

## KLIWAS

### Impacts of Climate Change on Waterways and Navigation – Options to adapt A German departmental Research Programme

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#### Partners:

- National Meteorological Service of Germany (DWD) [www.dwd.de](http://www.dwd.de)
- German Federal Institute of Hydrology (BfG) [www.bafg.de](http://www.bafg.de)
- German Federal Maritime and Hydrographic Agency (BSH) [www.bsh.de](http://www.bsh.de)
- German Federal Waterways Engineering and Research Institute (BAW) [www.baw.de](http://www.baw.de)

#### Programme-Coordination:

Dr Hans Moser (BfG, speaker), Dr Bruno Rudolf (DWD), Dr Hartmut Heinrich (BSH),

Dr Andreas Schmidt (BAW)

Operational office: Dr Sebastian Kofalk (BfG)

<b>Research task 1: Validation and evaluation of climate projections – provision of climate scenarios for the application on waterways and navigation</b> Task manager: Dr Annegret Gratzki, DWD; <a href="mailto:annegret.gratzki@dwd.de">annegret.gratzki@dwd.de</a>	
1.01	Hydrometeorological reference data for river basins Project manager: Dr Annegret Gratzki, DWD; <a href="mailto:annegret.gratzki@dwd.de">annegret.gratzki@dwd.de</a>
1.02	Provision of application-oriented and evaluated climate projection data Project manager: Joachim Namyslo, DWD; <a href="mailto:joachim.namyslo@dwd.de">joachim.namyslo@dwd.de</a>
1.03	Atmospheric and oceanic reference data and climate projections for coastal and open sea areas Project manager: Dr Hartmut Heinrich, BSH; <a href="mailto:hartmut.heinrich@bsh.de">hartmut.heinrich@bsh.de</a> and Gudrun Rosenhagen, DWD; <a href="mailto:gudrun.rosenhagen@dwd.de">gudrun.rosenhagen@dwd.de</a>
<b>Research task 2: Changes in the hydrological system of coastal waters</b> Task manager: Dr Stephan Mai, BfG; <a href="mailto:mai@bafg.de">mai@bafg.de</a>	
2.01	Climate change scenarios for the maritime area and their parametrisation Project manager: Dr Hartmut Heinrich, BSH; <a href="mailto:hartmut.heinrich@bsh.de">hartmut.heinrich@bsh.de</a> and Gudrun Rosenhagen, DWD; <a href="mailto:gudrun.rosenhagen@dwd.de">gudrun.rosenhagen@dwd.de</a>
2.02	Validation of climate projections for water level changes with regard to tectonic influence at the coast Project manager: Dr Astrid Sudau, BfG; <a href="mailto:sudau@bafg.de">sudau@bafg.de</a>
2.03	Climate induced changes of tidal parameters and sea state statistics at the coast Project manager: Dr Stephan Mai, BfG; <a href="mailto:mai@bafg.de">mai@bafg.de</a>
2.04	Vulnerability of hydraulic engineering systems at the North Sea and its estuaries due to climate change Project manager: Dr Norbert Winkel, BAW; <a href="mailto:norbert.winkel@baw.de">norbert.winkel@baw.de</a> and Dr Elisabeth Rudolph, BAW; <a href="mailto:elisabeth.rudolph@baw.de">elisabeth.rudolph@baw.de</a>
Argo	Array for real-time geostrophic oceanography Project manager: Dr Hartmut Heinrich, BSH; <a href="mailto:hartmut.heinrich@bsh.de">hartmut.heinrich@bsh.de</a>
<b>Research task 3: Changes and sensitivity of the water body state (morphology, quality, ecology) and adaptation options for navigation and waterways</b> Task manager: Dr Birgit Schubert, BfG; <a href="mailto:schubert@bafg.de">schubert@bafg.de</a>	
3.01	Impacts of climate change on navigation and other uses of the sea Project manager: Dr Hartmut Heinrich, BSH; <a href="mailto:hartmut.heinrich@bsh.de">hartmut.heinrich@bsh.de</a> and Gudrun Rosenhagen, DWD; <a href="mailto:gudrun.rosenhagen@dwd.de">gudrun.rosenhagen@dwd.de</a>
3.02	Adaptation options for waterways and ports at the German coast and for coastal protection in extreme weather events Project manager: Dr Norbert Winkel, BAW; <a href="mailto:norbert.winkel@baw.de">norbert.winkel@baw.de</a>
3.03	Impact of climate change on the budget of suspended particulate matters in North Sea estuaries Project manager: Dr Axel Winterscheid, BfG; <a href="mailto:winterscheid@bafg.de">winterscheid@bafg.de</a>

3.04	Impacts of climate change on microbial water quality and their implications for dredged material management in coastal waters Project manager: Dr Georg Reifferscheid, BfG; reifferscheid@bafg.de
3.05	Impact of climate change on stability and environmental relevance of hydraulic engineering materials in coastal waters Project manager: Dr Lars Düster, BfG; duester@bafg.de
3.06	Impacts of climate change on the transport behaviour of contaminated sediments and the maintenance of coastal waterways Project manager: Dr. Birgit Schubert, BfG; schubert@bafg.de
3.07	Impacts of climate change on patterns of organic pollutants in coastal waters Project manager: Dr Michael Schlüsener, BfG; schluesener@bafg.de
3.08	Climate change related impacts on the oxygen budget of North Sea estuaries due to alterations of river discharge and nutrient and carbon load – potential adaptation strategies for navigation and sediment management Project manager: Andreas Schöl, BfG, schoel@bafg.de
3.09	Vegetation shift in German estuaries due to climate change and consequences for bank protection and maintenance Project manager: Eva-Maria Bauer, BfG; bauer@bafg.de
<b>Research task 4: Changes in the hydrological system: Sediment budgets, morphology and adaptation options for inland waterways and navigation</b>	
	Task manager: Dr Thomas Maurer, BfG; thomas.maurer@bafg.de
4.01	Impacts of climate change on hydrology and management options for the economy and inland navigation Project manager: Dr Enno Nilson, BfG; nilson@bafg.de
4.02	Climate projections for sediment budgeting and river morphology Project manager: Dr Stefan Vollmer, BfG; vollmer@bafg.de
4.03	Options for the regulation and adaptation of hydraulic engineering measures to climate induced changes of the discharge regime Project manager: Dr Michael Schröder, BAW; michael.schroeder@baw.de
4.04	Minimum width of fairways for safe and easy navigation Project manager: Prof. Dr Bernhard Söhngen, BAW; bernhard.soehngen@baw.de
4.05	Process studies on the development of ice formation in waterways Project manager: Dr Thomas Maurer, BfG; thomas.maurer@bafg.de
<b>Research task 5: Impacts of climate change on structure, ecological integrity and management of inland waterways</b>	
	Task manager: Dr Helmut Fischer, BfG; fischer@bafg.de
5.01	Climate projections for sediment budgets and risks due to cohesive sediments Project manager: Dr Gudrun Hillebrand, BfG; hillebrand@bafg.de
5.02	Impacts of climate change on nutrient and phytoplankton dynamics in navigable rivers Project manager: Dr Helmut Fischer, BfG; helmut.fischer@bafg.de
5.03	Impacts of climate change on microbial water quality and their implications for dredged material management in inland waterways Project manager: Dr Georg Reifferscheid, BfG; reifferscheid@bafg.de
5.04	Impacts of climate change on patterns of organic pollutants in inland waters Project manager: Dr Thomas Ternes, BfG; ternes@bafg.de
5.05	Impacts of climate change on stability and environmental relevance of hydraulic engineering materials in inland waters Project manager: Dr Thomas Ternes, BfG; ternes @bafg.de
5.06	Impact of climate change on floodplain vegetation Project manager: Dr Peter Horchler, BfG; horchler@bafg.de
5.07	Basics for the adaptation of faunistic evaluation methods due to climate change Project manager: Dr Jochen H. Koop, BfG; koop@bafg.de
5.08	Indicators for impact evaluation of climate change and for adaptation options at river basin scale Project manager: Dr Sebastian Kofalk, BfG; kofalk@bafg.de
<b>Operational office:</b> kliwas-koordination@bafg.de	
	Coordination and communication: Andrea Mehling, mehling@bafg.de
	Coordination and administration: Stefanie Wienhaus, wienhaus@bafg.de
	Manager: Dr Sebastian Kofalk, kofalk@bafg.de