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Nature-based Solutions and Natural River Management

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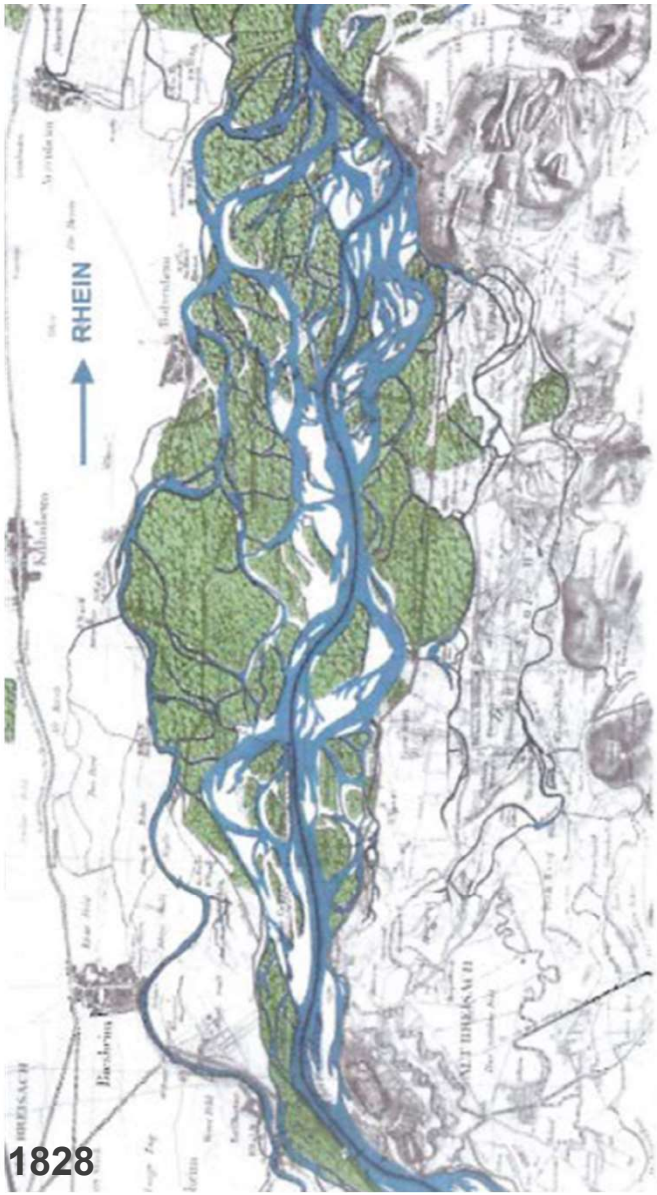
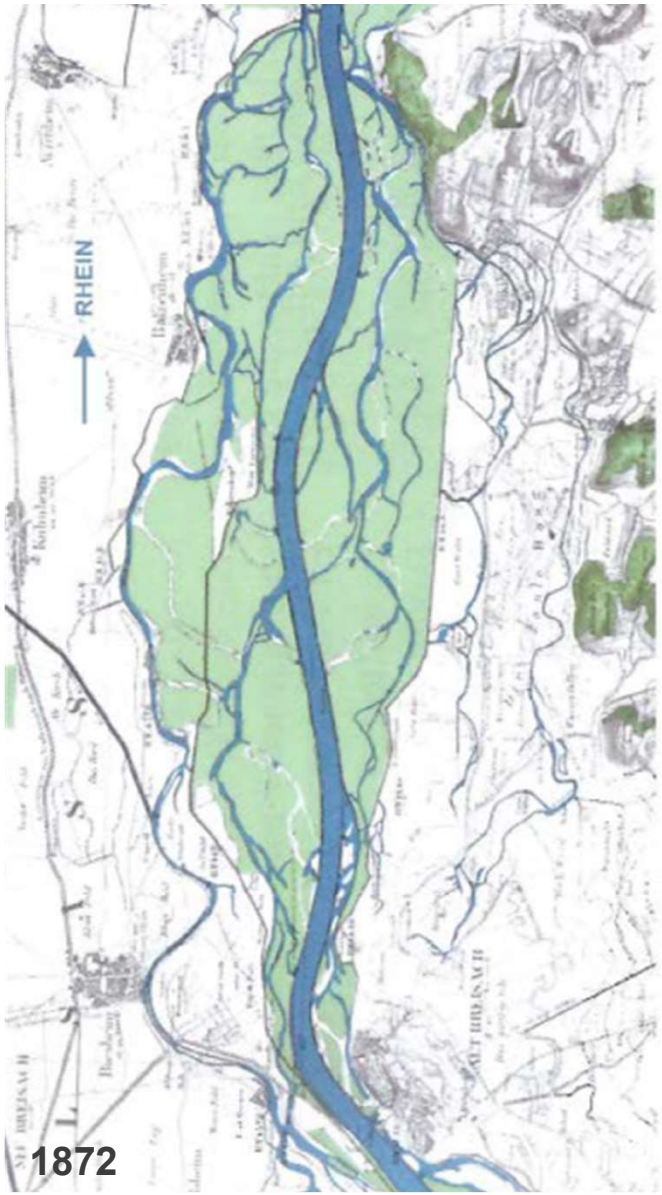
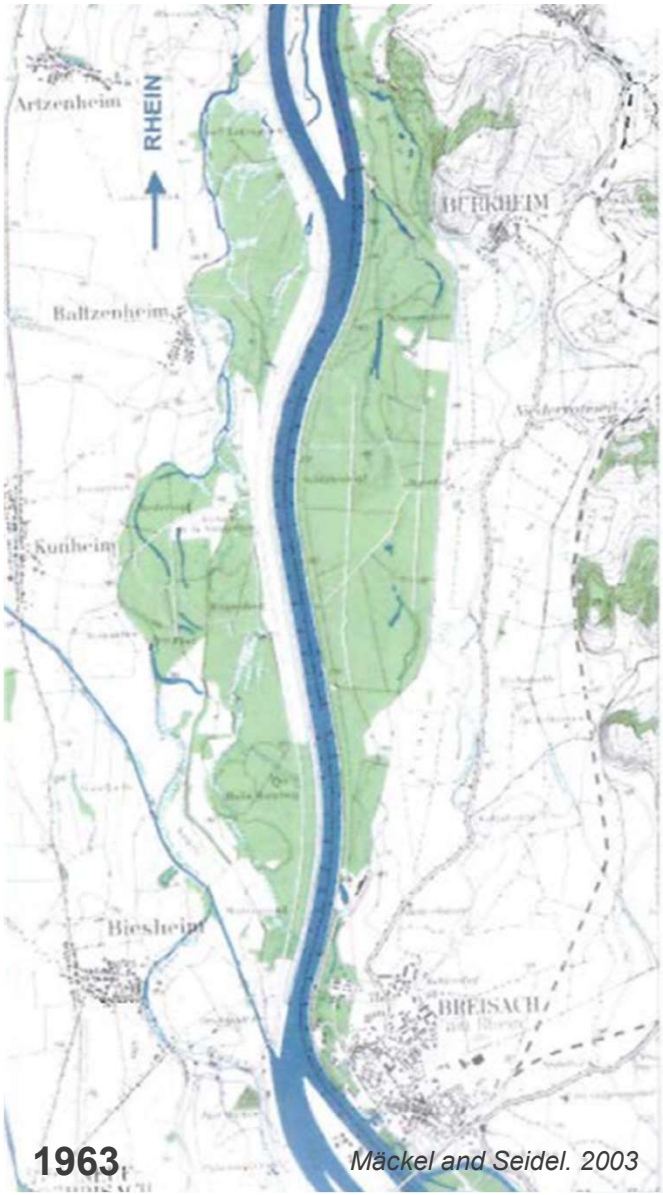
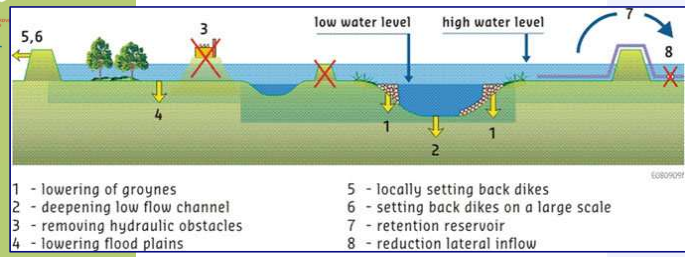






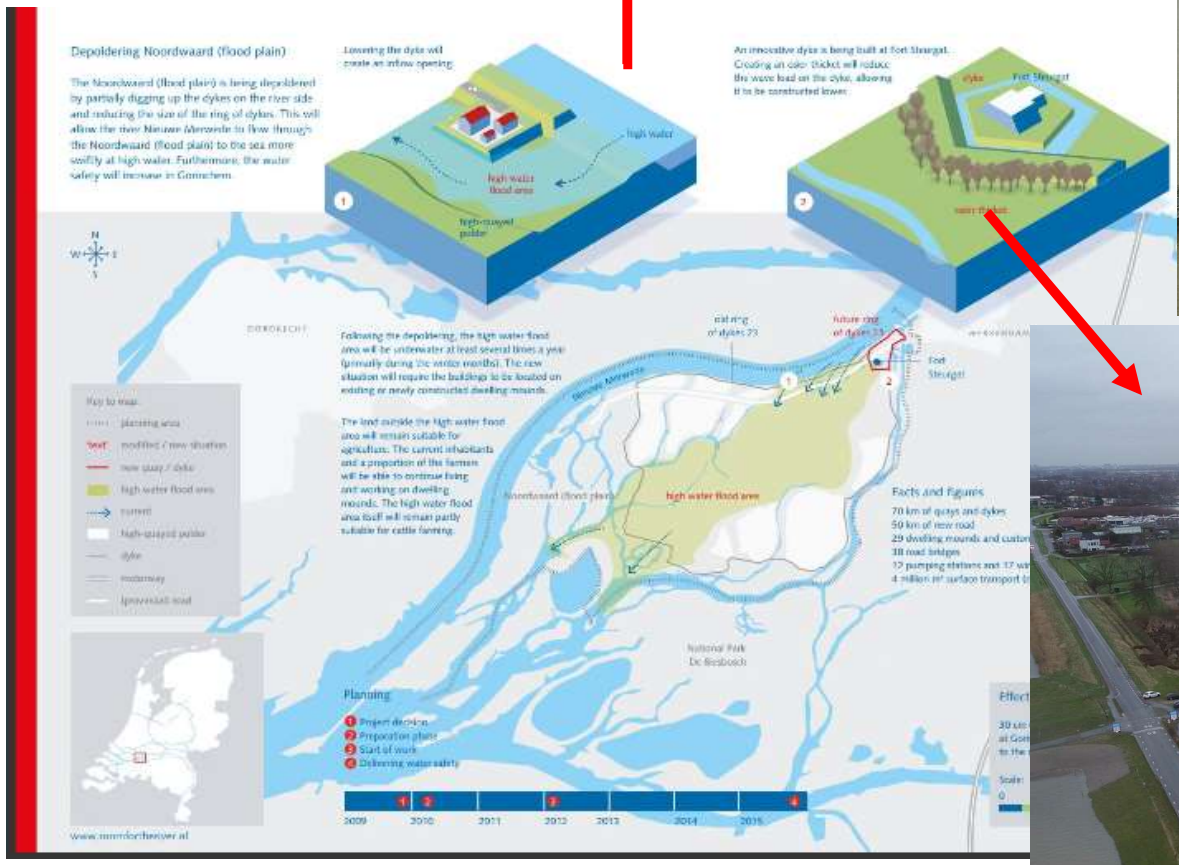
Mäckel and Seidel. 2003

Room for the river



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

Room for the River



https://issuu.com/ruimtevoorderivier/docs/depoldering_noordwaard__flood_plain

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Photos – Robbert de Koning

Natural River Management (NRM)

	Natural river management
Definition	Low interference management of rivers aiming to optimize river use and to reduce river related risks, while respecting natural dynamics and flow of fresh water, sediment and nutrients, and peoples' dependence on these at a basin scale.
Aims	Facilitate sustainable social and economic development by advocating a short- as well as long-term perspective on effects on the natural river system.
	Define optimal management strategies and interventions for long-term sustainable river management.
	Give guidance on optimizing the engineering process to arrive at a coherent set of interventions that constitutes the best investment option in the whole basin for achieving the desired objectives.

NRM approach

NRM APPROACH

Step 1: Definition of goals and objectives

Step 2: System analysis

Step 3: Selection of hotspot areas

Step 4: Selection of NbS

Step 5: Impact and economic analysis

Step 6: Prioritization of interventions

Step 7: Implementation

Step 8: Maintenance and monitoring

River function	Objective
Nature	• Ensure flows of freshwater and sediment to sustain downstream livelihoods, ecosystem services and biodiversity
Flood safety	• Decrease vulnerability of people to flooding through targeted, sustainable and long-term strategies per river section
Other functions	• Accommodate other functions but minimize interference with natural river behavior as much as possible

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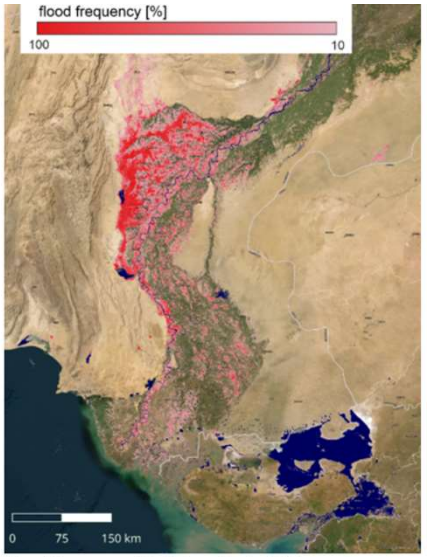
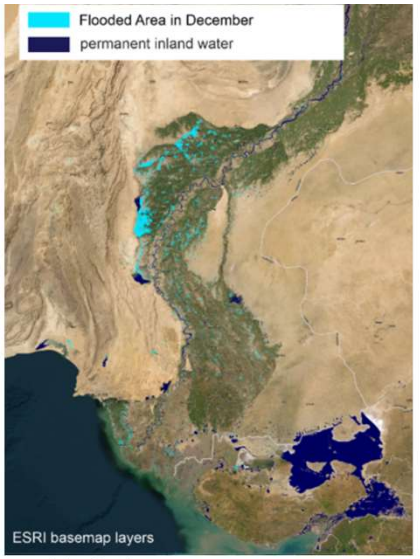


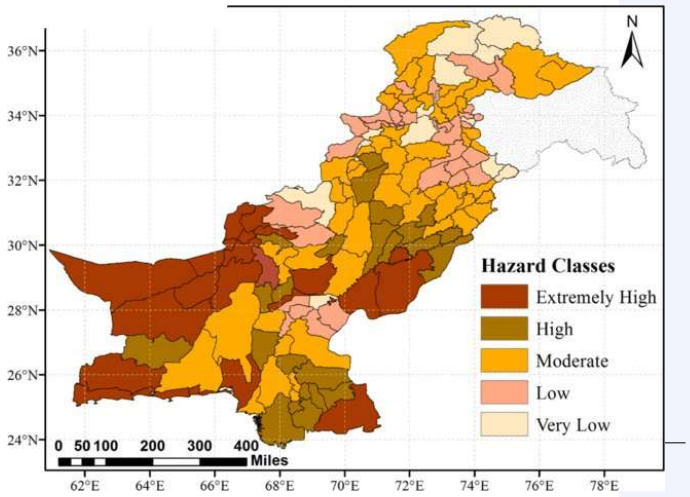
Flood frequency | Pakistan / Indus Valley.
Frequency of flood detection in period 18 August - 23 September 2022.



Remaining flood area.
Flood area remaining in period 1 December - 15 December 2022.

Source: https://www.eumetsat.int/features/towards-better-flood-and-drought-monitoring

Dynamics in space and time



Drought hazard map showing the vulnerability index for each district of Pakistan
Source Adnan&Ullah, 2020 https://link.springer.com/article/10.1007/s11069-020-04116-3

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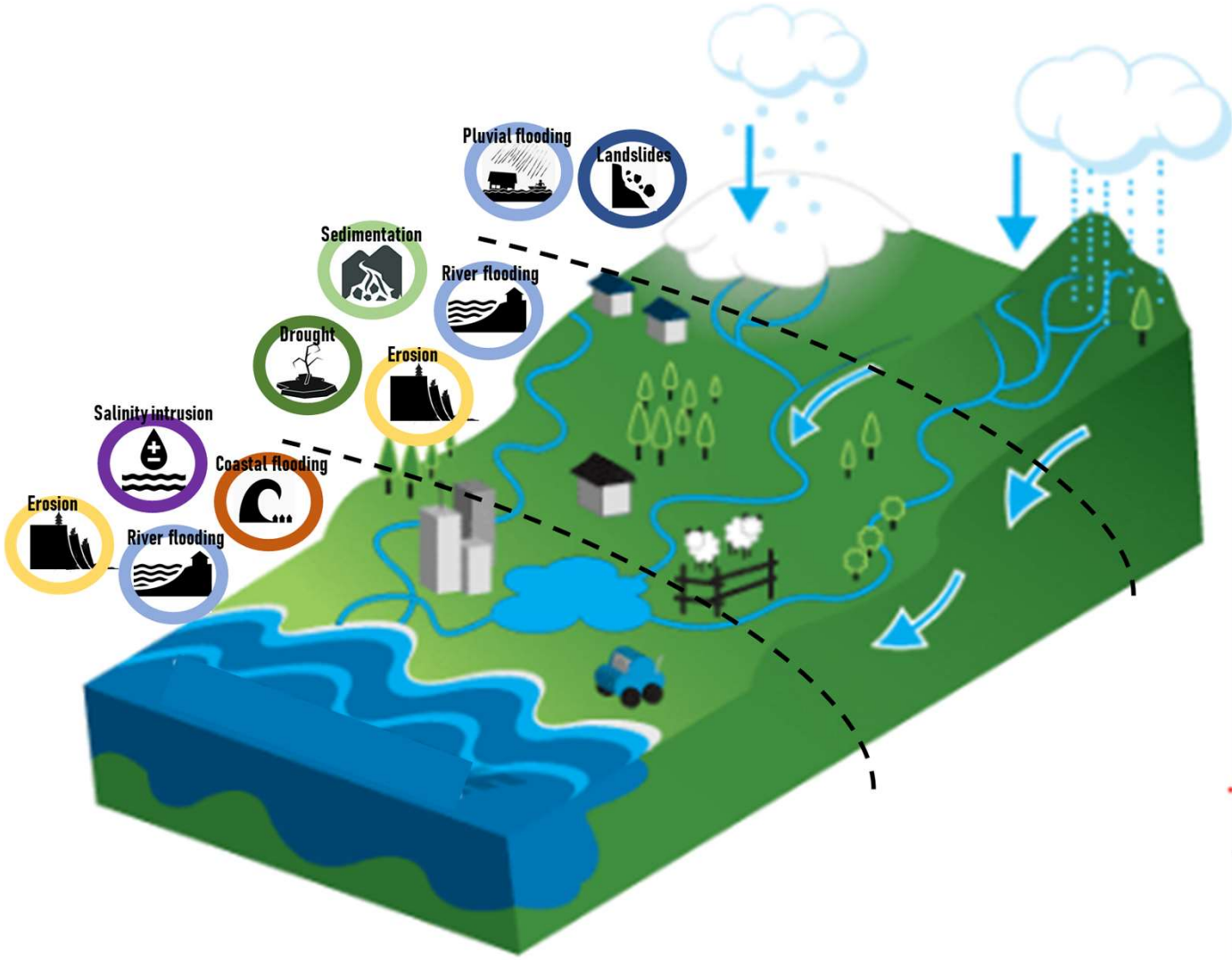

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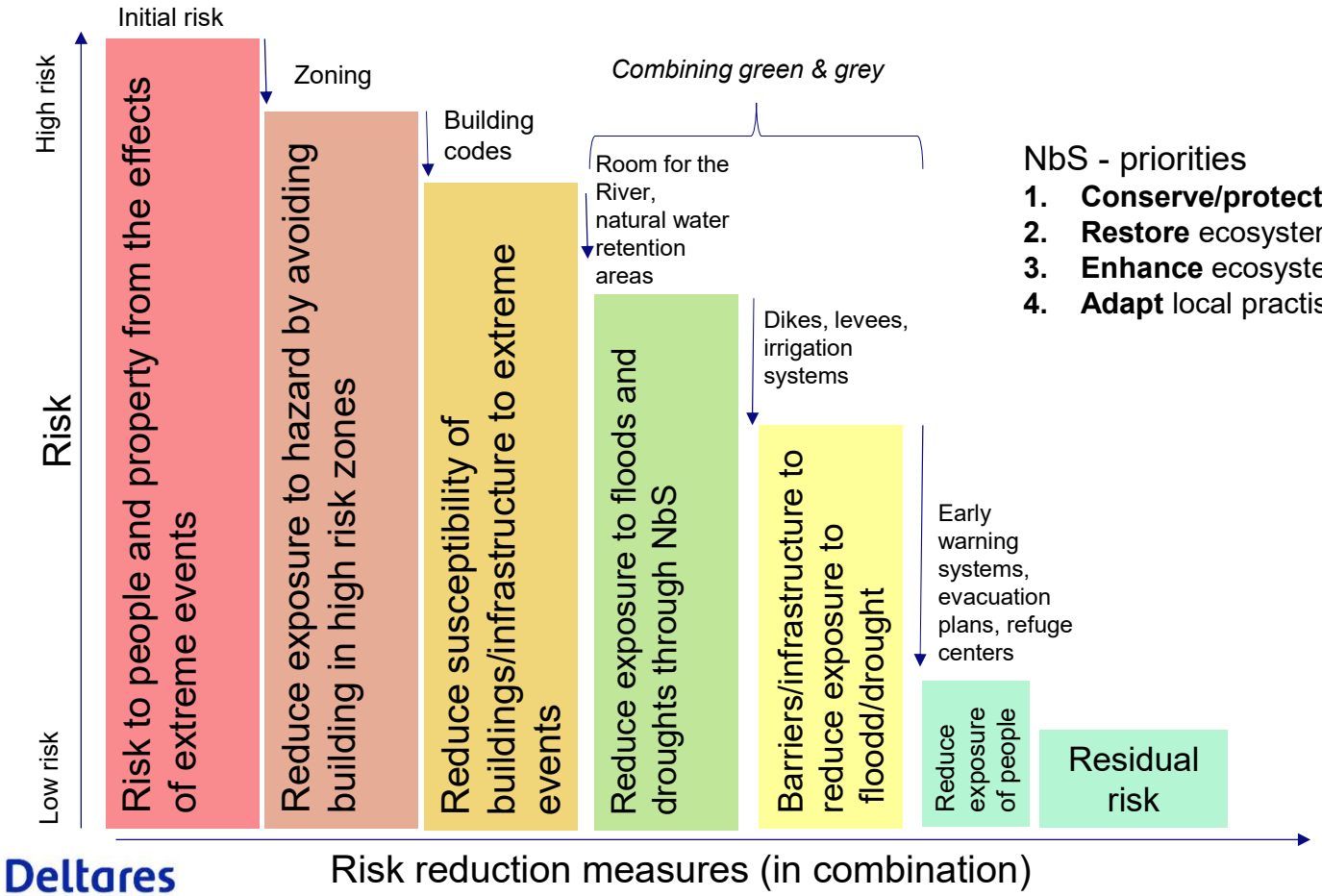
Where do Nature-based Solutions fit in?



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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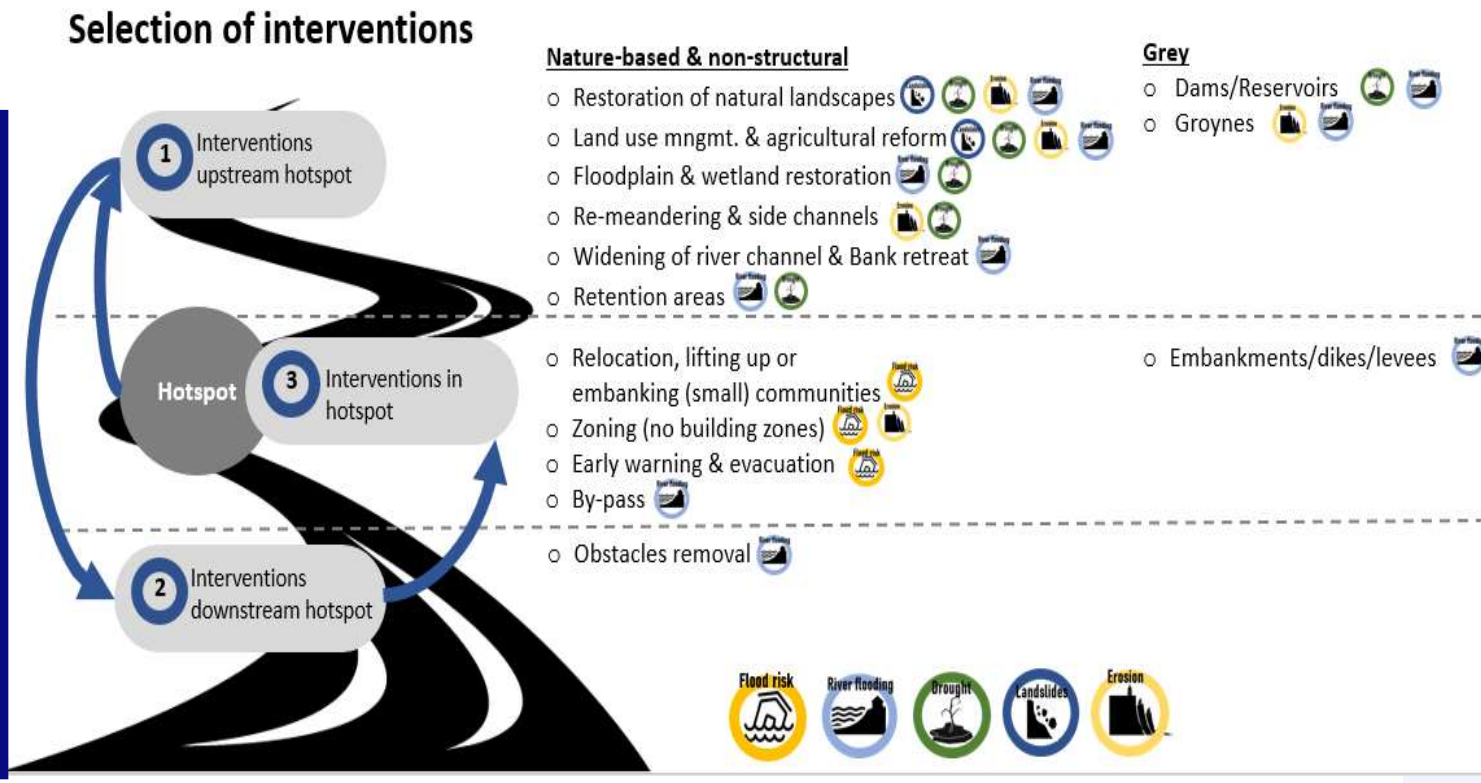

Take home messages

- Define an overarching water management strategy for floods AND droughts
- Ensure good system understanding
- Respect and harness flows of fresh water, nutrients, sediment and species to increase resilience of natural systems and maintain their services
- Give space to the river and create buffer zones
- Apply NbS in combination with other types of solutions

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