Structuring adaptation measures in the BMVI Network of Experts

L. Klippel
S. Hänsel
and the entire project team

BMVI Network of Experts
Knowledge Ability Action

INSTITUTIONS

7

Higher Federal Authorities and the BMVI

STAFF*

20+28

project employees + associated professionals

TRANSPORT MODES

3

Railways
Waterways
Streets

TOPIC CLIMATE CHANGE IMPACTS AND ADAPTATION / *APRIL 2021

Structure of adaptation options

Regulations and Standards

Information and Services

Construction/
Technical measures

Management of transport infrastructure

Management of transport

Regulations and standards

Inspection of technical standards of rail operations on possible climate change impacts

temperature
heat, frost

precipitation
drought

storms

lightnings

1. Identification of passages, which are connected to climate indices
2. Assessment of the need for adaptation (RCP 8.5, distant future)

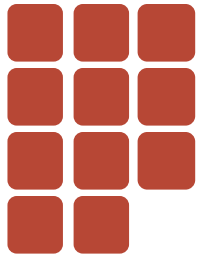
TECHNICAL STANDARDS

59

Technical Standards of the DB Netz AG (DB RIL) and others (e.g. DIN)

ENTRYS

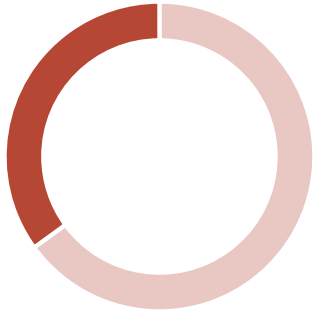
1650



Systematic search for keywords

NEED FOR ADAPTATION

35%



Medium to high need for adaptation

At the moment a similar analysis is conducted for regulations and standards of the Federal Highways

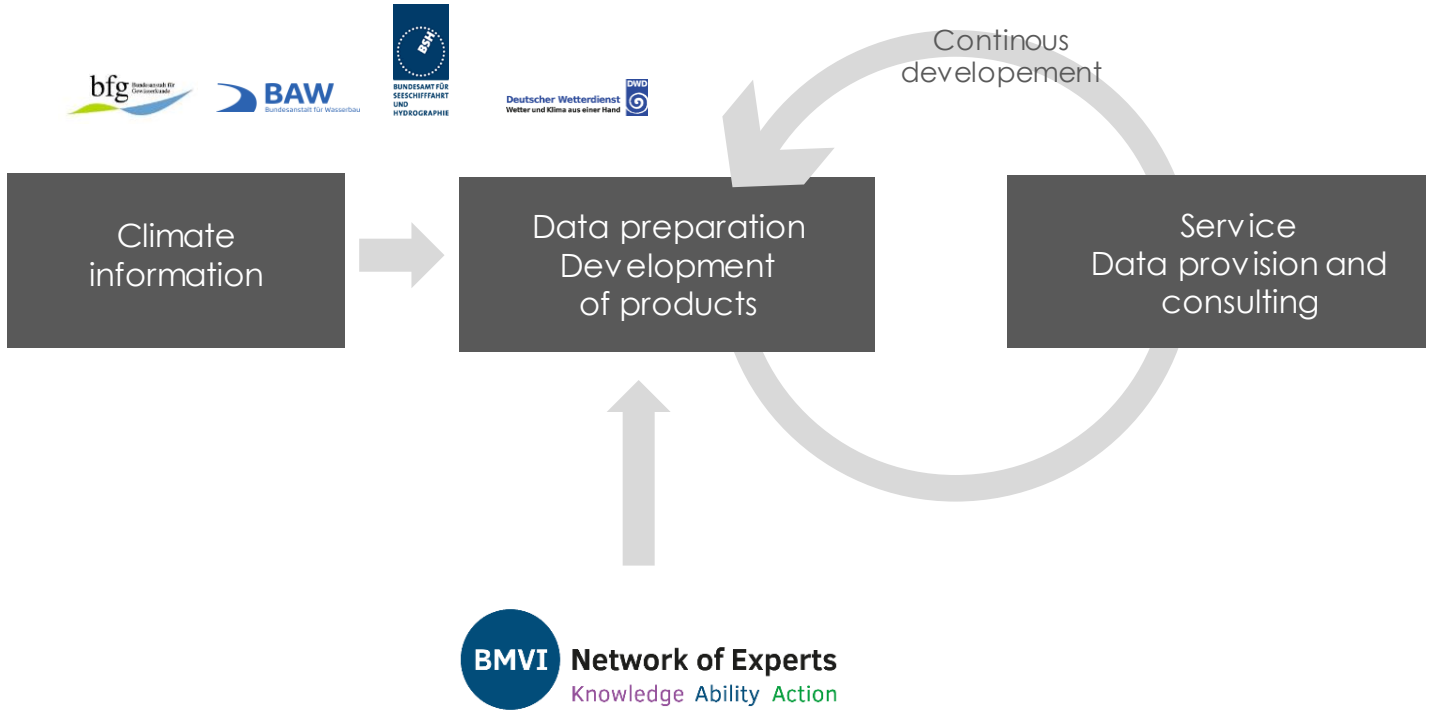
Regulations and Standards

- Inventory of standards and regulations that need to be adapted
- Guidelines for integration of climate change in planning
  Federal Waterways and Shipping Administration WSV Climate Proofing
- Measures to set dimensions of stormwater drains (roads and rails) or floodgates

Information & Services

DAS-Basisdienst „Climate and Water“

DAS-Basisdienst



Information and Services

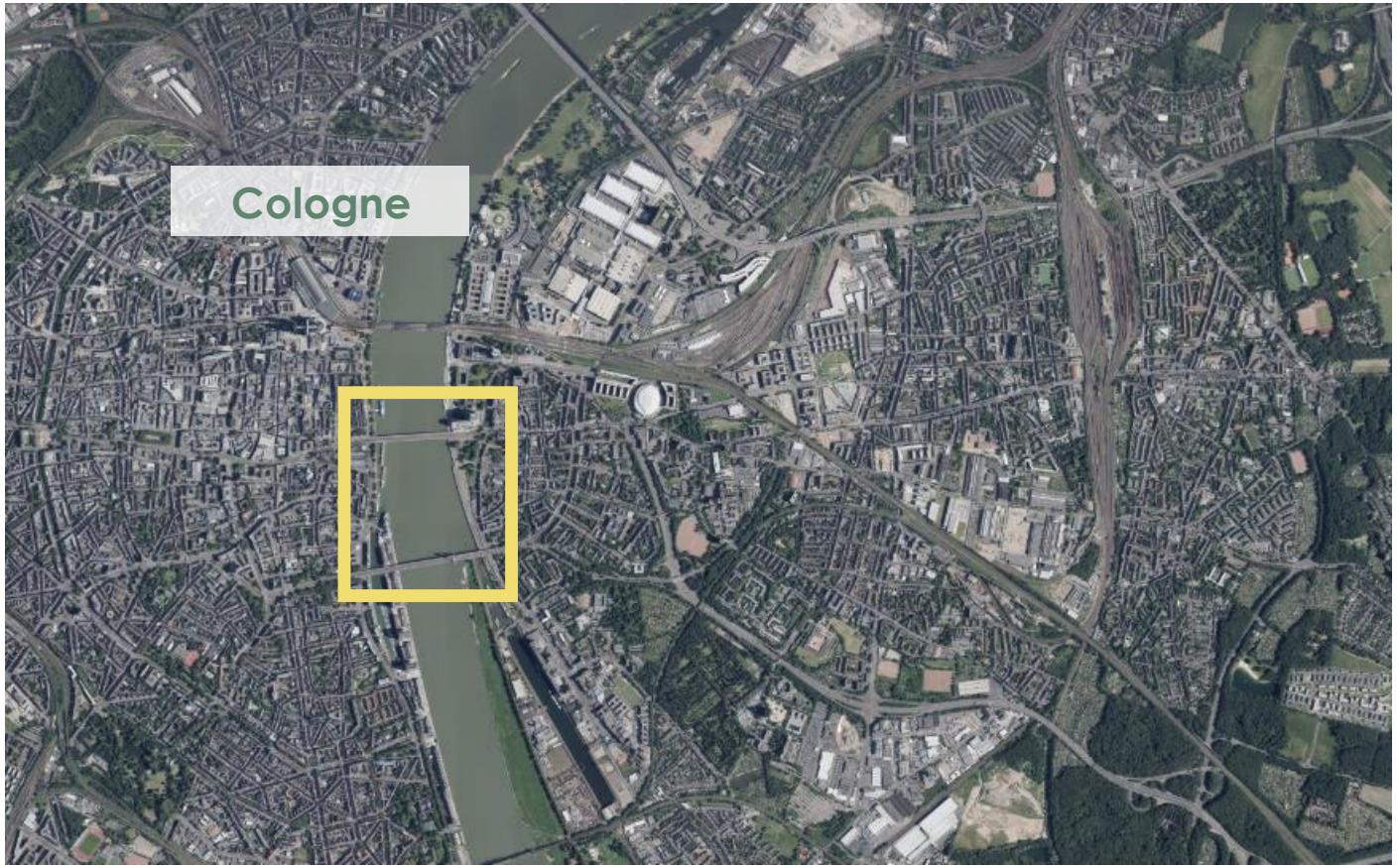
- Education (Lectures, Workshop, Seminars)
  Provide an understanding about climate change, weather extremes and impacts to infrastructure planners and other professions that do not have background knowledge about climate from their qualification

- BMVI Network of Experts: Participation at a WSV-Seminar to convey basic knowledge on climate change to engineers

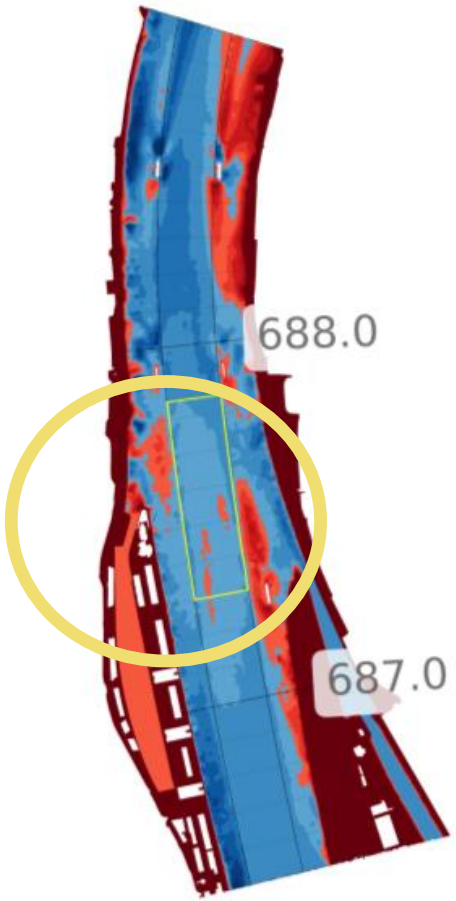
Construction/ technical measures

Management of the shallow bank Deutzer Platte - Cologne

Sediment accumulation at the Deutzer Platte leads to a reduction in water depth. Already today this leads to limitations in transport capacity at low water levels.



TODAY



+ Management

Quelle: Norpoth et al. (2020)

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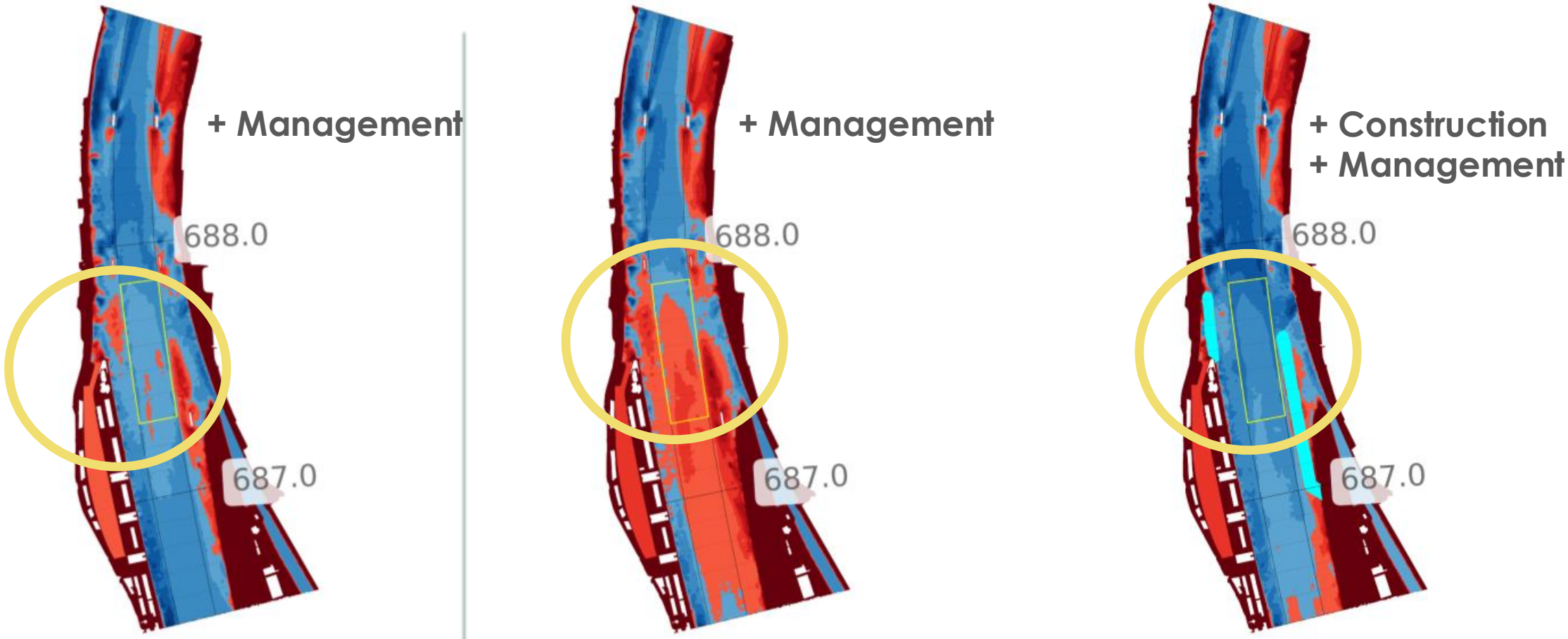
Today + 2031-2060 (RCP8.5, extreme scenario)

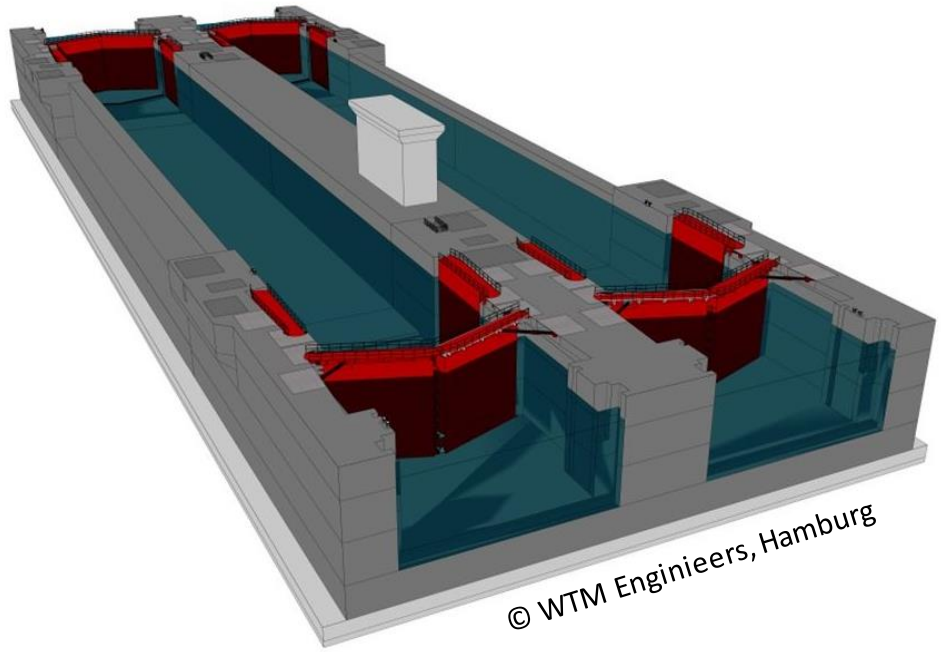


Quelle: Norpoth et al. (2020)

Construction/ Technical measures

- Changes in asphalt composition to increase resistance against hot temperatures. Changes in the brightness or heat conductance

- Re-building of floodgates and pumps to cope with sea-level rise and stabilisation of drainage of the inland parts



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Management of transport infrastructure

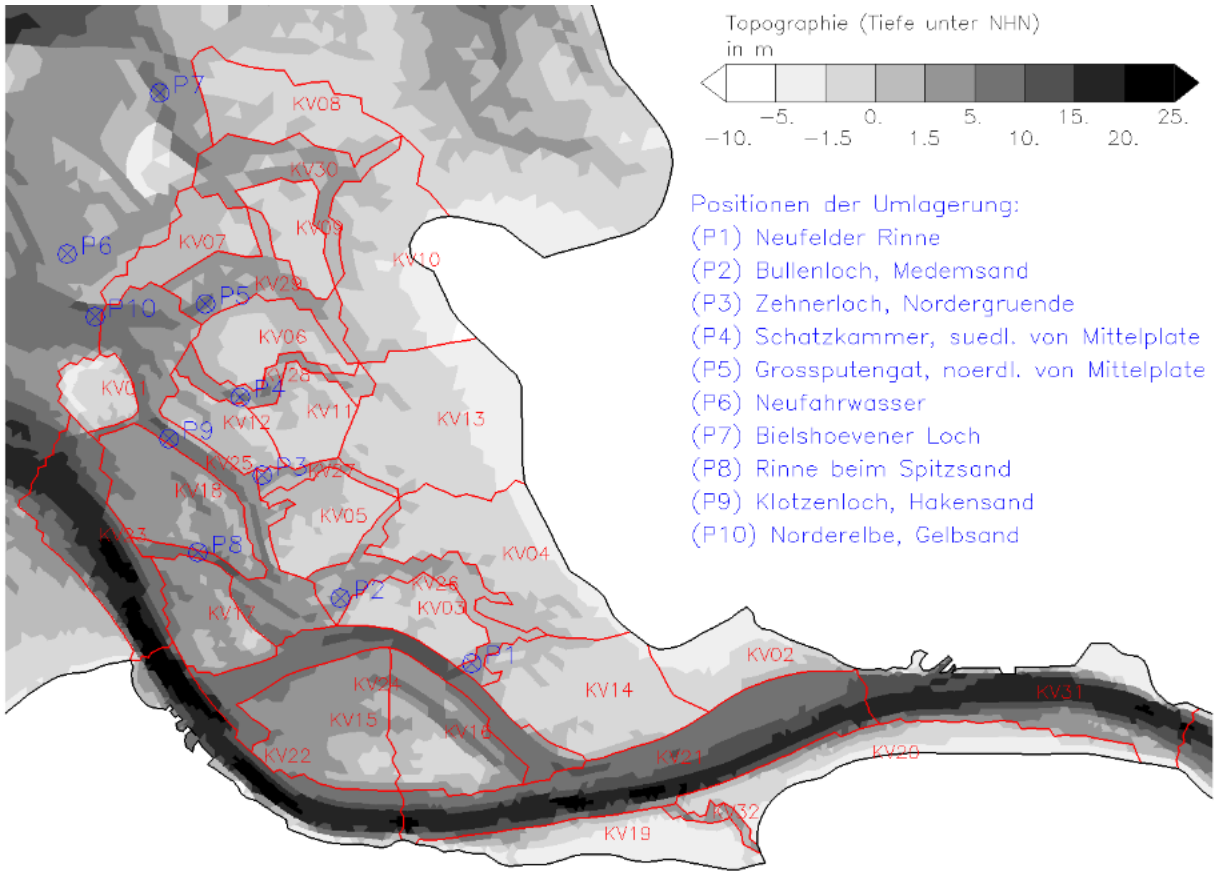
Supporting the growth of the German Wadden Sea (Elbe estuary)

Besides of being an important ecosystem, the German Wadden Sea serves as a buffer for the harbour entrances

It is unclear if Wadden Sea growth, which is dependend on sediment availability, can cope with an increased sea level rise

Supporting the growth of the Wadden Sea by transfer of sediments in the Elbe estuary. Simulations with the German Bight model

Assessment of different 62 variantes with regard of the efficienty to promote sediment growth



Position of the sediment transfer

Timing of the sediment deposition

Grain size distribution

Management of transport infrastructure

- Management of the vegetation along streets and rails, e.g. to prevent bush fires or storm throw
- Sediment management to guarantee a sufficient water depth, e.g. Deutzer Platte

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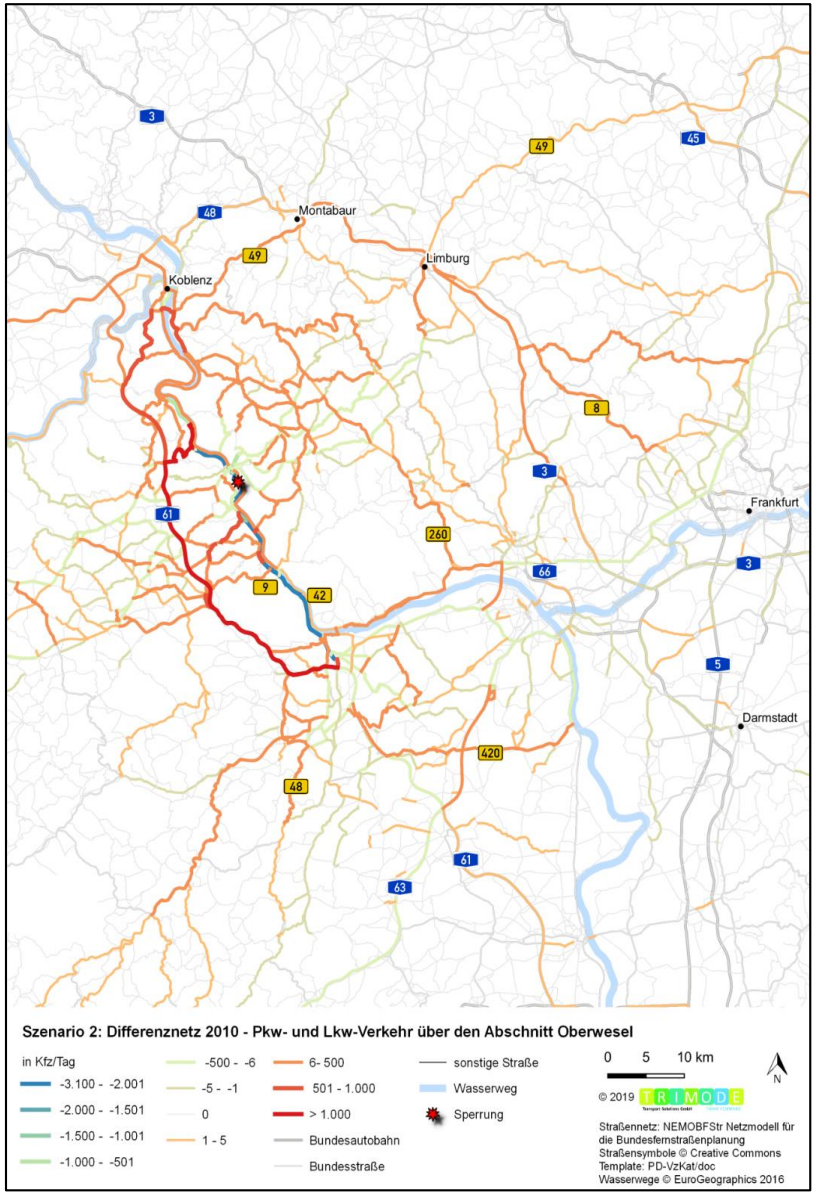
Management of transport

Stress tests

- Simulation of shifts in transport modes and routes due to climate induced failures of sections
- Presentation of S. Hänsel



Fact sheets/profiles

Climate Impact	Seal level rise, increased inflow from the catchment area
Study area	Drainage basin – Kiel canal
Effect of adaptation	The navigability of the Kiel canal is ensured in the future through hydraulic engineering adaptation measures (new lock construction, installation of pumps) and adapted drainage management.
Type of adaptation	Construction / technical adaptation Compensation
Stakeholders	WSV, WSA, …
Approach	Modeling study (water balance model, channel balance model), sensitivity experiments, scenario assumptions (continue-as-is, Grinsted et al. 2015, land lowering).
Further Information	WSV Bericht der BfG (BfG in Vorbereitung), TF1-Endbericht – Case study (BMVI-Expertennetzwerk 2020)
Contact person BMVI network of experts	M. Zierul (WSV), Dr. A.-D. Ebner von Eschenbach (BfG), Dr. N. Schade (BSH), J. Möller (BSH)

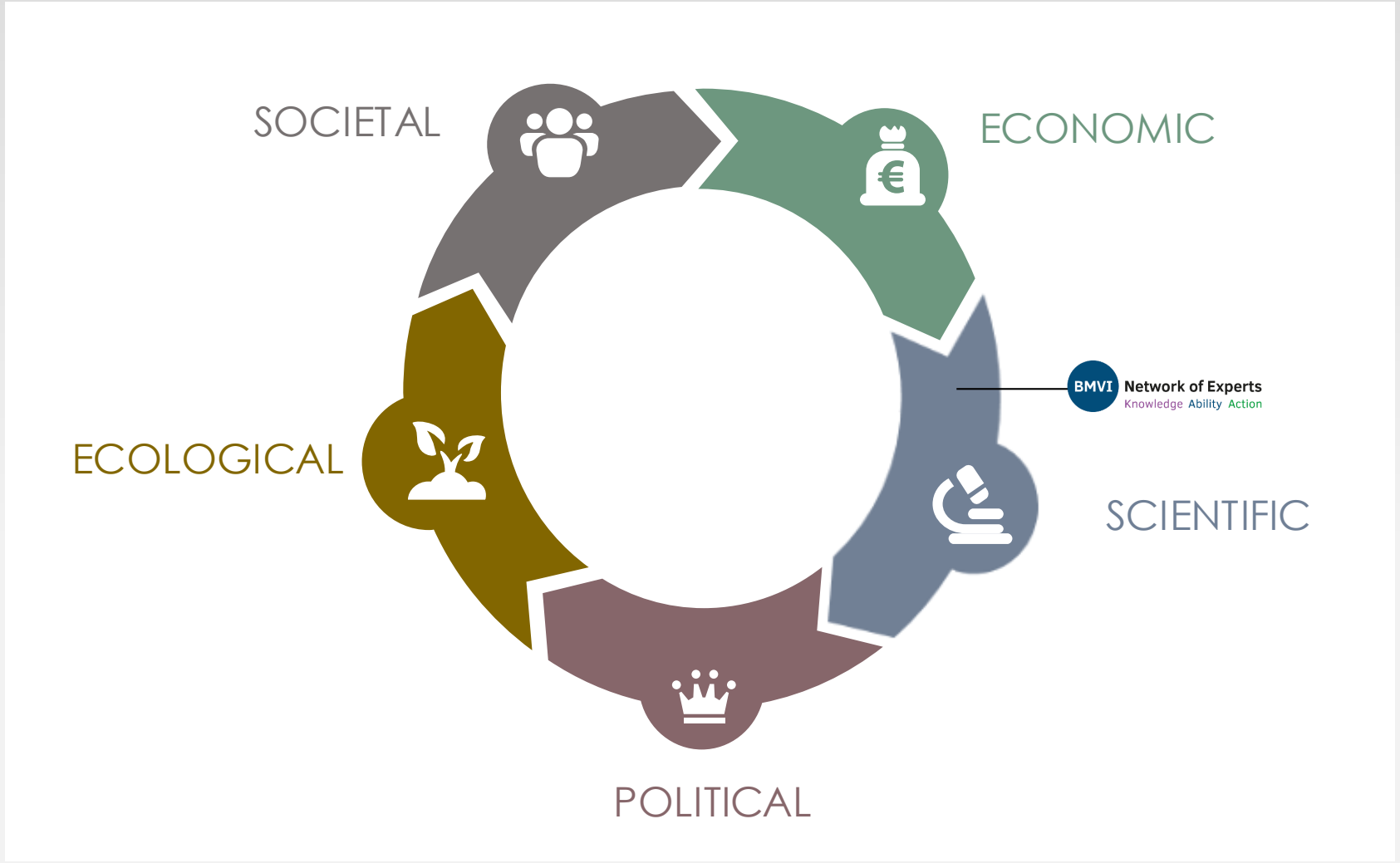
Results:

- Even an assumed sea level rise of 55 cm would already reduce the drainage potential of the Kiel canal by 40 % by the end of the century. If one also considers the current land subsidence in southwestern Schleswig-Holstein and possible higher rates of rise from assumptions on glacier melt (Grinsted et al. 2015), as well as more frequent and heavier precipitation, the drainage potential is reduced even more significantly.
- Further results Schade et al. (2020) – BMVI Network of Experts (in German)

e.g. Kiel canal
DAS-Basisdienst "Climate and Water"
Technical standards of railway operations
Design of drainage facilities of roads and rails
Workflow WSV Climate Proofing
….. and more

Further information: here (german)

Adaptation options – boundary conditions



BMVI Network of Experts
Knowledge Ability Action

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