Für Mensch & Umwelt

Umwelt Bundesamt

KomPass
Kompetenzzentrum
Klimafolgen und Anpassung

UNECE

Climate Change in Germany: The Federal Climate Impact and Risk Assessment (KWRA)

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Climate Impacts and Adaptation in Germany

Climate Impact and Risk Analysis for Germany

Mission and objective

On behalf of the federal government (2015), cross-field vulnerability analyses are to be carried out every 6 years.

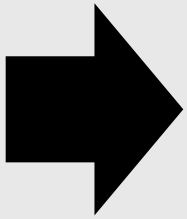
The Climate Impact and Risk Analysis 2021 shows at the federal level in **which fields of action, for which climate impacts and in which regions** special

- climate risks,
- adaptation capacities and
- needs for action

exist.

25 public agencies from 9 ministries, approx. 50 external experts and a scientific consortium were involved.

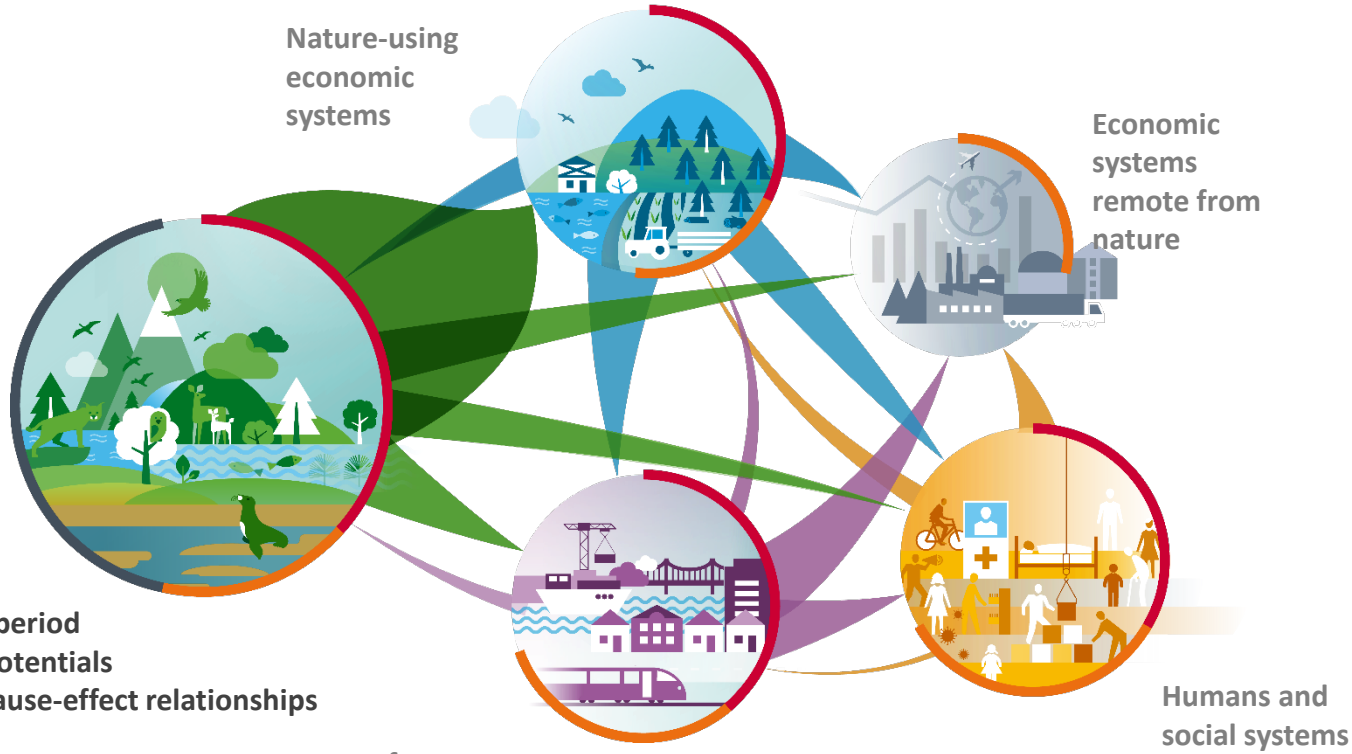
Key challenges



31 Impacts of climate change with very urgent need for action

- Climate risks from **heat for health**, especially in urban areas
- Climate risks from **drought and low water** (often associated with heat) for all water-using and water-dependent systems.
- Climate risks from **heavy rainfall, flash floods and flooding**, especially for infrastructure and buildings; settlements near water bodies or in narrow valleys in the low mountain ranges are primarily affected.
- Climate risks from **gradual temperature rise**, such as **sea-level rise**, for natural and nature-using systems.

Affected system domains and interdependencies



Natural systems and resources

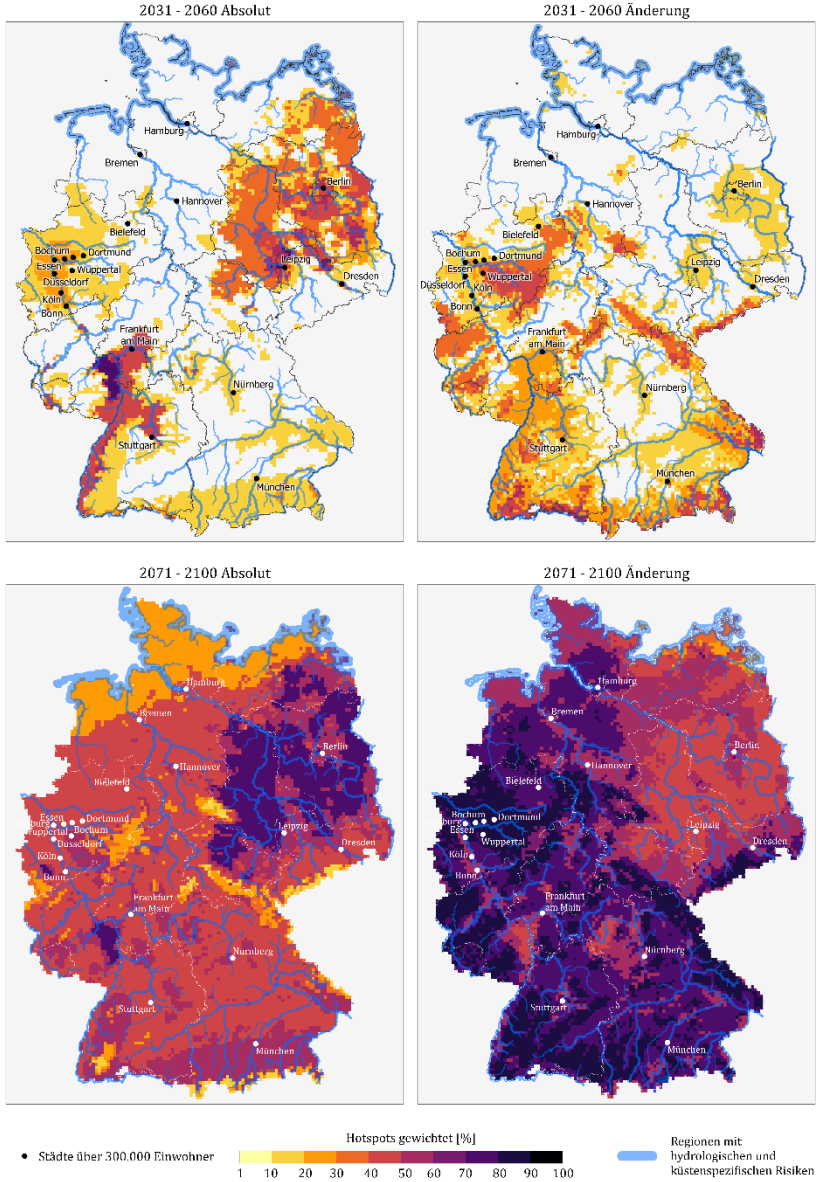
Especially

- **high climate risks**
- **Long adaptation period**
- **low adaptation potentials**
- **Many outgoing cause-effect relationships**

➢ **High urgency**
➢ **Limits to adaptation**

Source: KWRA 2021

Climate hotspot maps



- Mid-century:
  - Climatic hotspots, especially in the south, southwest and east of Germany.

- End of the century:
  - Climatic hotspots clearly more intensive with strong expansion
  - Particularly many climatic hotspot regions in southern Germany and in the west, but in fact the whole of Germany is affected.

Climate Impacts on Transport infrastructure

Intensive assessment

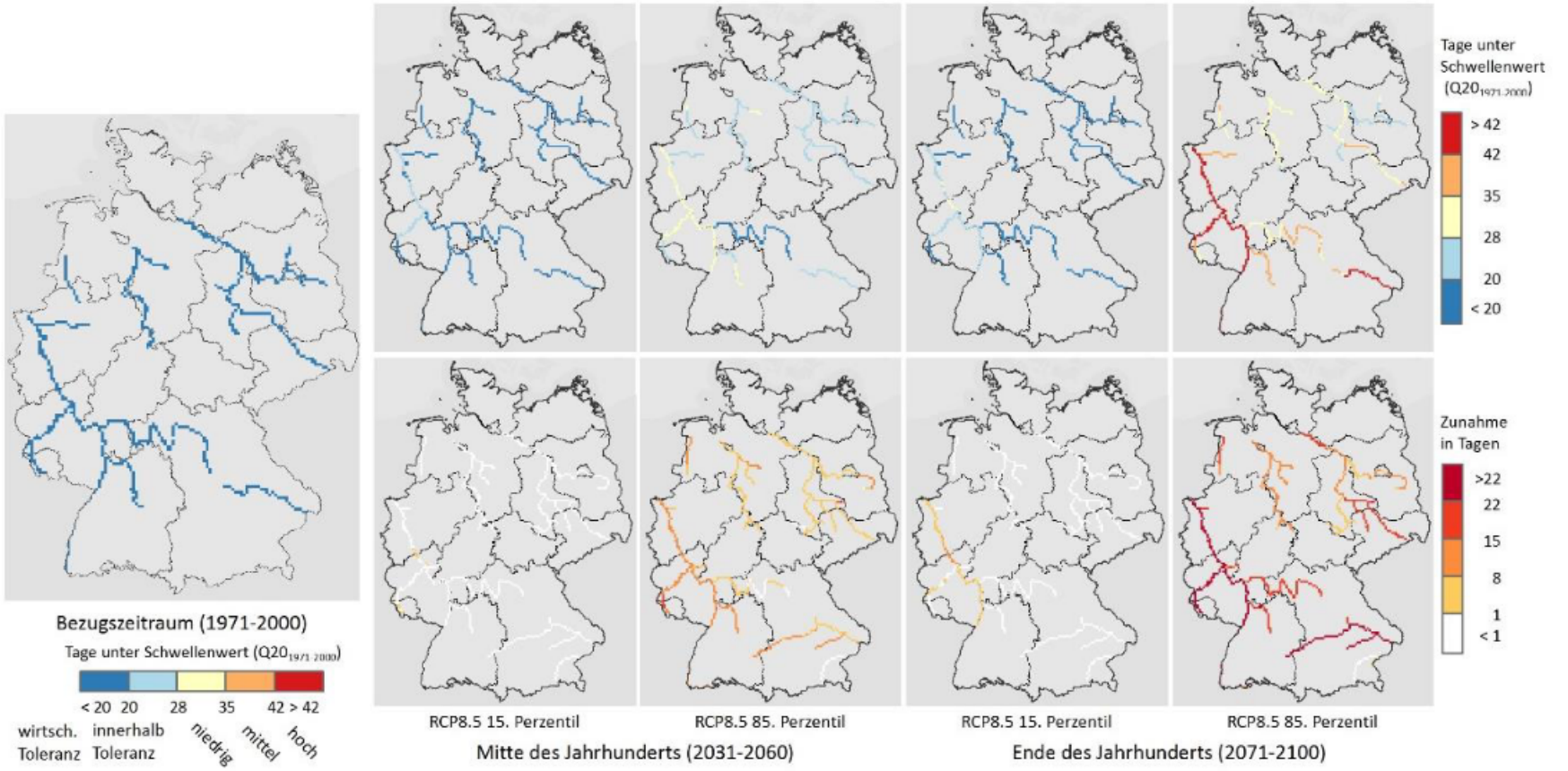
- Navigability of inland waterways (low water)
- Navigability of inland waterways (high water)
- Damage/obstacles to roads and railways (high water)
- Damage/obstacles to roads and railways (gravitational mass movements) (gravitational mass movements)

Extensive assessment

- Navigability of maritime waterways
- Damage to traffic control systems, overhead power lines and power supply systems
- Damage to inland and maritime shipping routes, ports and maritime infrastructures

Example: Navigability of inland waterways (low water)

Abbildung 9: **Tage unter dem Schwellenwert $Q20_{1971\text{-}2000}$ für den Bezugszeitraum, die Mitte und das Ende des Jahrhunderts (jeweils 15. und 85. Perzentil des RCP8.5) und Änderungswerte für die Mitte und das Ende des Jahrhunderts**



Datengrundlage: Bundesanstalt für Gewässerkunde

Example: Navigability of inland waterways (low water)

Assessment of Climate risk

	Gegenwart	2031-2060		2071-2100	
		Optimistisch	Pessimistisch	Optimistisch	Pessimistisch
Klimarisiko ohne Anpassung	mittel	mittel	hoch	mittel	hoch
Gewissheit		mittel		gering	

Key statements

- Low water situations on German inland waterways may increase in the future. Under unfavourable conditions, a resulting **seasonal reduction in transport capacities** can have a **significant impact on companies using inland waterways**.
- For the middle of the century, the **optimistic case** (15th percentile of RCP8.5) **shows no significant change in shipping-relevant low water situations** with 20 to 28 days. In the **pessimistic case** (85th percentile of RCP8.5), the selected low threshold value could be **undershot on up to 35 days** on the Rhine, Moselle and sections of the Neckar.
- For the end of the century, in the **optimistic case**, a **moderate increase** in the number of days below the threshold can be observed **on many waterways**. In the **pessimistic case**, **up to 35 days of underflow** are projected **for most waterways**. On the federal waterways of the Rhine and Danube, which are particularly important for the transport industry, **values of 42 days and more** can be reached.

Summary

Climate risks without adaptation On transport and transport infrastructure

Klimawirkungen mit sehr dringenden Handlungserfordernissen sind durch einen Farbstreifen links neben der Bezeichnung der jeweiligen Klimawirkung gekennzeichnet.

		Gegen-wart	2031-2060		2071-2100		
			optimis-tisch	pessimis-tisch	optimis-tisch	pessimis-tisch	
Klimarisiko des Handlungsfelds		gering-mittel	gering	mittel	gering-mittel	mittel-hoch	
Klimarisiken ohne Anpassung auf Ebene der Klimawirkungen							
Klimawirkung		**Gegen-wart**	**2031-2060**		**2071-2100**		**An-pas-sungs-dauer**
			optimis-tisch	pessimis-tisch	optimis-tisch	pessimis-tisch	
Schiffbarkeit der Bin-nenschifffahrtstraßen (Niedrigwasser)	Klimarisiko	mittel	mittel	hoch	mittel	hoch	10-50 Jahre
	Gewissheit		mittel		gering		
Schiffbarkeit der Binnen-schifffahrtstraßen (Hoch-wasser)	Klimarisiko	gering	gering	gering	gering	mittel	10-50 Jahre
	Gewissheit		mittel		gering		
Schiffbarkeit der Seeschiff-fahrtsstraßen	Klimarisiko	gering	gering	gering	gering	mittel	10-50 Jahre
	Gewissheit		mittel		gering		
Schäden/ Hindernisse bei Straßen und Schienenwe-gen (Hochwasser)	Klimarisiko	gering	gering	mittel	gering	mittel	10-50 Jahre
	Gewissheit		mittel		gering		
Schäden/ Hindernisse bei Straßen und Schienenwe-gen (gravitative Massenbe-wegungen)	Klimarisiko	gering	gering	mittel	gering	mittel	10-50 Jahre
	Gewissheit		mittel		gering		
Schäden an Verkehrsleit-systemen, Oberleitungen und Stromversorgungsan-lagen	Klimarisiko	gering	gering	mittel	gering	mittel	10-50 Jahre
	Gewissheit		gering		gering		
Schäden an Binnen- und Seeschifffahrtsstraßen, Hä-fen und maritimen Infra-strukturen	Klimarisiko	gering	gering	gering	gering	mittel	10-50 Jahre
	Gewissheit		mittel		gering		

Assessment of Adaptive Capacity in the field of transport, transport infrastructure

Effectiveness of adaptation

	Beschlossene Maßnahmen (APA III)[24]			Weiterreichende Anpassung		Steige-rungspo-tenzial für 2071-2100
	2020-2030	2031-2060		2031-2060		
		Optimistisch	Pessimistisch	Optimistisch	Pessimistisch	
Wirksamkeit der Anpassung	mittel	mittel-hoch	mittel	mittel-hoch	hoch	ja
Gewissheit	hoch	hoch				

Contributions to the effectiveness of extensive adaptation

	Wissen	Motivation, Akzeptanz	Technologie, natürliche Ressourcen	Finanzielle Ressourcen	Institutionelle Strukturen, personelle Ressourcen	Rechtliche Rahmenbe-dingungen, politische Strategien
Weiterreichende Anpassung	3	4	4	3	3	4

Skala: 1 = gering, 5 = hoch

Conclusion: urgent action required, high climate risk for the middle of the century in pessimistic case, adaptation period of up to 50 years is assumed for comprehensive measures

Aggregated climate risks without/with adaptation for all fields of action

Handlungsfeld	Klimarisiken ohne Anpassung		Klimarisiken mit Anpassung mit weiterreichender Anpassung	
	Mitte des Jahrhunderts		Mitte des Jahrhunderts	
	Optimistisch	Pessimistisch	Optimistisch	Pessimistisch
Biologische Vielfalt				
Boden				
Landwirtschaft				
Wald und Forstwirtschaft				
Fischerei				
Küsten- und Meeresschutz				
Wasserhaushalt, Wasserwirtschaft				
Bauwesen				
Energiewirtschaft				
Verkehr, Verkehrsinfrastruktur				
Industrie und Gewerbe				
Tourismuswirtschaft				
Menschliche Gesundheit				

gering | gering-mittel | mittel | mittel-hoch | hoch

Further information

Climate Impact and Risk Analysis for Germany 2021

English Summary (available soon)

Six Reports

1. Foundations (German)
2. Risks and adaptation: Land(German)
3. Risks and adaptation: Water (German)
4. Risks and adaptation: Infrastructure (German)
5. Risks and adaptation: Economy and Health (German)
6. Integrated evaluation – Climate risks, needs for action, and research needs (German)

Entry Point:
https://www.umweltbundesamt.de/en/press/pressinformation/new-study-shows-risks-of-climate-change-in-germany

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