

7. April 2022, Wegener Center Common Space

Auswirkungen, Risiken und Anpassung in Europa

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[Arnaud Steckle / Unsplash]

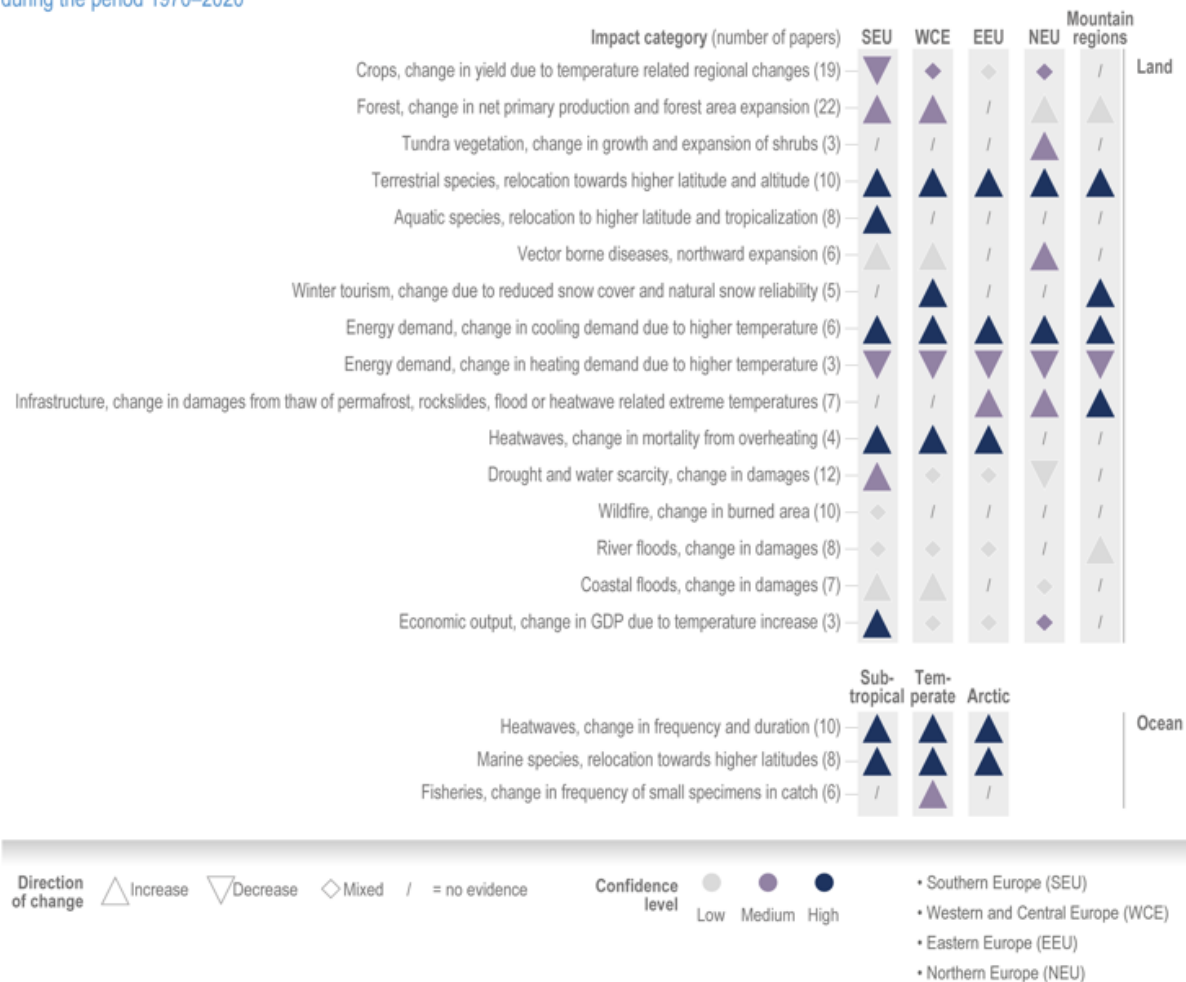


[Renan / Unsplash]



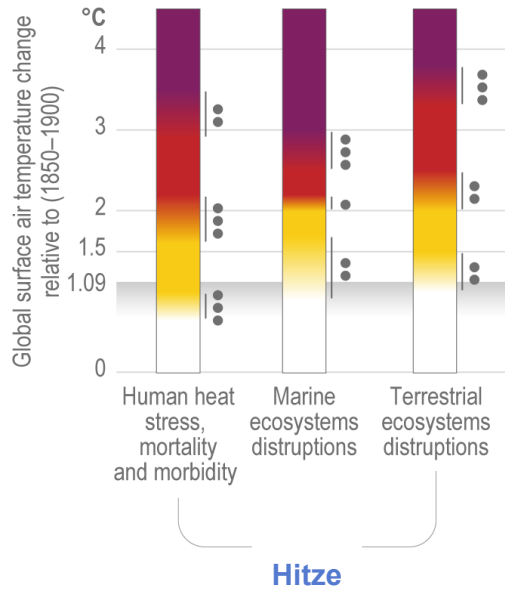
Die globale Erwärmung von $1,1^{\circ}\text{C}$ hat in Europa zu Verlusten und Schäden an Menschen, Ökosystemen, Ernährungssystemen, Infrastruktur, Energie- und Wasserverfügbarkeit, Gesundheit und Wirtschaft geführt.

Detection and attribution of climate-related impacts in Europe during the period 1970–2020



Vier Hauptrisiken für Europa

Key risks for Europe under low to medium adaptation



Level of risk

- Very high
- High
- Moderate
- Undetectable

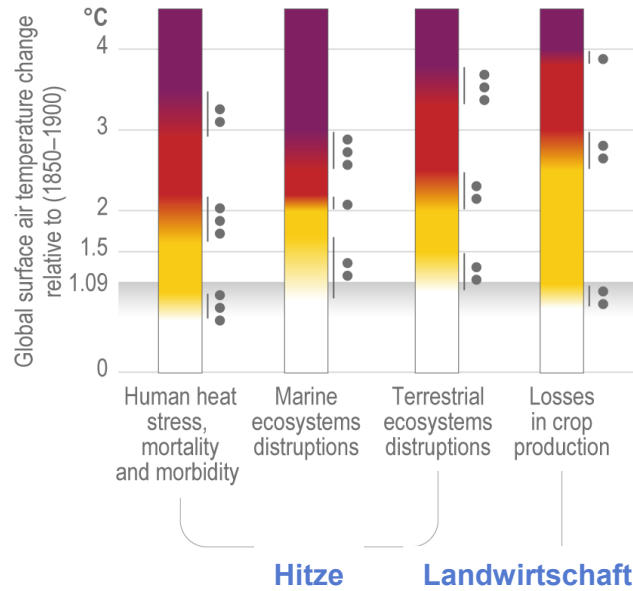
Confidence

- Low → High

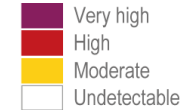
The ember colour gradient indicates the level of additional risk to society and ecosystems as a function of global temperature change. Confidence is provided for the change of risk level at given temperature ranges.

Vier Hauptrisiken für Europa

Key risks for Europe under low to medium adaptation



Level of risk



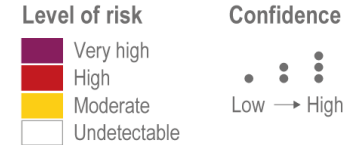
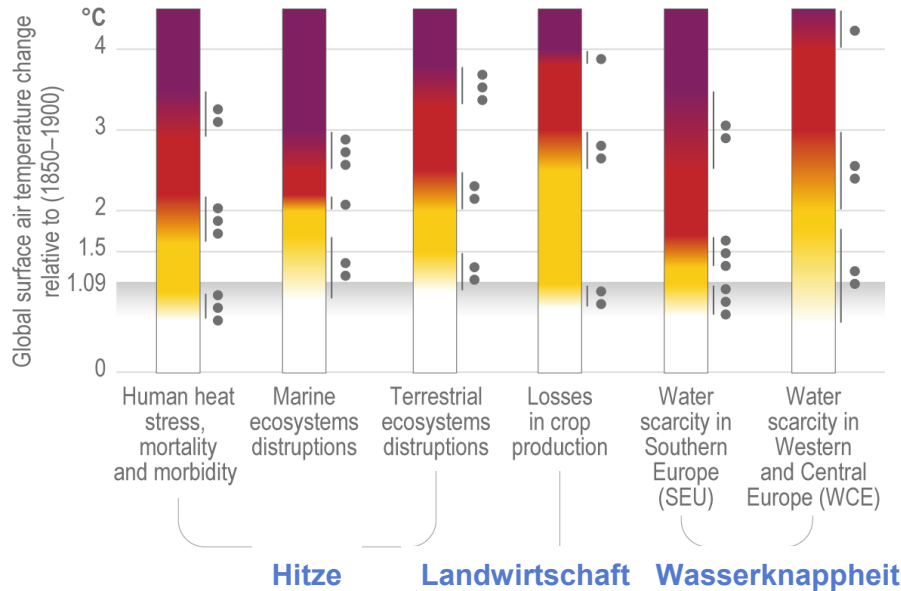
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Vier Hauptrisiken für Europa

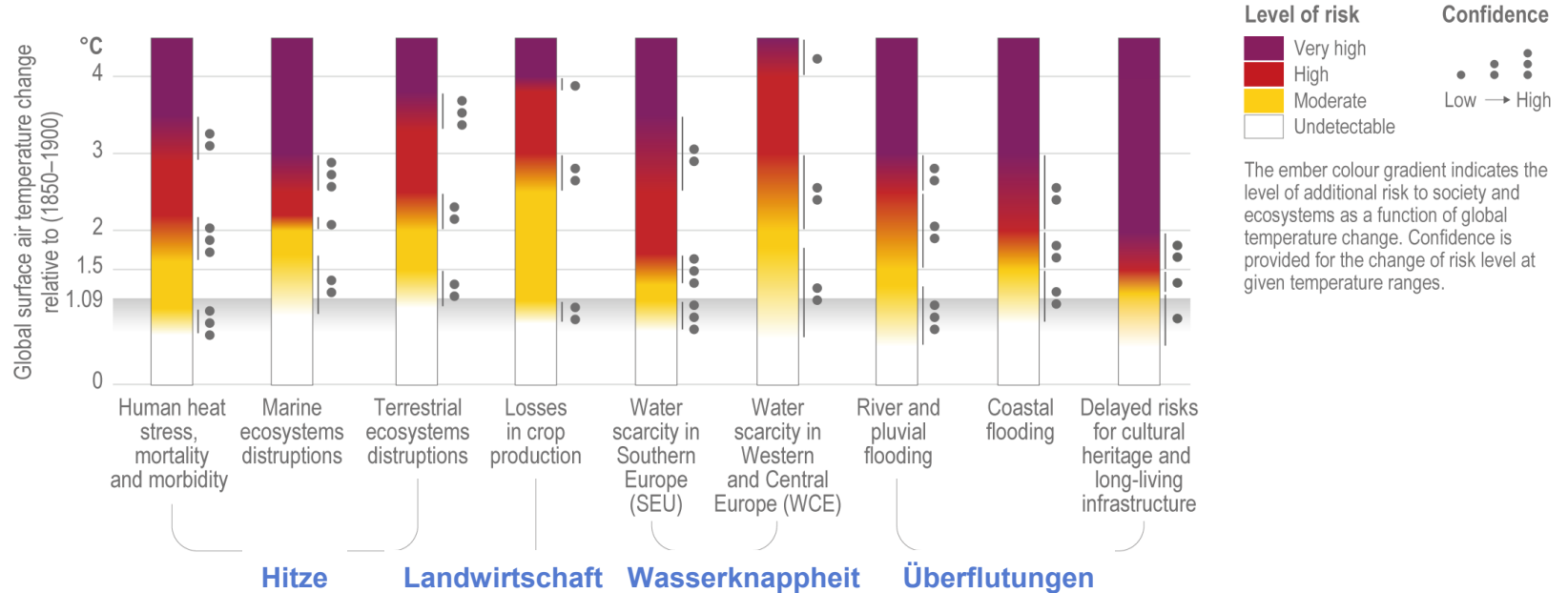
Key risks for Europe under low to medium adaptation



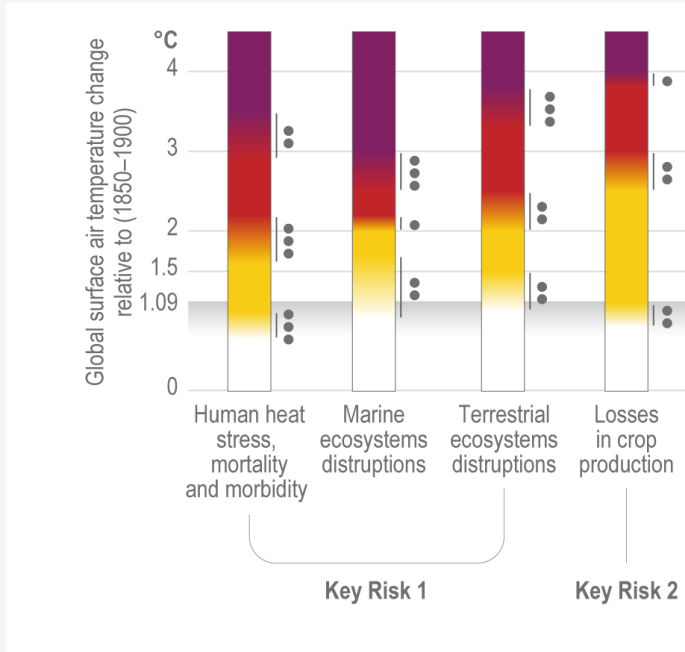
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Vier Hauptrisiken für Europa

Key risks for Europe under low to medium adaptation

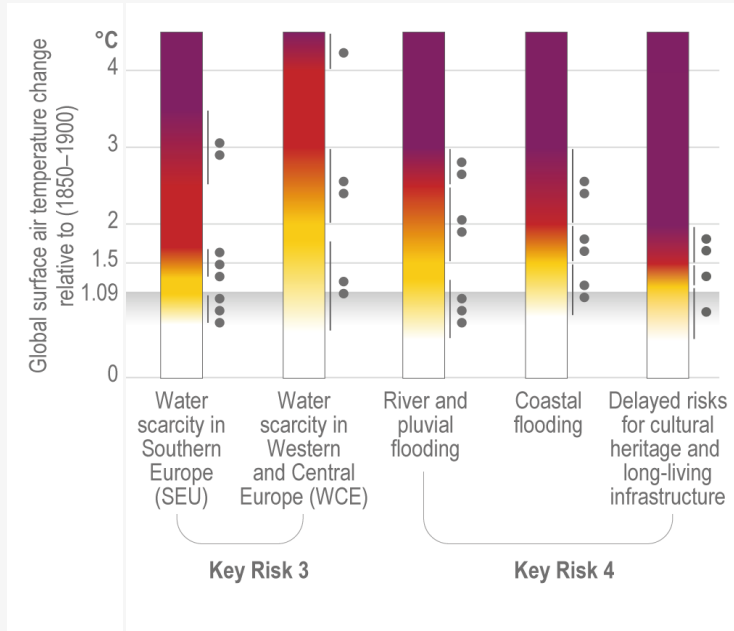


Hauptrisiken: Hitze, Landwirtschaft



- Die Zahl der **Todesfälle und Menschen mit Hitzestress** steigt bei 3°C um das Zwei- bis Dreifache gegenüber 1,5 °C globaler Erwärmung.
- Die **Erwärmung** wird den geeigneten **Lebensraum für Ökosysteme** verringern und ihre Zusammensetzung irreversibel verändern. Waldbrandgefährdete Gebiete werden sich ausdehnen.
- Für die meisten europäischen Gebiete werden **erhebliche landwirtschaftliche Produktionsverluste** aufgrund von **Hitze und Dürre** prognostiziert.

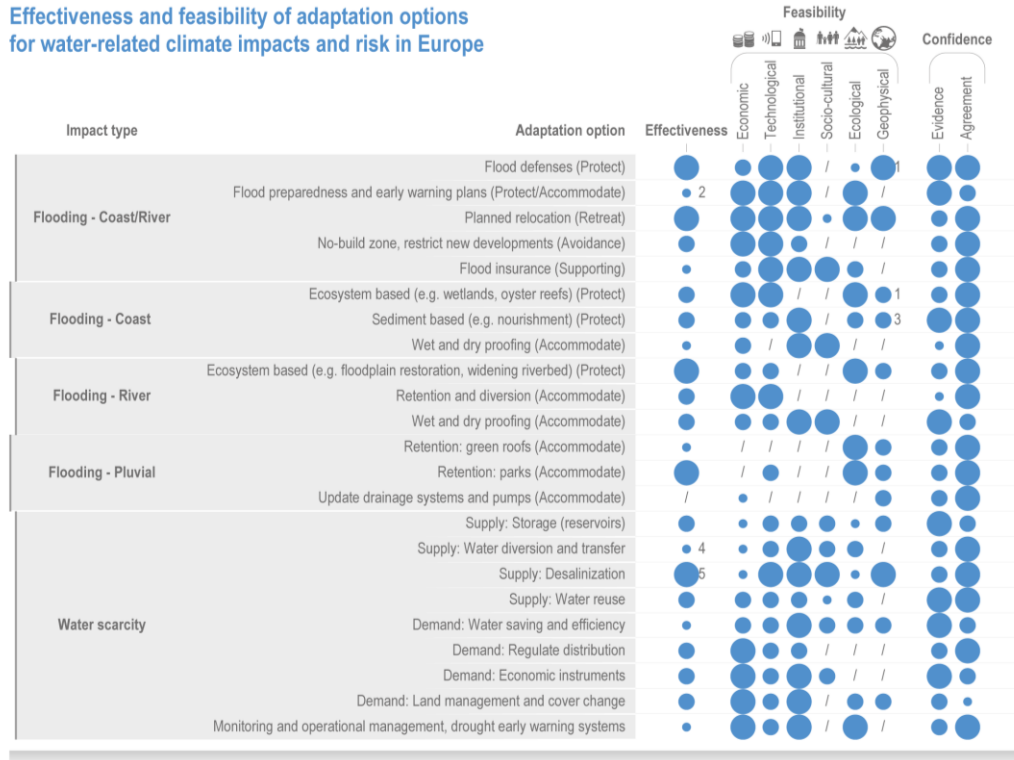
Hauptrisiken: Wasserknappheit, Überflutungen



- In Südeuropa wird mehr als ein Drittel der Bevölkerung **Wasserknappheit** bei 2 °C globaler Erwärmung ausgesetzt sein; bei 3 °C verdoppelt sich dieses Risiko und nimmt auch in Westmittel- und Südeuropa und vielen Städte stark zu.
- Die Risiken für Menschen und Infrastrukturen durch **Überschwemmungen an Küsten und entlang von Flüssen** in Europa nehmen zu. Über 3 °C globaler Erwärmung können sich die Schäden durch Überflutungen, deren Kosten und die Anzahl der betroffenen Menschen verdoppeln.

Anpassung in Europa

Effectiveness and feasibility of adaptation options for water-related climate impacts and risk in Europe



Assesment score

● Low Medium High

/ = no/limited evidence

1 = Physically hampered in highly urbanized regions.

2 = Low on preventing damage, medium on preventing fatalities.

3 = Availability of sand can hamper feasibility in Southern Europe.

4 = In Southern Europe, no evidence for other parts of Europe.

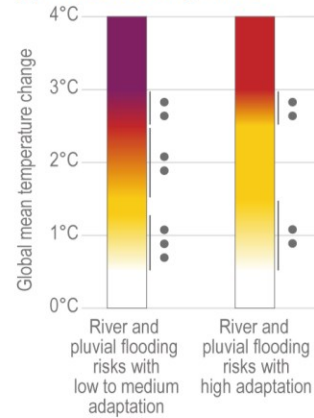
5 = Medium in Southern Europe and high in Western and Central Europe/Northern Europe.

- Es gibt bereits heute ein wachsendes Spektrum an **Anpassungsoptionen** in Europa, viele mit **hoher Wirksamkeit und Machbarkeit**.
- Die meisten Anpassungsoptionen an die Hauptrisiken hängen von **begrenzten Wasser- und Landressourcen** ab.

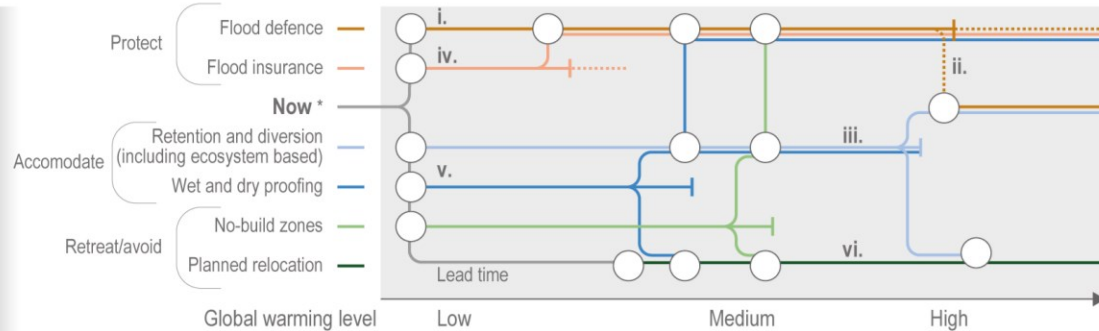
Anpassungsbedarf Überflutungen

Burning embers and illustrative adaptation pathways for inland and coastal flooding in Europe (Key Risk 4)

(a) Inland flooding risks



(b) Adaptation pathways riverine flood risk



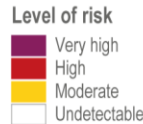
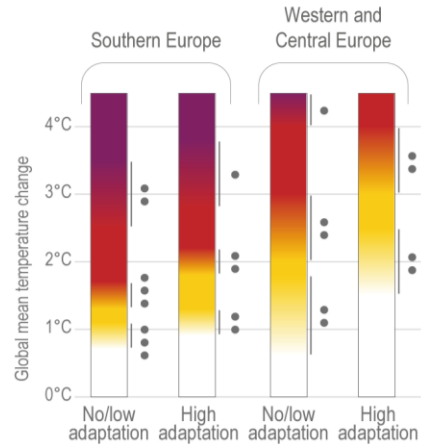
- Continuing a protect pathway by strengthening existing dyke systems is cost-effective, but with regional variation in benefit cost ratio. This comes with increasing path-dependency and residual risk (**).
- In cities where there is no place or no support to further heighten structure, upstream retention and movable barriers combined with an early warning system can be added (**).
- Natural retention and diversion of peak flows can reduce risk effectively and have co benefits for the environment and climate mitigation. A combination with flood defenses in highly urbanized regions can further reduce risk (**).
- Insurance can limit consequences of residual risk for people (**).
- Wet and dry proofing can be taken at household level and can reduce residual risk as levees are raised (**).
- Planned relocation has been implemented locally to restore floodplain both pre and post-hoc events and can ultimately remove risk (**).

* Mostly flood defences and early warning.

Anpassungsbedarf Wasserknappheit

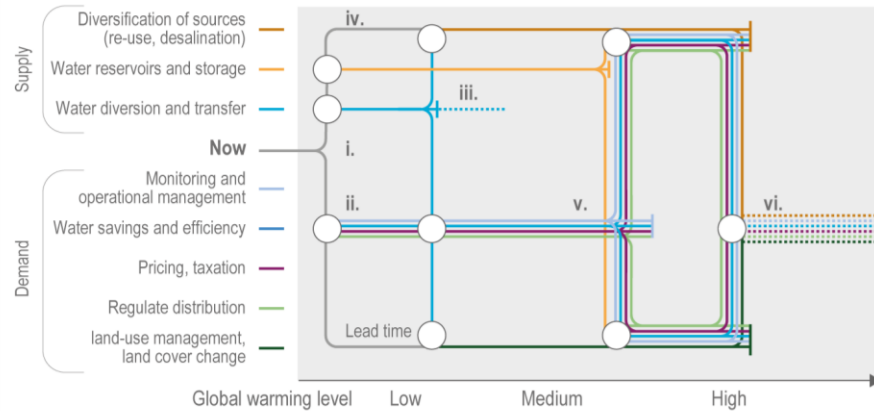
Burning embers and illustrative adaptation pathways for risk of water scarcity to people in Europe (Key Risk 3)

(a) People at risk of water scarcity



The ember colour gradient indicates the level of additional risk to society and ecosystems as a function of global temperature change. Confidence is provided for the change of risk level at given temperature ranges.

(b) Adaptation pathways water scarcity

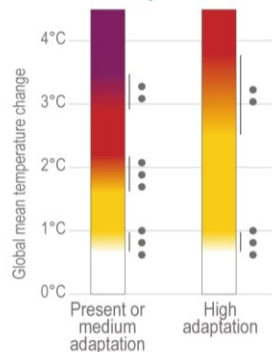


- i. Presently there is already a gap between water demand and water availability in some parts of Europe (**), which is increasing due to climate change and socio-economic developments (**).
- ii. A portfolio of demand-side measures can reduce risk to medium global warming level (GWL) (**).
- iii. Water reservoirs and transfer can have distributional impacts and when used for irrigation they intensify dependency on water (**).
- iv. Desalination is effective and can be expanded, but has adverse effect on the environment and energy demand. Water re-use is effective, but depends on water availability, has a long lead time for infrastructure development and overcome hesitation for household use (**).
- v. Under medium GWL, the portfolio of demand side measures needs to be combined with transformative measures inc diversification of sources or land-use/cover changes (**).
- vi. Under high global warming a large portfolio of measures is needed to reduce risk to water scarcity sufficiently, and this may not be possible to avoid water shortage (dashed lines) (**).

Anpassungsbedarf Hitze

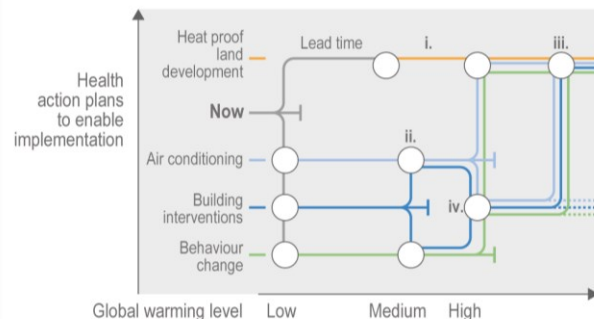
Burning embers and illustrative adaptation pathways for risks to human health from heat, in Europe (Key Risk 1)

(a) Heat stresses, mortality and morbidity



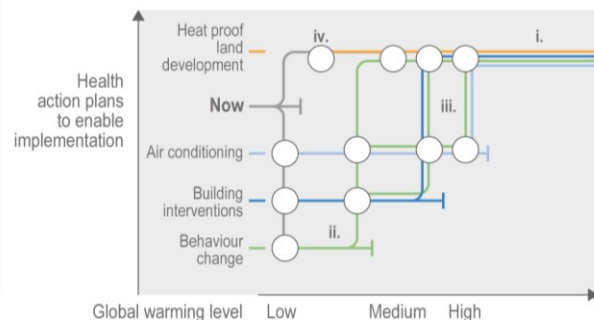
The ember colour gradient indicates the level of additional risk to society and ecosystems as a function of global temperature change. Confidence is provided for the change of risk level at given temperature ranges.

(b) Pathway to achieve high adaptation to heat stress, mortality and morbidity in Northern Europe



- i. Heat proof land development takes time to become effective (***) and is bundled with other measures to achieve high adaptation as warming increases (***)
- ii. Air conditioning alone is not enough and is combined with behaviour changes and/or building interventions (**)
- iii. For high warming heat proof land development might still be needed (**)
- iv. Building interventions have low to medium effectiveness and need to be combined with other measures at higher warming (**)

(c) Pathway to achieve high adaptation to heat stress, mortality and morbidity in Southern Europe

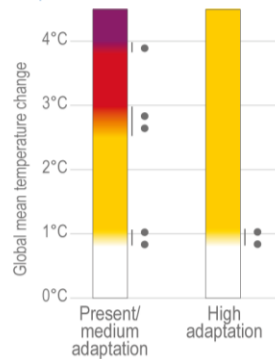


- i. Measures are to be implemented and combined earlier in Southern Europe due to higher risk (**)
- ii. There is less that can be achieved with behaviour change because there is already extensive culture of heat in Southern Europe (**)
- iii. Building interventions are crucial to be combined with other measures earlier since they have low to medium effectiveness (**)
- iv. Heat proof land development is needed for high warming levels (***)

Anpassungsbedarf Landwirtschaft

Burning embers and illustrative adaptation pathways for losses in crop production in Europe (Key Risk 2)

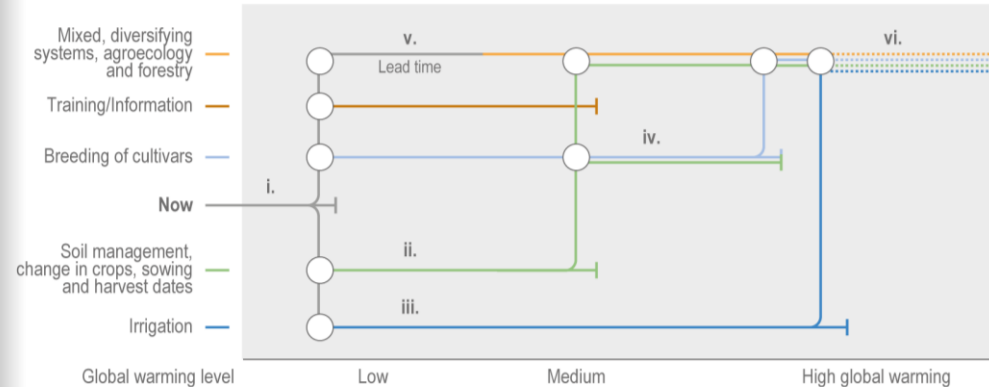
(a) Risks of losses in crop production



The ember colour gradient indicates the level of additional risk to society and ecosystems as a function of global temperature change.

Confidence is provided for the change of risk level at given temperature ranges.

(b) Adaptation pathways agriculture risk

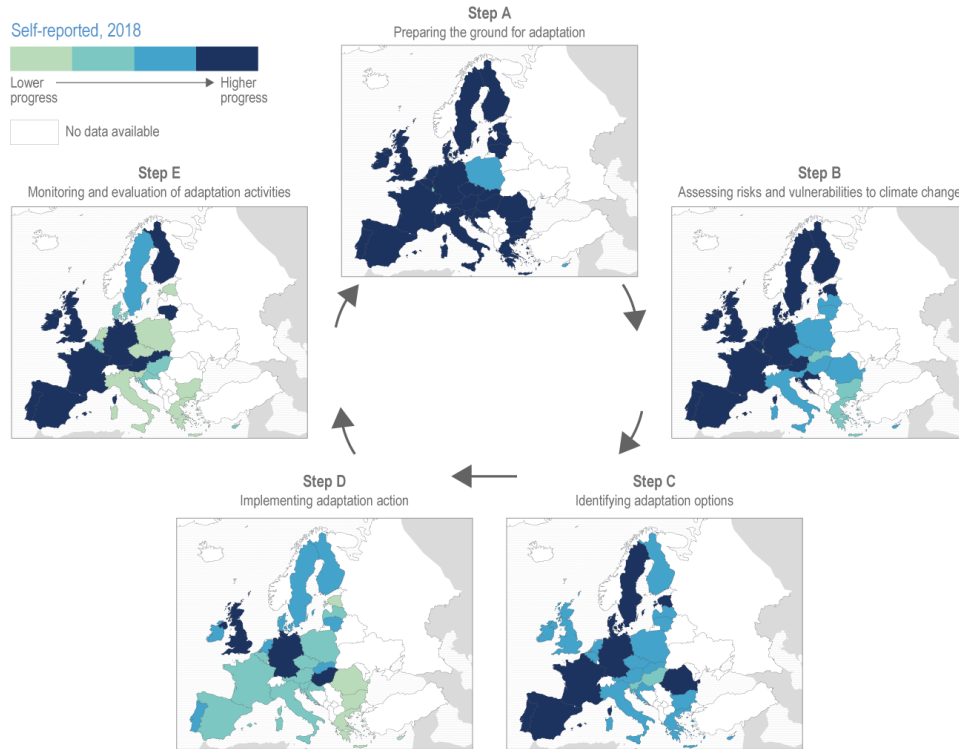


- i. Current management practices are insufficient to respond to extreme events (**).
- ii. Change in crops, sowing and harvest dates and soil management reduce the risk at low warming (**).
- iii. Irrigation is highly effective but it is limited by water availability (**). Beyond medium warming, it needs to be combined with other measures to take into account water constraints (**).
- iv. Breeding of cultivars for heat tolerance and drought resistance extends the effectiveness of management adaptation options (**).
- v. Mixed, diversified systems, agro forestry and -ecology have long lead times due to farmer socio-economic and policy constraints (**).
- vi. At high warming a mix of most measures will be needed (**). Limitation of water availability and other adaptation options would be insufficient to fully ameliorate losses in all regions (**).

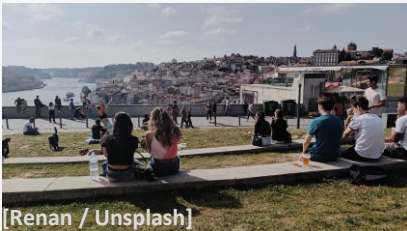
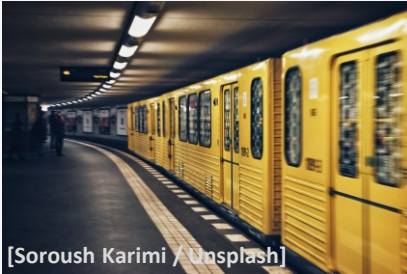
Anpassung in Europa

Progress of National Adaptation in Europe

Self-reported, 2018



- Die **Umsetzung von Anpassung in Europa erfolgt jedoch nicht im erforderlichen Ausmaß**, um die Risiken zu vermeiden.
- **Haupt Hindernisse** sind begrenzte Ressourcen, mangelndes Engagement, unzureichende Mobilisierung von Finanzmitteln, mangelnde politische Führung und geringes Dringlichkeitsbewusstsein.



Städte

- Europäische Städte sind **Hotspots für zahlreiche Risiken** wie steigende Temperaturen und extreme Hitze, Überschwemmungen und Dürren.
- **Klimaresiliente Entwicklung ist in europäischen Städten sichtbar**, insbesondere in Form von grüner Infrastruktur, energieeffizienten Bauen und wenn ein Zusatznutzen z. B. für die Gesundheit und Biodiversität entstehen.

Overview of adaptation actions reported in European cities and their co-benefits

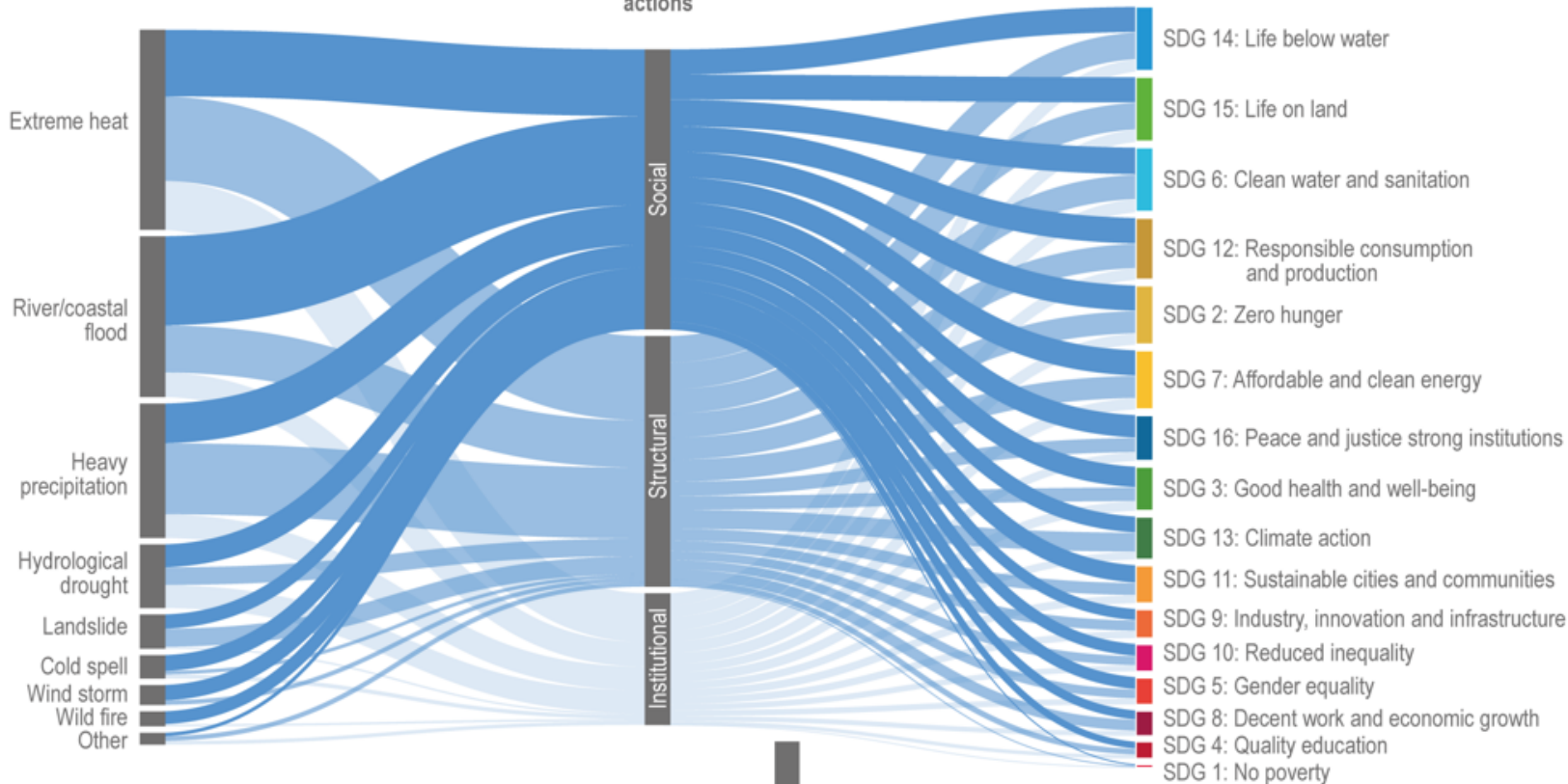


(a)

Climate impact drivers

Adaptation actions

Co-benefits of adaptation



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Observed and projected climate impact drivers for Europe

Observations from 1970–2019, Projected changes based on warming levels

