp-lonjsko-polje.hr

Lonjsko polje (Croatia)

- Natural retention area in the floodplains of the Sava River
- Part of the central Sava flood control system, one of several retention areas
- Nature park with abundant biodiversity



NBS in Sava River Basin: Lonjsko polje

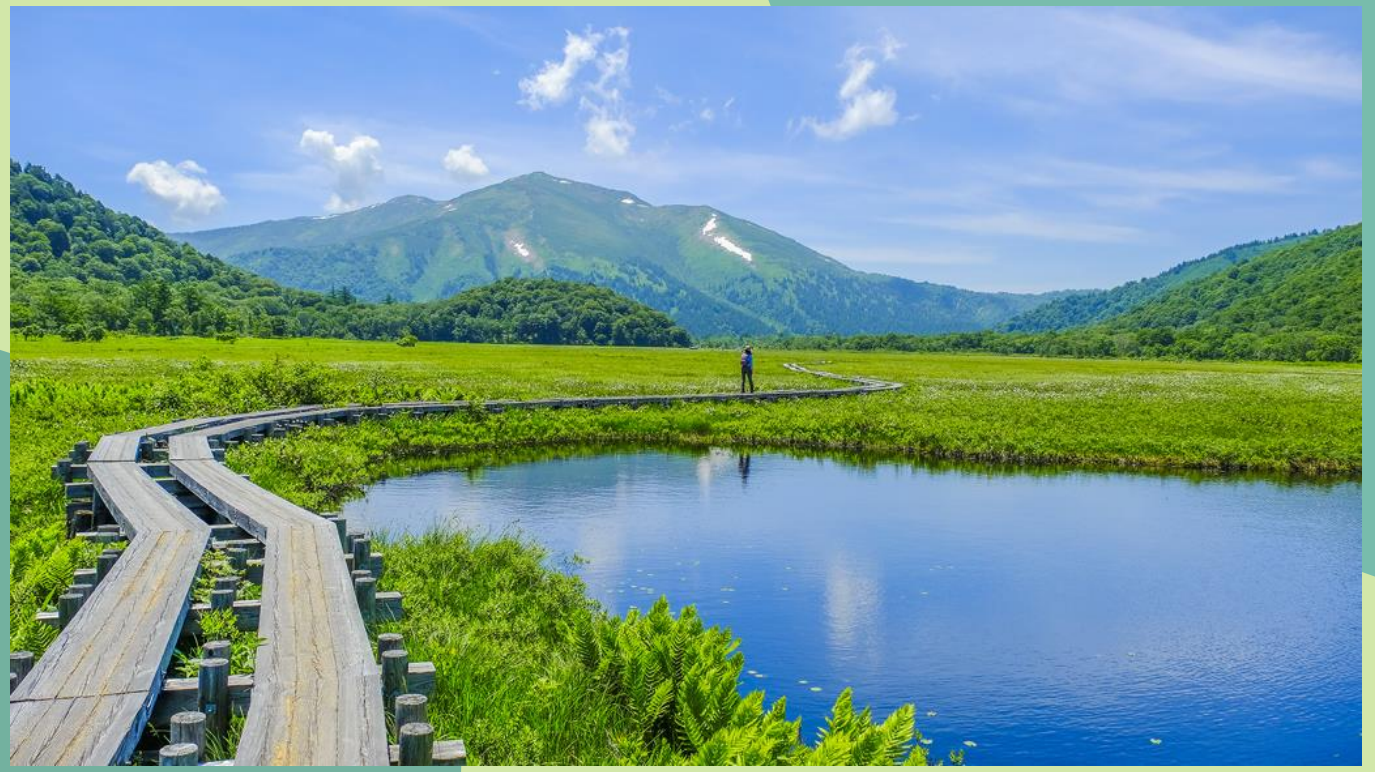
NATURAL AMENITIES & RECREATIONAL AREA

Summary

- Large-scale NBS can be used for flood risk reduction in rural and agricultural areas
- Large-scale NBS provide multiple benefits for water, nature and people
- In addition to reducing risk from floods, some large-scale NBS can also reduce risk from other hydrometeorological hazards (erosion, droughts, heat waves)

- Some resources:
  - Comprehensive catalogue of measures: http://nwrm.eu/
  - Interactive selection of measures for different conditions: http://www.reconect.eu/services-platform/measure-selector-tool/

Thank you



Ozegahara in Oze National Park, Japan