

Structuring adaptation measures in the BMVI Network of Experts

L. Klippel
S. Hänsel
and the entire project team



INSTITUTIONS

7



Higher Federal
Authorities and the
BMVI

STAFF*

20+28



project
employees +
associated
professionals

TRANSPORT MODES

3



Railways
Waterways
Streets

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

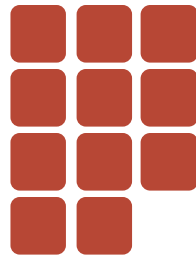
59



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

ENTRYS

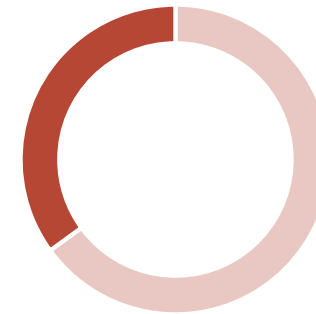
1 650



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



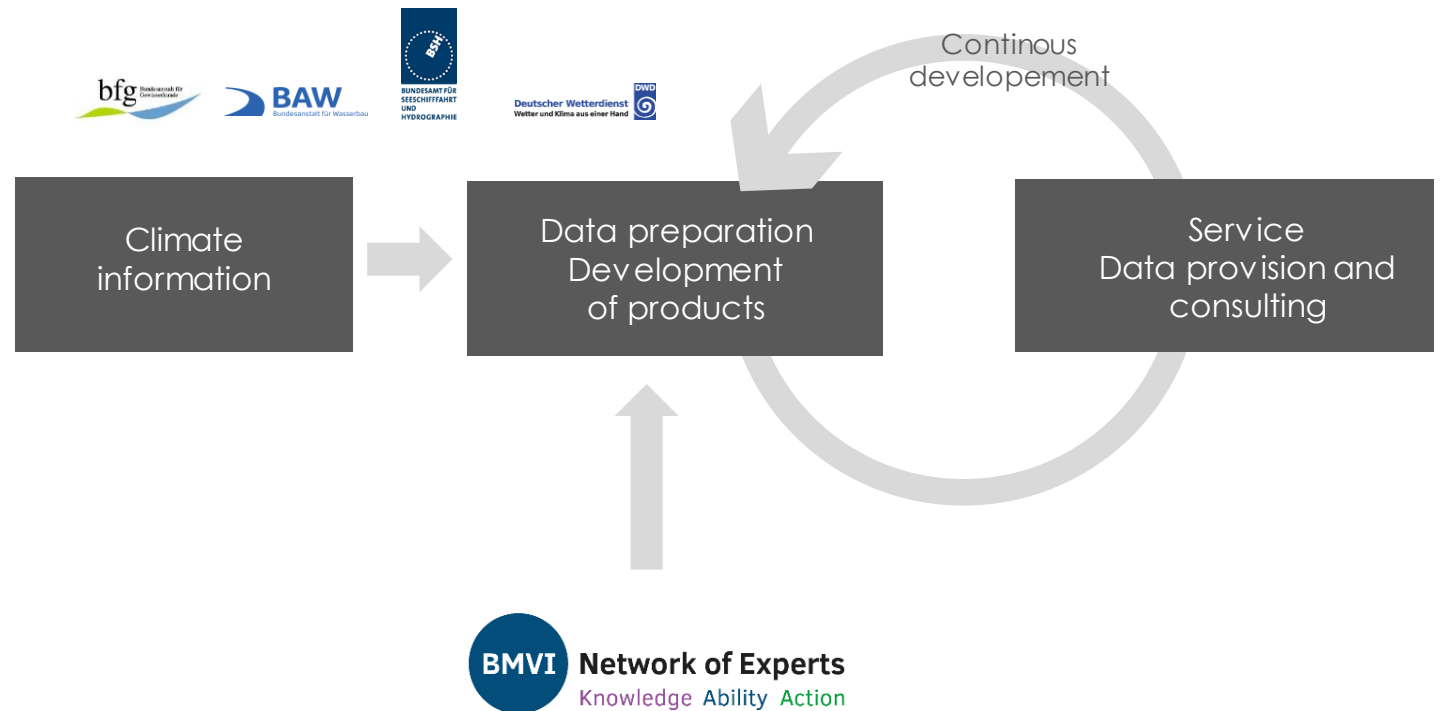
Measures to set dimensions of stormwater drains (roads and rails) or floodgates



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



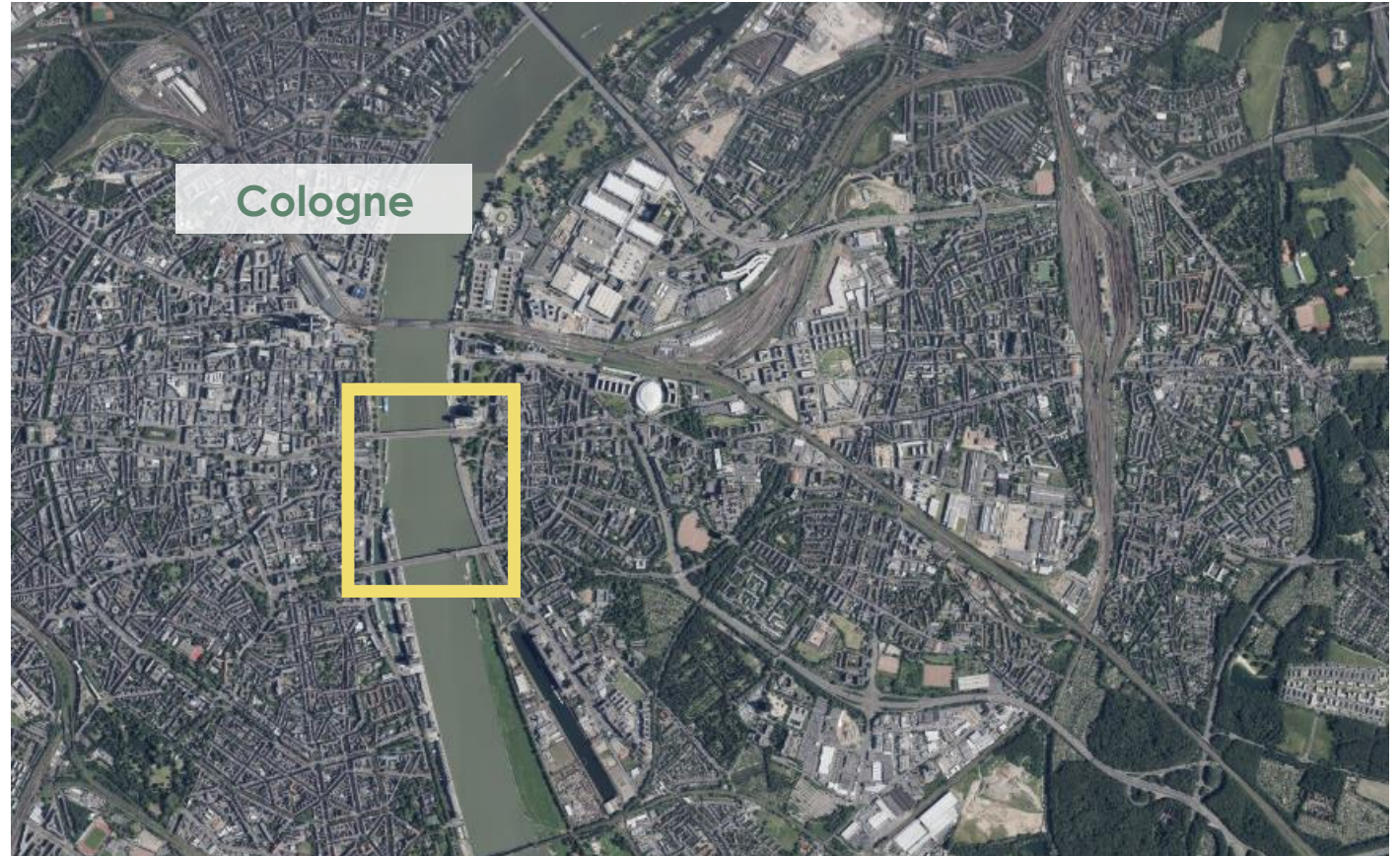
BMVI Network of Experts: Participation at a WSV-Seminar to convey basic knowledge on climate change to engineers



Construction/ technical measures

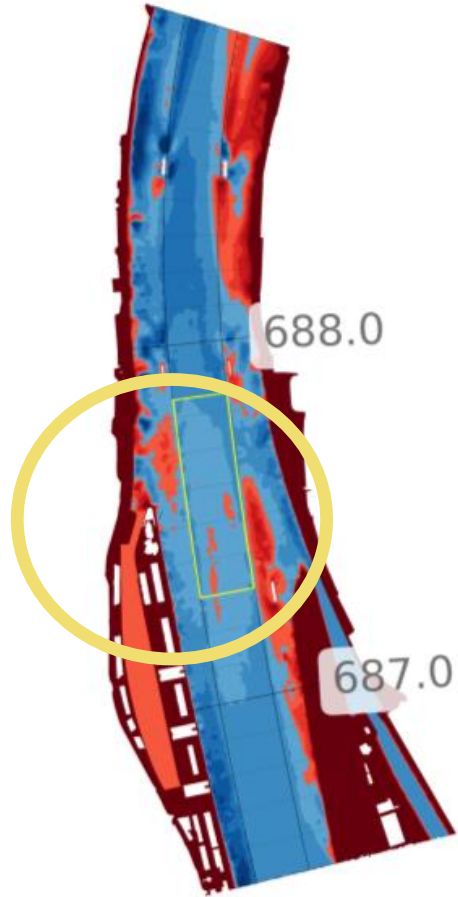
Management of the
shallow bank Deutzer
Platte - Cologne

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.



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TODAY



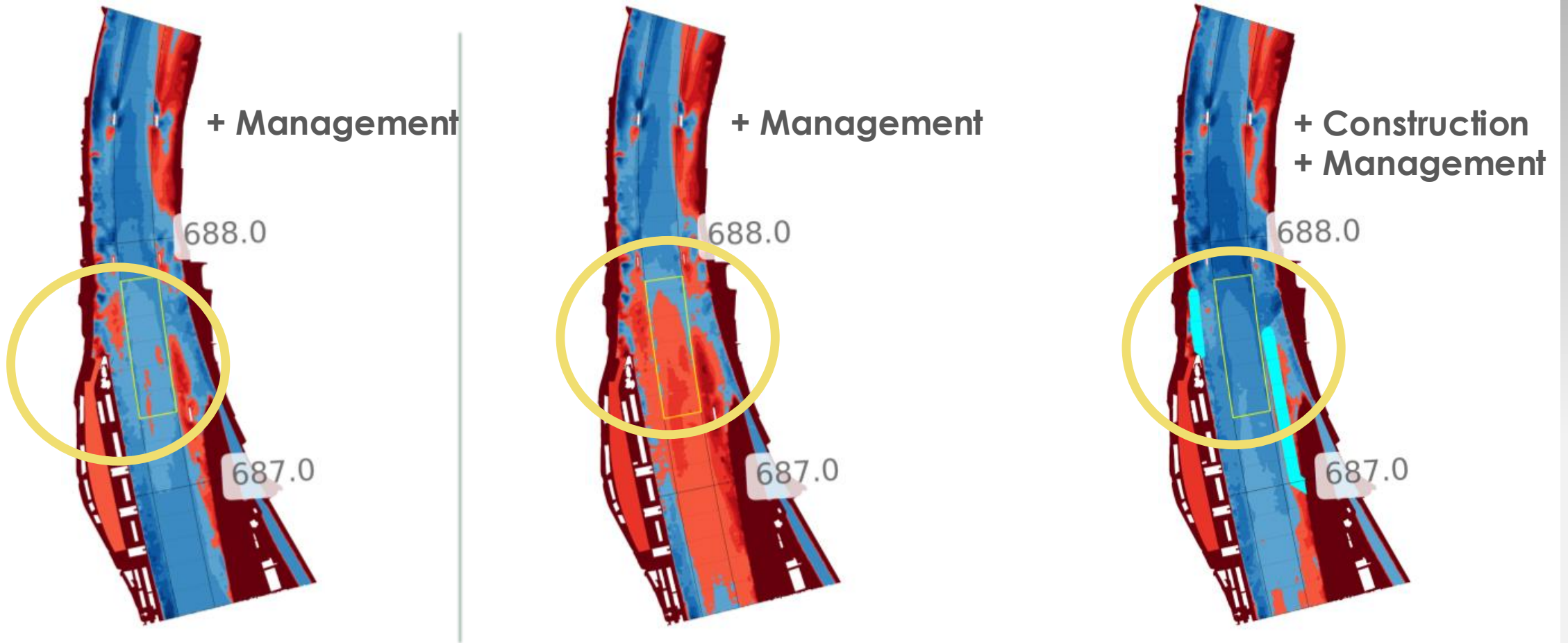
+ Management

Quelle: Norpoth et al. (2020)



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

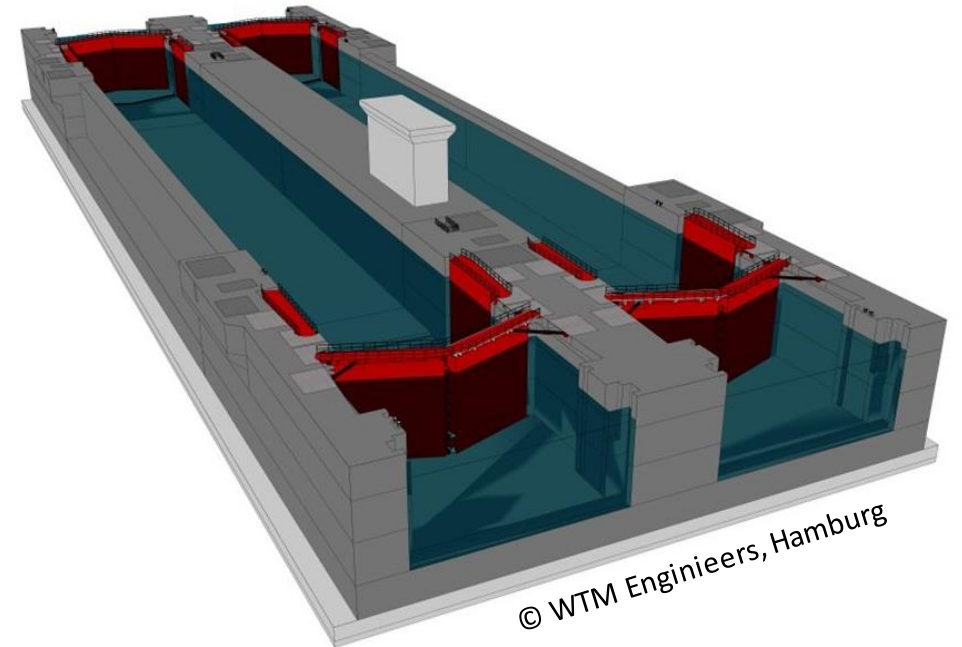


Quelle: Norpoth et al. (2020)



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





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

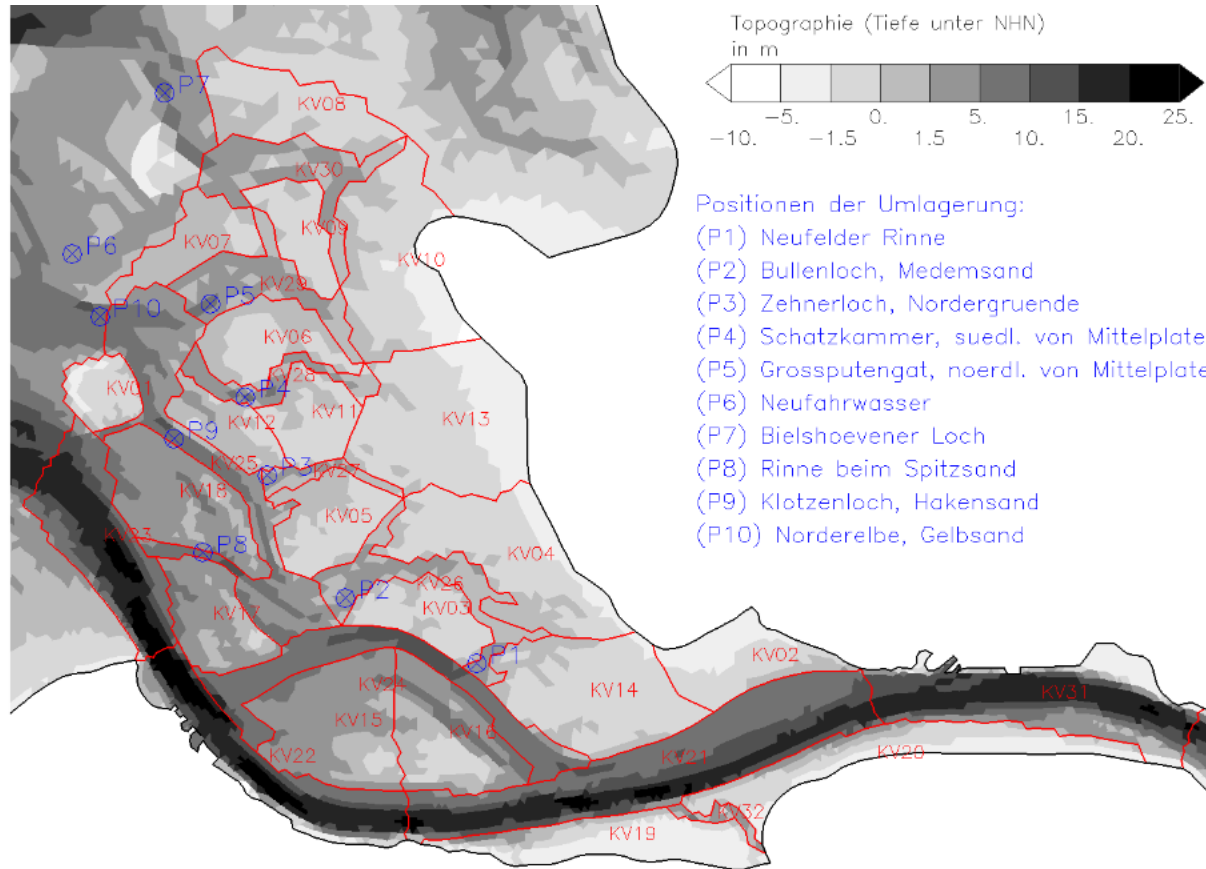


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Supporting the growth of the Wadden Sea by transfer of sediments in the Elbe estuary. Simulations with the German Bight model

Assessment of different 62 variantes with regard of the efficiency 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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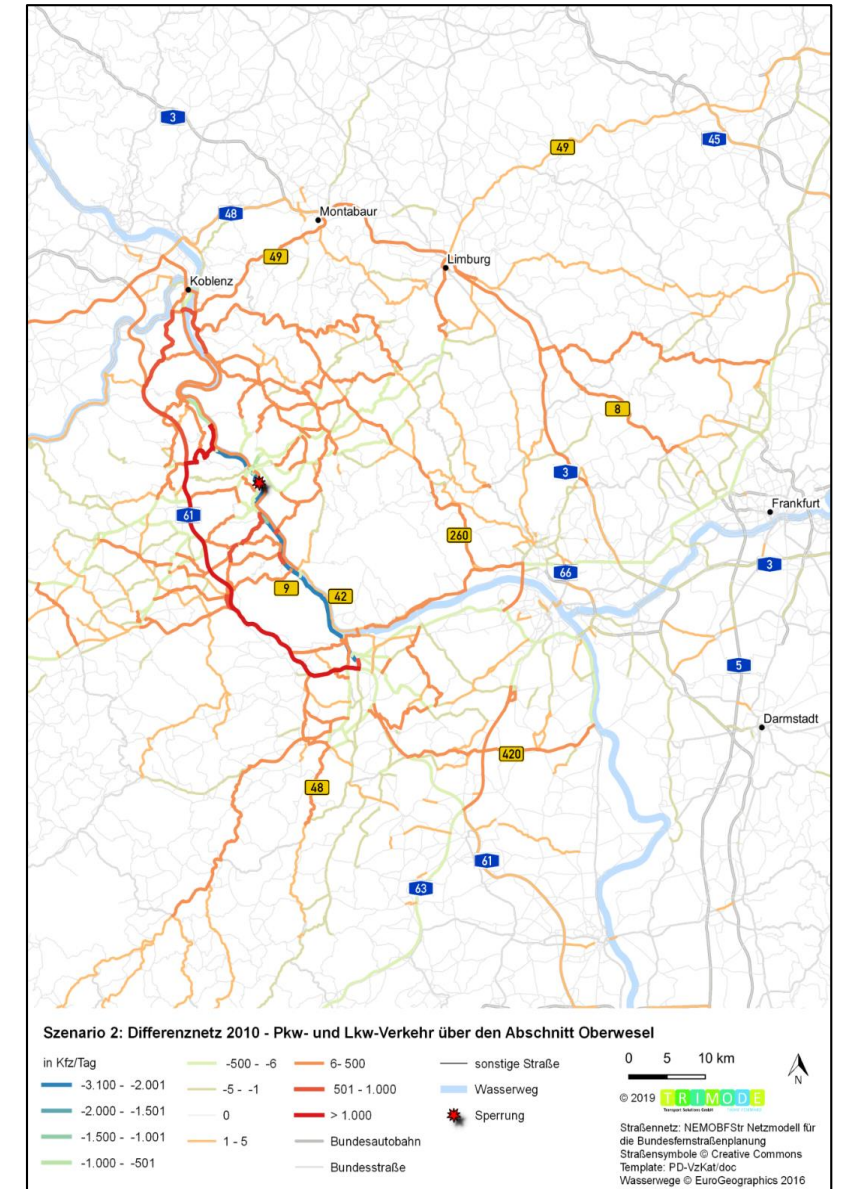


Management of transport

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	Sea 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)

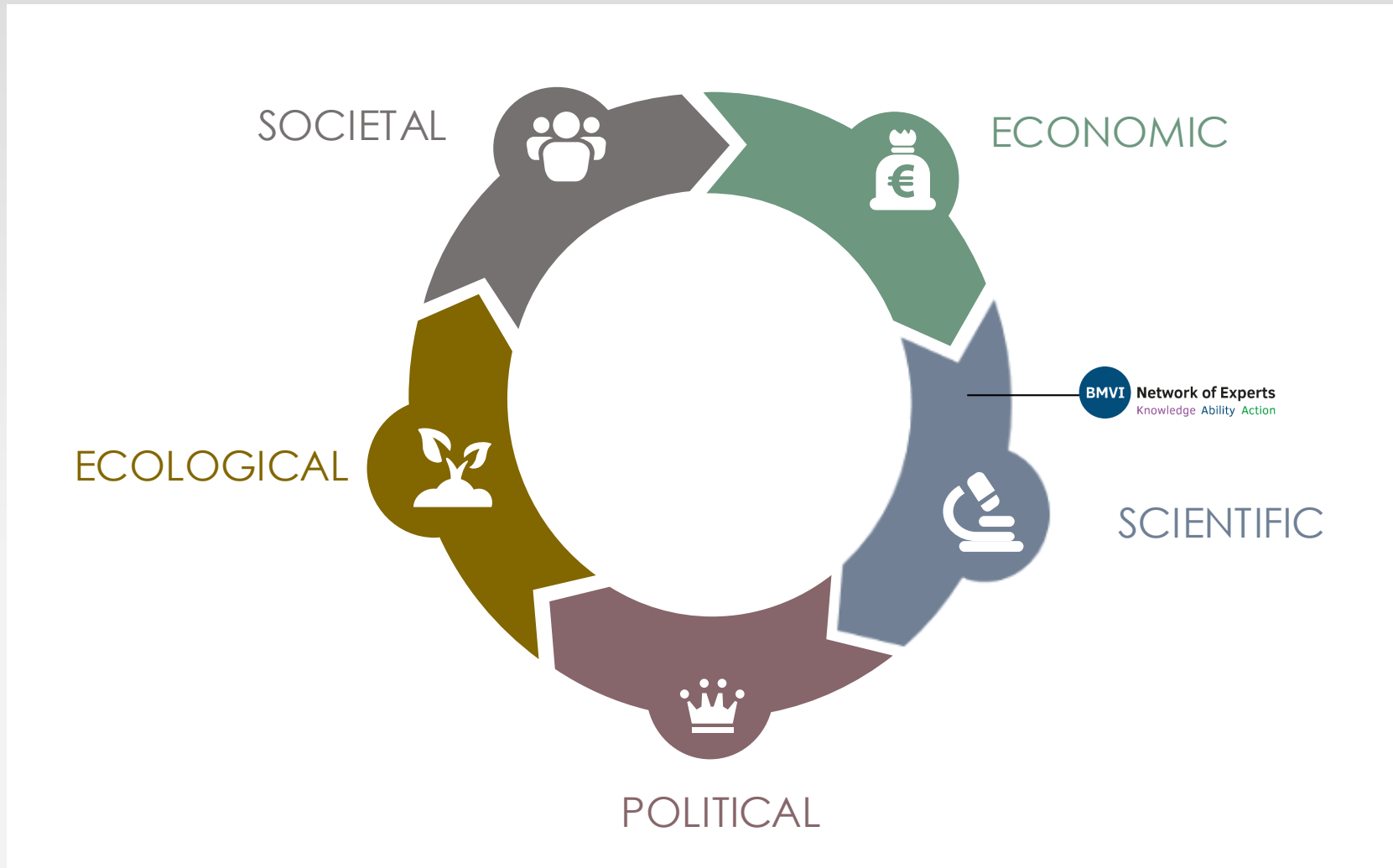
Results:

- 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





Project coordinators (TF-1)

Dr. Stephanie Hänsel (DWD), stephanie.haensel@dwd.de

Dr. Lara Klippel (DWD), lara.klippel@dwd.de

Contact persons transport modes



Carina Herrmann (EBA/DZSF)
HerrmannC@dzsf.bund.de



Anne-Farina Lohrengel (BAST)
lohrengel@bast.de



Dr. Enno Nilson (BfG)
nilson@bafg.de