WBGU

German Advisory Council on Global Change

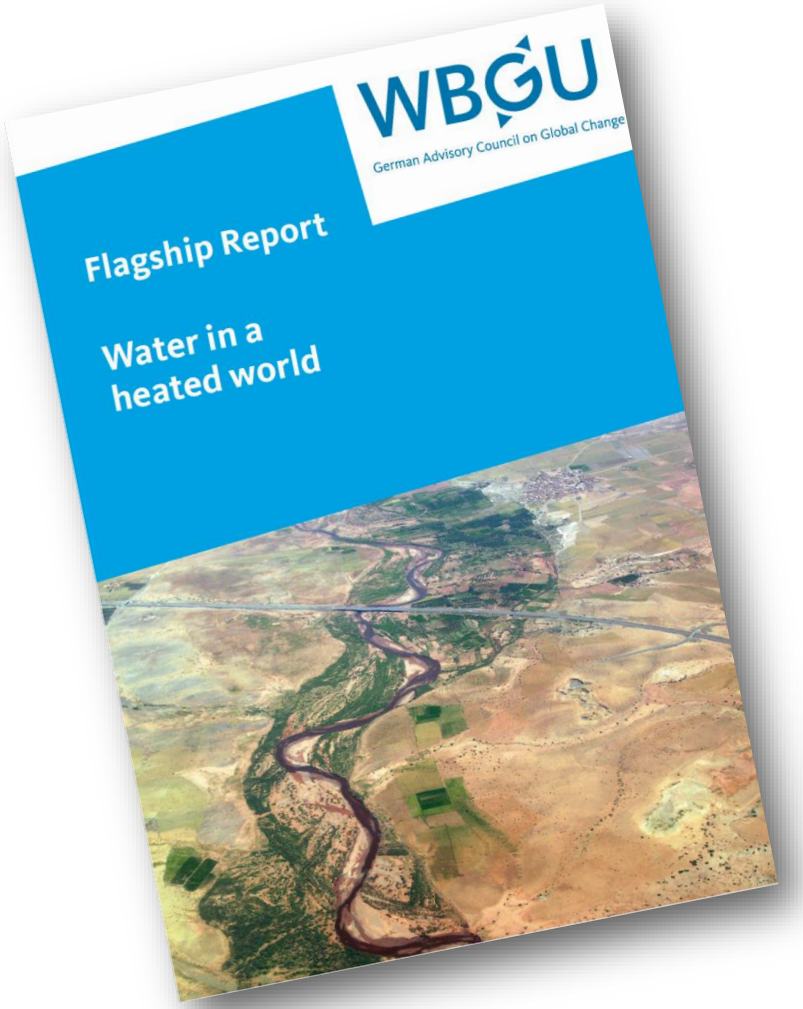
# Scientific Policy Advice – Examples of the WBGU

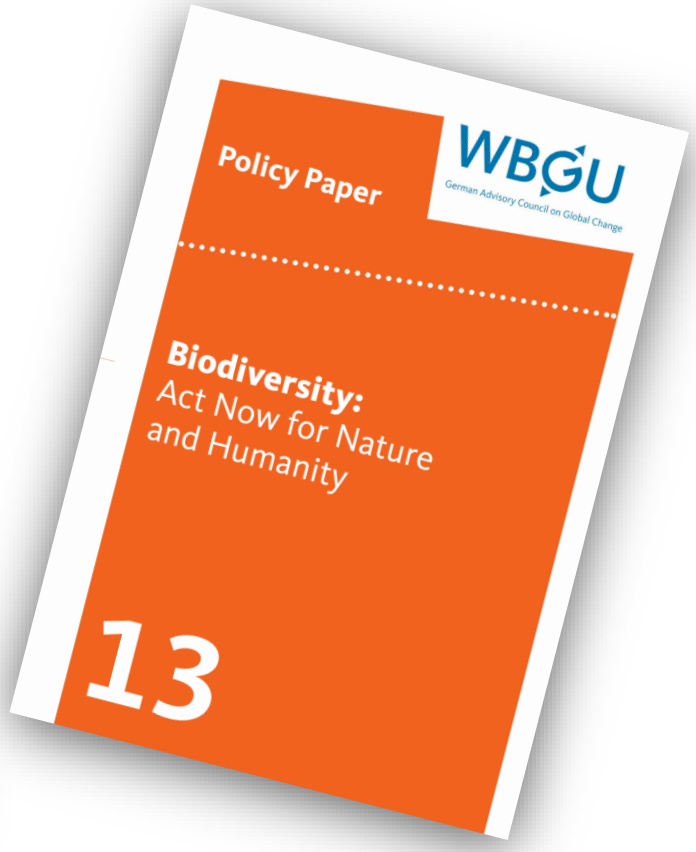
*Tallulah Gundelach and Mareike Blum*

Global Change Management HNEE

March 31st, 2025

# Scientific Policy Advice – Examples of the WBGU



# German Advisory Council on Global Change

**Science**

Society

Policy

## Independent scientific advisory council (1992)

- Founded 1992
- 9 members, plus 9 research analysts, mandate for 4 years
- Secretariat with scientific core expertise and administration

**POLICY**
**National and Global**

Science

Society

**Bundesregierung**
BMUV & BMBF
Interministerieller Ausschuss

SUSTAINABLE DEVELOPMENT GOALS

Deutscher Bundestag

# Members of the WBGU 2024-2028

**Aletta Bonn**
Biodiversitätsforscherin
Helmholtz-Zentrum für Umweltforschung – UFZ und Deutsches Zentrum für integrative Biodiversitätsforschung (iDiv)

**Jörg E. Drewes**
Umweltingenieur
Technische Universität München

**Anna-Katharina Hornidge**
Entwicklungs- und Wissenssoziologin
German Institute of Development and Sustainability (IDOS) und Universität Bonn

**Kai Maaz**
Soziologe
DIPF | Leibniz-Institut für Bildungsforschung und Bildungsinformation

**Karen Pittel**
Ökonomin
ifo Institut, Leibniz-Institut für Wirtschaftsforschung und Universität München

**Hans-Otto Pörtner**
Ökophysiologe und Klimaforscher
Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung

**Sabine Schlacke**
Rechtswissenschaftlerin
Universität Greifswald

**Claudia Traidl-Hoffmann**
Medizinerin
Universität Augsburg

**Joscha Wullweber**
Politikwissenschaftler und Politikökonom
Universität Witten/Herdecke

**Marion Schulte zu Berge, Secretary-General**

## Secretariat and research analysts

# Sustainable development: 3 relevant councils with a mandate from the German government

| | Members | Focus | Assigment | Established |
|---|---|---|---|---|
| SRU German Advisory Council on the Environment | 7 scientists | German and European environmental policy | Ministry for the Environment | 1971 |
| WBGU German Advisory Council on Global Change | 9 scientists | Global environment and development policy | German Federal Government: Interministerial Working Group WBGU<br><br>Funding: Ministries for Environment & Research | 1992 |
| German Council for SUSTAINABLE Development | 15 societal groups | German Sustainable Development Strategy | Federal Chancellery | 2001 |

Source: WBGU

+ more focused scientific councils: Energy Transition Monitoring Commission (Energiewende Monitoring Kommission; 2011); Council of Experts on Climate Change (Klimaexpertenrat; 2020); Scientific Platform for Climate Protection (Wissenschaftsplattform Klimaschutz; 2019)

# Mandate and tasks

**Policy making / agenda-setting (e.g. through advisory reports)**

- Analysis of global environmental and development trends
- Monitoring international policy processes and early warning
- Developing recommendations for policy making

**Research policy**

- Evaluation/assessment of sustainability research
- Identification of research gaps and proposals for research

**Public relations**

- Bringing debates into society

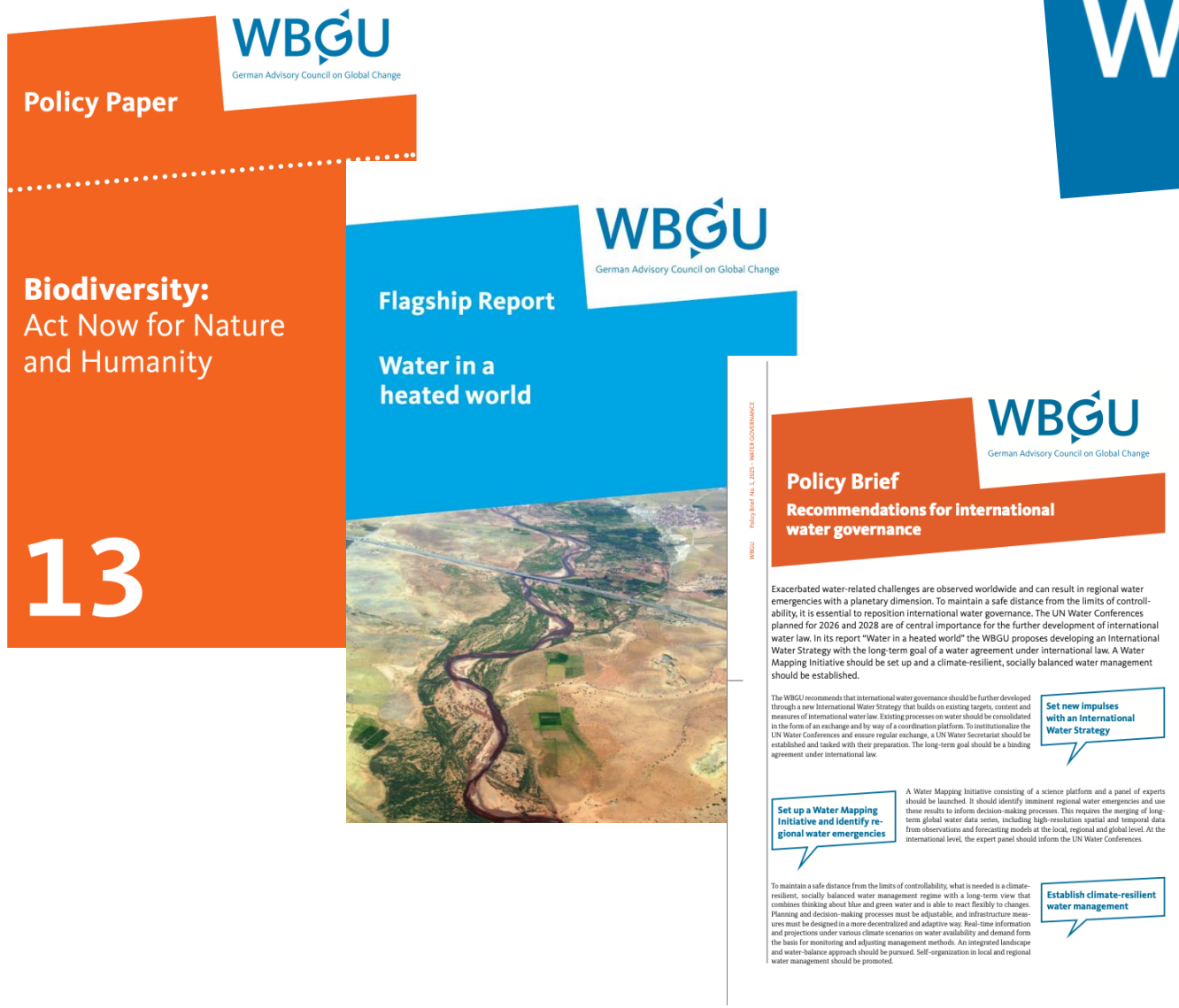
# Overview of formats

## Main Outputs

- Flagship Reports
- Special Reports

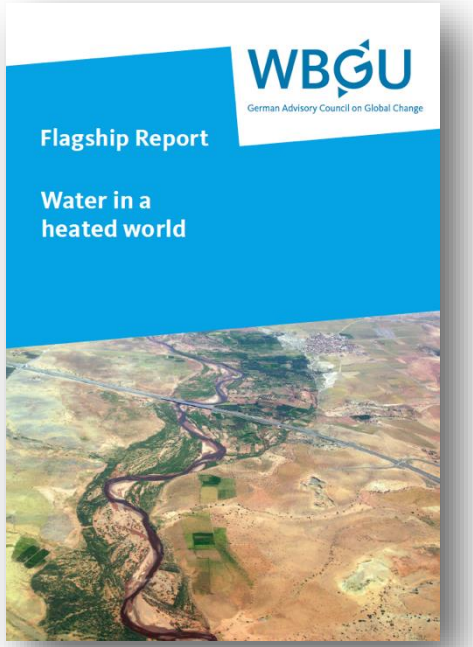
## Dissemination

- Policy Papers
- Short papers



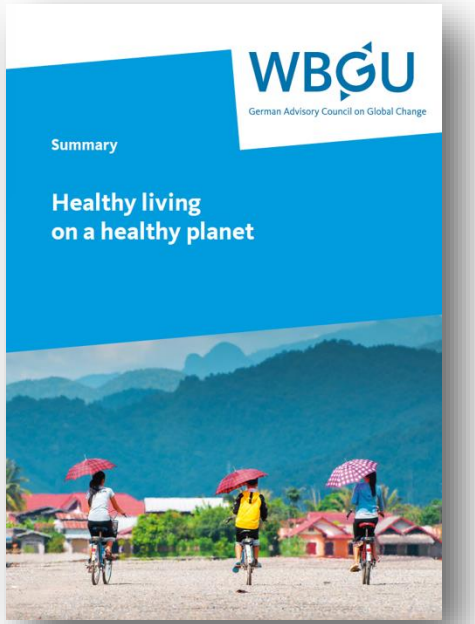
# Flagship Reports: global change analyses

- Water in a heated world (2024)
- Healthy Living on a healthy planet (2023)
- Rethinking Land in the Anthropocene (2020)
- Towards our Common Digital Future (2019)
- Transformative power of cities (2016)
- Governing the Marine Heritage (2013)
- A Social Contract for Sustainability (2011)
- Bioenergy and Sustainable Land Use (2008)
- Climate Change as a Security Risk (2007)




**Format**

Main advisory report (300-400 pages)

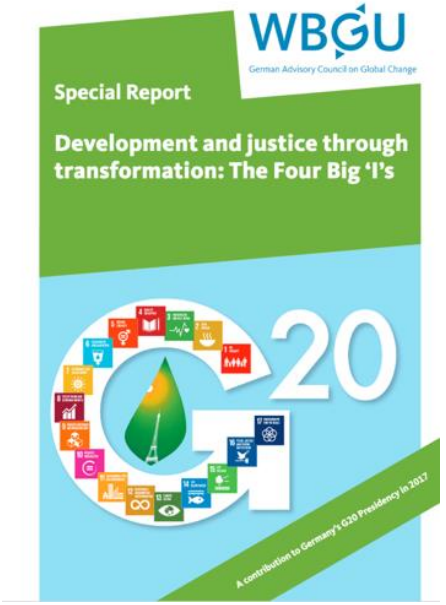


# Special reports

- Development and justice through transformation: a contribution to G20-presidency (2017)
- Climate Protection as a World Citizen Movement (2014)
- Solving the climate dilemma: The budget approach (2009)
- The Future Oceans – Warming Up, Rising High, Turning Sour (2006)

**Format**

Short advisory report (50-150 pages)



# Policy Papers

- Biodiversity: Act Now for Nature and Humanity (2024)
- Planetary Health: What we need to talk about (2021)
- Beyond climate neutrality (2021)
- A European Way to our Common Digital Future (2019)
- Digital Momentum for the UN Sustainability Agenda (2019)
- Just & In-Time Climate Policy: Four Initiatives for a Fair Transformation (2018)
- Human Progress within Planetary Guard Rails (2015)

**Format**

- Around 20 pages long
- Based on a full report
- Aims to inform a current policy process
- Highlights recommendations

# Short Papers:
# Fact Sheets and Policy Briefs

**Format**

> 4 pages

> Short and concise

> „What we need to talk about“
  → in early stage of report

> Fact Sheets and Policy Briefs: summarize key messages and recommendations of selected chapters → dissemination

WBGU

German Advisory Council on Global Change

**Planetary Health:**
**What we need to talk about**

The COVID-19 pandemic has shown us how vulnerable we are and how closely connected we are with Nature. Health cannot be taken for granted. Do we take the prerequisites for healthy living seriously enough? Or are we, as a civilization, systematically jeopardizing our health?

**Healthy people as part of a healthy planet Earth**

In recent decades, as prosperity has increased, human health has improved worldwide; yet not everyone has benefited. In poorer population groups, infectious diseases and maternal and child mortality still cause a great deal of avoidable suffering. Increasingly, however, the gains in prosperity are themselves having a negative impact on health: on the one hand as 'too much of a good thing' through the overconsumption of food and the displacement of physical activity from everyday life, on the other as harmful side effects in the form of air pollution and environmental toxins. As a result, lifestyle diseases such as overweight, diabetes, cardiovascular and respiratory diseases are on the rise worldwide.

Last but not least, our resource-intensive way of life, with its immense emissions of greenhouse gases, the destruction of natural habitats and increasing pollution of land and sea, has led to a planetary crisis. It threatens the natural life-support systems on Earth and thus the health of all people. Heat waves, disastrous floods and pandemics drastically demonstrate to us that our society is dependent on functioning ecosystems and a stable climate. The planetary crisis could furthermore threaten the cohesion of our societies and overburden healthcare systems.

But the crisis also gives us an opportunity to rethink our idea of prosperity and progress, to break habits and make our societies fairer, more sustainable and healthier. Because the increasing environmental and health problems often have common roots, synergies can be found in approaches to solving them. We are at a crossroads. Society, business and politics must assume responsibility and initiate a comprehensive transformation that leads to healthy human life on a healthy planet.

The WBGU is currently working on the interconnections between health and global environmental change and would like to put forward three assertions and ten sets of questions for discussion.

1 Our lifestyle is making us ill and is destroying the planet.
2 Healthy people can only exist on a healthy planet.
3 We must initiate a civilizational transformation for planetary health.

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**Policy Brief**
**Recommendations for international water governance**

Exacerbated water-related challenges are observed worldwide and can result in regional water emergencies with a planetary dimension. To maintain a safe distance from the limits of controllability, it is essential to reposition international water governance. The UN Water Conferences planned for 2026 and 2028 are of central importance for the further development of international water law. In its report "Water in a heated world" the WBGU proposes developing an International Water Strategy with the long-term goal of a water agreement under international law. A Water Mapping Initiative should be set up and a climate-resilient, socially balanced water management should be established.

The WBGU recommends that international water governance should be further developed through a new International Water Strategy that builds on existing targets, content and measures of international water law. Existing processes on water should be consolidated in the form of an exchange and by way of a coordination platform. To institutionalize the UN Water Conferences and ensure regular exchange, a UN Water Secretariat should be established and tasked with their preparation. The long-term goal should be a binding agreement under international law.

**Set new impulses with an International Water Strategy**

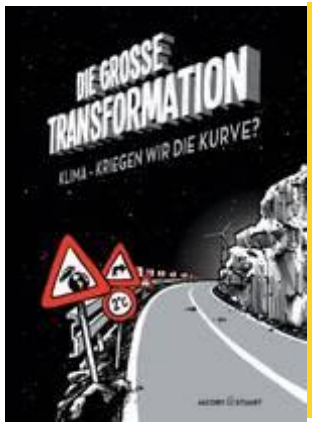
**Set up a Water Mapping Initiative and identify regional water emergencies**

A Water Mapping Initiative consisting of a science platform and a panel of experts should be launched. It should identify imminent regional water emergencies and use these results to inform decision-making processes. This requires the merging of long-term global water data series, including high-resolution spatial and temporal data from observations and forecasting models at the local, regional and global level. At the international level, the expert panel should inform the UN Water Conferences.

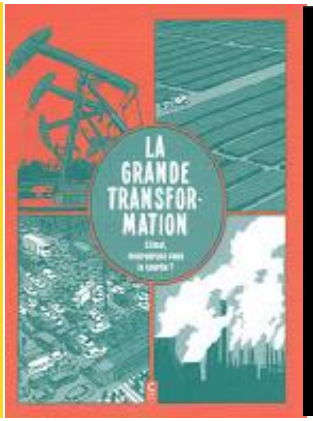
To maintain a safe distance from the limits of controllability, what is needed is a climate-resilient, socially balanced water management regime with a long-term view that combines thinking about blue and green water and is able to react flexibly to changes. Planning and decision-making processes must be adjustable, and infrastructure measures must be designed in a more decentralized and adaptive way. Real-time information and projections under various climate scenarios on water availability and demand form the basis for monitoring and adjusting management methods. An integrated landscape and water-balance approach should be pursued. Self-organization in local and regional water management should be promoted.

**Establish climate-resilient water management**

# Comics


DIE GROSSE TRANSFORMATION
KLIMA - KRIEGEN WIR DIE KURVE?


THE GREAT TRANSFORMATION
CLIMATE – CAN WE BEAT THE HEAT?


LA GRANDE TRANSFOR-MATION


위대한 전환
: 지구 온도 2도를 지키기 위해


HÀNH TINH ĐÔ THỊ


DER URBANE PLANET


THE URBAN PLANET


EL PLANETA URBANO

# Short movies

## Human Power – The concept of planetary guard rails


## Our common digital future

# Dissemination

## Launch of reports

> Submission to Federal Minister(s)

## Presentation at national and international levels

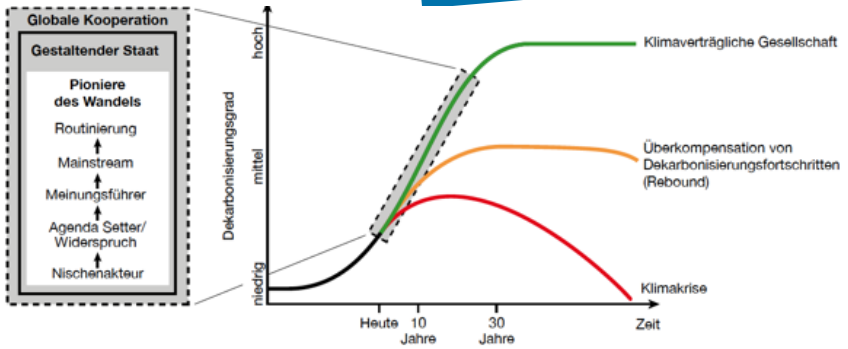
> Federal Ministries, German Parliament, United Nations,
> World Bank, global summits (UNFCCC, CBD, G20 etc.)
> Development Banks, NGOs, private sector, universities


## Media

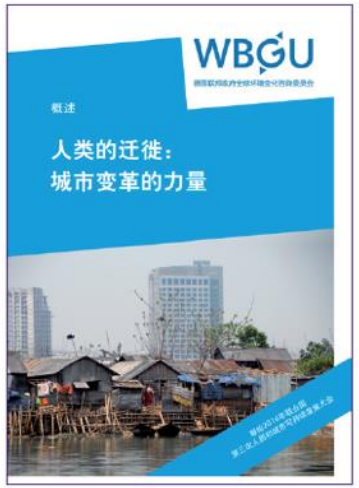
> Press conferences, op-ed, interviews, briefings
> Social Media (LinkedIn, Bluesky, Mastodon) – follow us for updates!

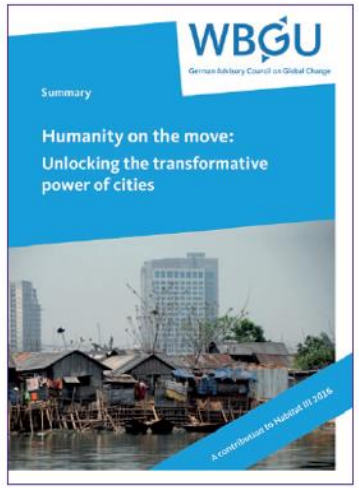
# Impact / Success stories

- 2°C guardrail
- Framing: global transformation to sustainability
- $CO_2$-budget approach
- Early warning: climate change as a security risk (2007)
- School curricula
- Digitisation report (2019) as input für CODES (Coalition for Digital Environment Sustainability; UNDP, UNEP et al.)




# WBGU Urbanisation report as a contribution to UN conference on urban sustainable development (”Habitat III”)

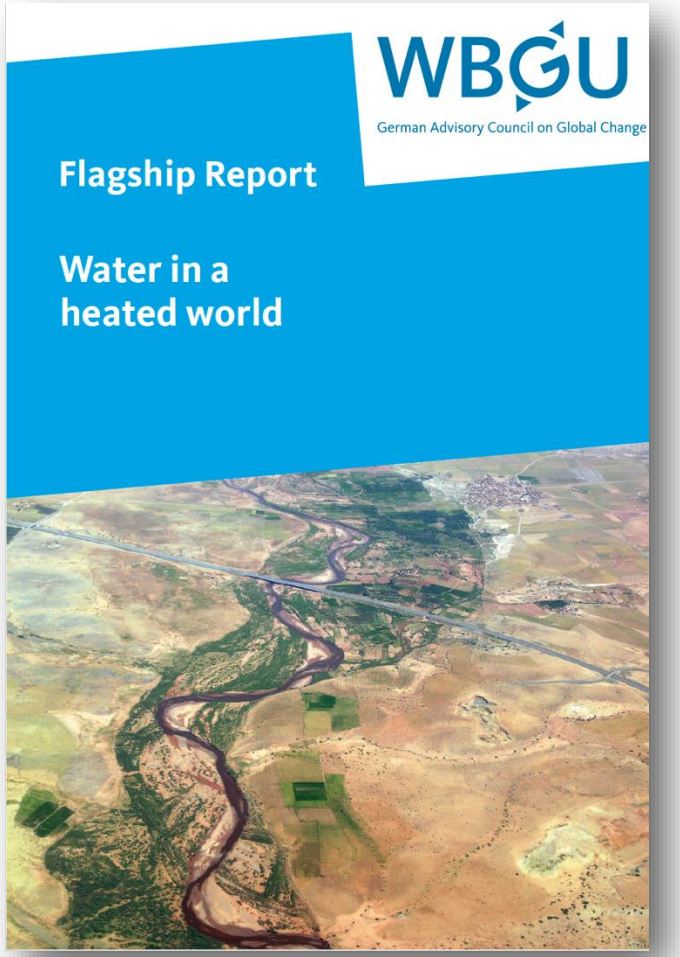


## Outreach 2016/2017

- New Urban Agenda (NUA): Support of Ministries in preparing Germany’s position
- Participation at Habitat III – side events
- Statement on the outcome of Habitat III
- Statement on New Urban Agenda implementation
- Conference „Transformative Power of Cities“


Source: WBGU

# **Latest Flagship Report**: Water in a heated world (2024)



# Droughts and flash floods are increasing

*"…water is the messenger delivering the bad news of climate change"*

Jay Famiglietti, Arizona State University, 2022

Quelle: Emilio Morenatti/AP 2024; Münchner RE 2024; WWF Deutschland: www.picture-alliance/dpa

# Regional water emergencies with a planetary dimension

## Overexploitation of groundwater and climate change in the Central Valley (USA)

**25 %**
of fruit and nut production in the USA originates from the Central Valley

**10 %**
water losses are expected in the region by 2030

**75 %**
of the wells have suffered a 1.5 metre lowering of the groundwater level 2018–2023

Central Valley

## Increase in droughts and flash floods in the MENA region

**6 %**
of the world's population live in the MENA region

only **1 %**
of global freshwater resources is available there

**24 %**
decline in per-capita renewable freshwater availability between 2007 and 2018

MENA-Region

Hindukusch-Karakorum-Himalaya

## Melting glaciers in the Hindu Kush-Karakoram-Himalayan mountain range: loss of large water reservoirs

**2 billion**
people access their water from the region's river basins

**200 million**
people are already suffering from increased water stress

**20 %** to **65 %**
glacier loss depending on climate scenario

## Water scarcity in cities

**> 933 million**
urban dwellers today are affected by water shortages

**30–50 %**
of the world's population will be affected by 2050

approx. **80 %**
growth in urban demand for water expected by 2050

São Paulo

Subsahara-Afrika

Chennai

## Water pollution in Sub-Saharan Africa

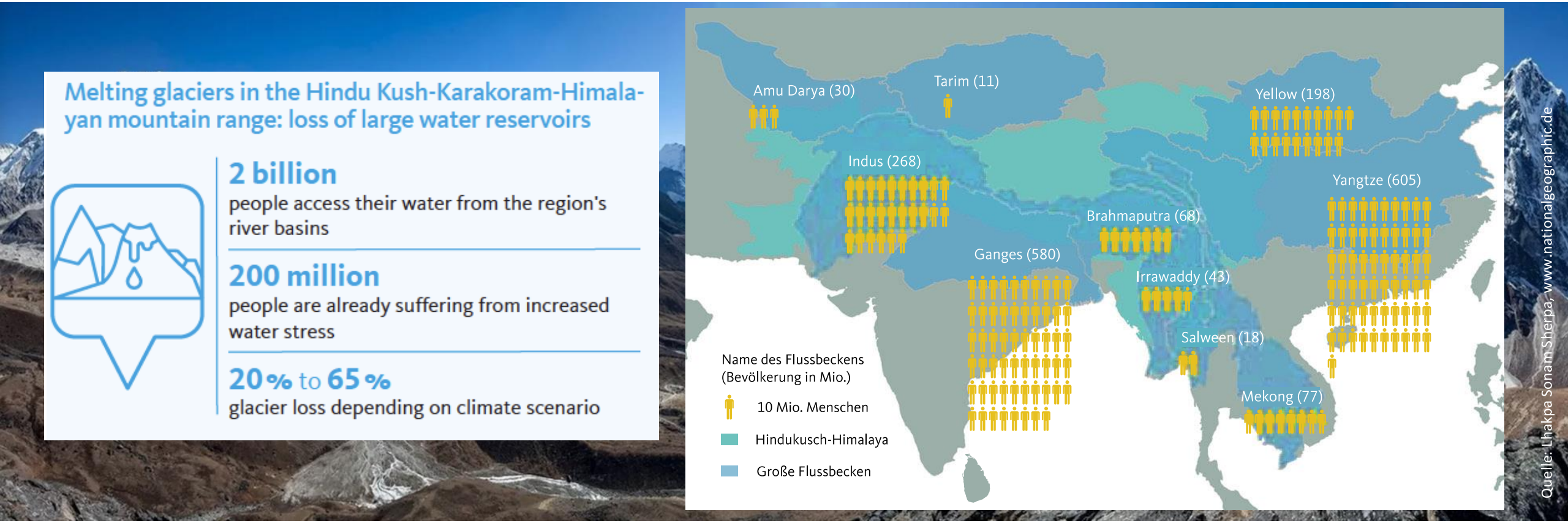
**2.7 billion**
people are today affected by water pollution

**4.2 billion**
is their expected number by 2100

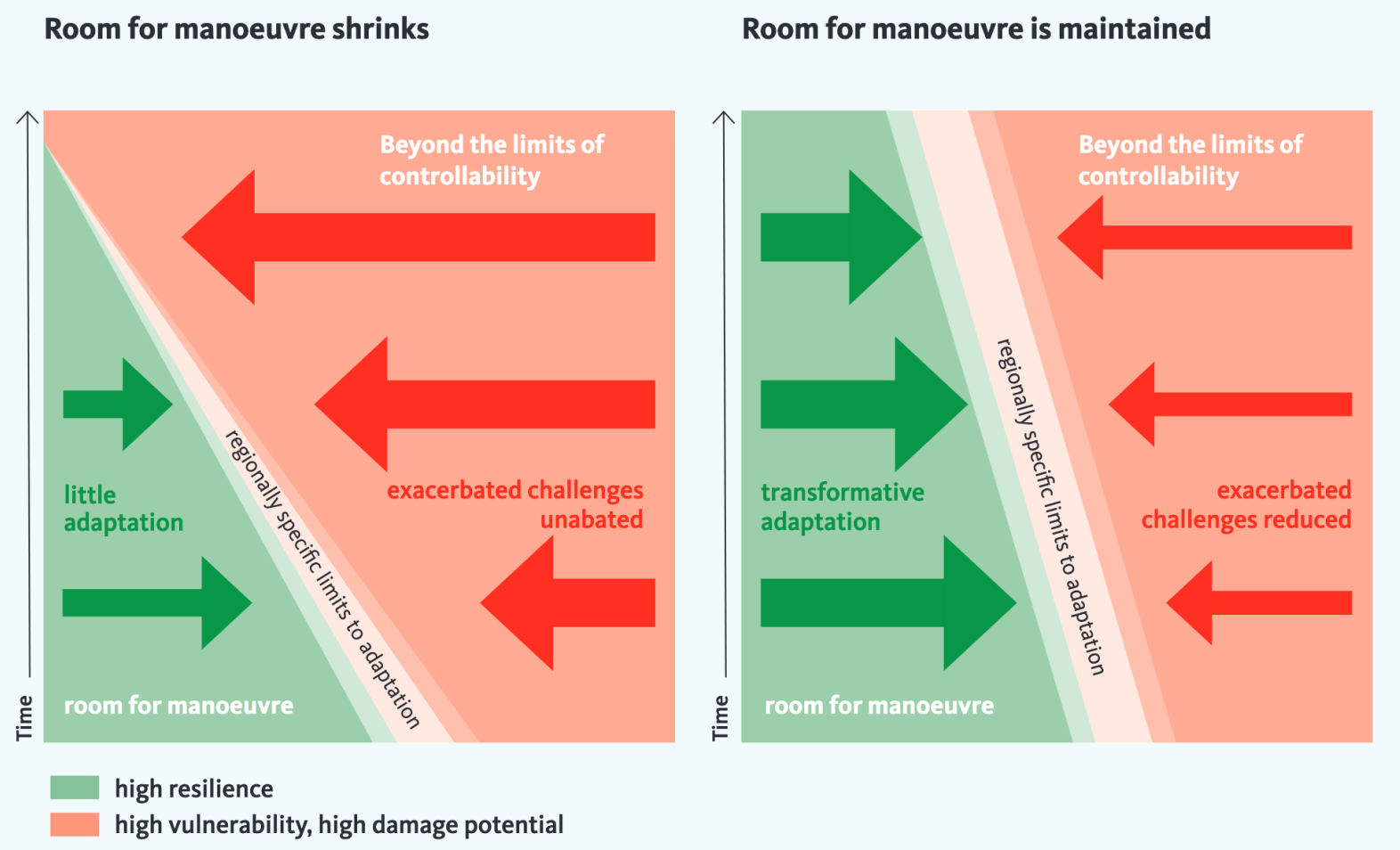
**38 %**
of the world's population affected by organic water pollution will live in Sub-Saharan Africa in 2100

Source: WBGU 2024

# Glacier retreat in the Hindu Kush-Karakoram-Himalayan mountain range: loss of large water reservoirs



# Maintain a safe distance from the limits of controllability, maintain room for action

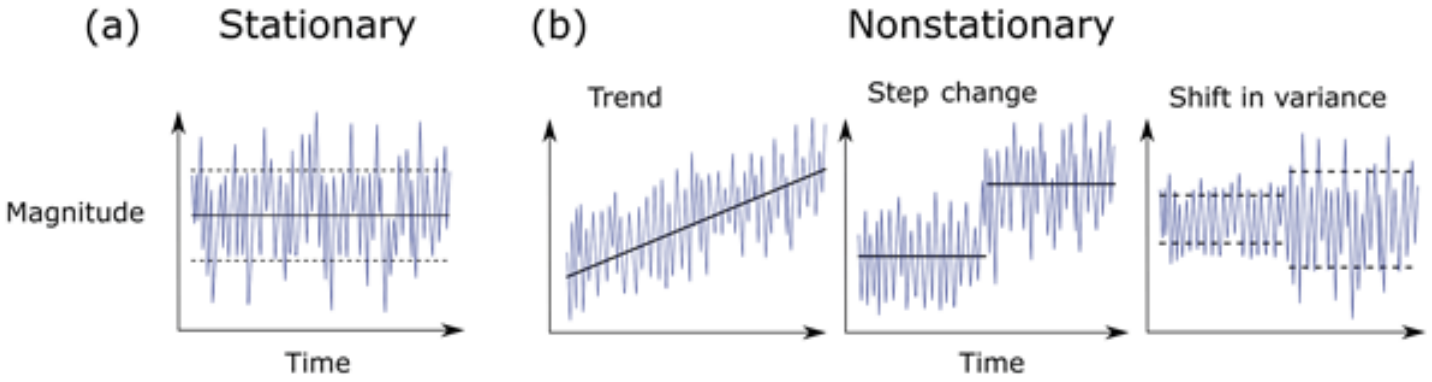


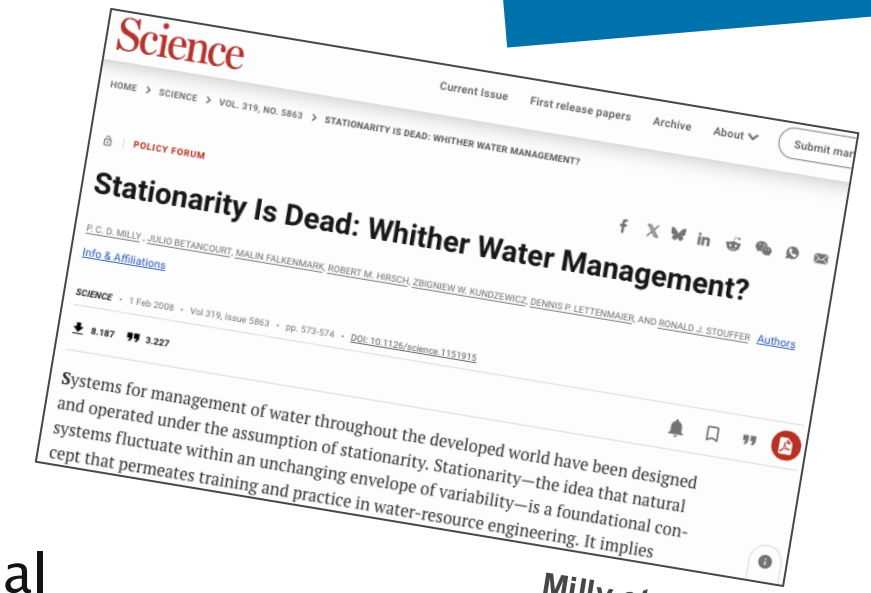

1. Limit direct drivers on the global water balance: ambitious climate policy
2. Increase adaptability: climate-resilient, socially balanced water management
3. Prepare a ‘Plan B’, potentially prepare an orderly retreat

Source: WBGU 2024

# Message 1: New quality of risks and uncertainties

## “Stationarity is dead”





Science

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Current issue First release papers Archive About Submit man

POLICY FORUM

**Stationarity Is Dead: Whither Water Management?**

P. C. D. MILLY, JULIO BETANCOURT, MALIN FALKENMARK, ROBERT M. HIRSCH, ZBIGNIEW W. KUNDZEWICZ, DENNIS P. LETTENMAIER, AND RONALD J. STOUFFER Authors

Info & Affiliations

SCIENCE · 1 Feb 2008 · Vol 319, Issue 5863 · pp. 573-574 · DOI: 10.1126/science.1151915

8,187 3,227

Systems for management of water throughout the developed world have been designed and operated under the assumption of stationarity. Stationarity—the idea that natural systems fluctuate within an unchanging envelope of variability—is a foundational concept that permeates training and practice in water-resource engineering. It implies

Milly et al. 2008

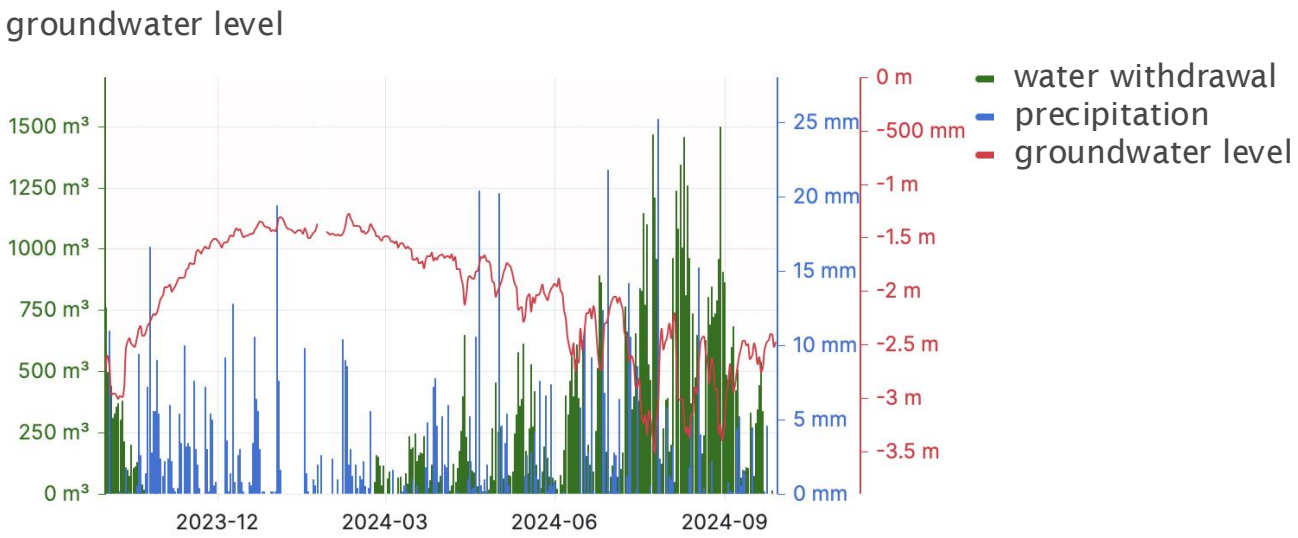
- Stationarity describes the circumstance that statistical properties of natural systems (e.g. precipitation rates and groundwater levels) remain constant within a time frame
- Human intervention and Climate Change lead to water system changes in short time
- Societal negotiation process: tolerable risks, scope of adaptation

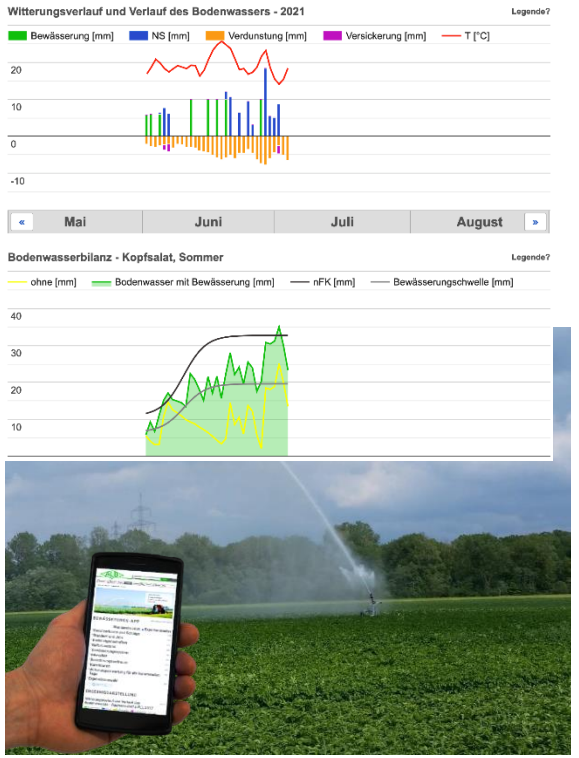
Source: Slater et al. 2021

# Message 1: New quality of risks and uncertainties

## Increased resilience for sustainable water management

- Rapidly adapt infrastructure planning (e.g. $HQ_{100}$)
- Diversify water portfolios; buffer water supply
- Manage water supply and water consumption
- Improve data → digitalization campaign



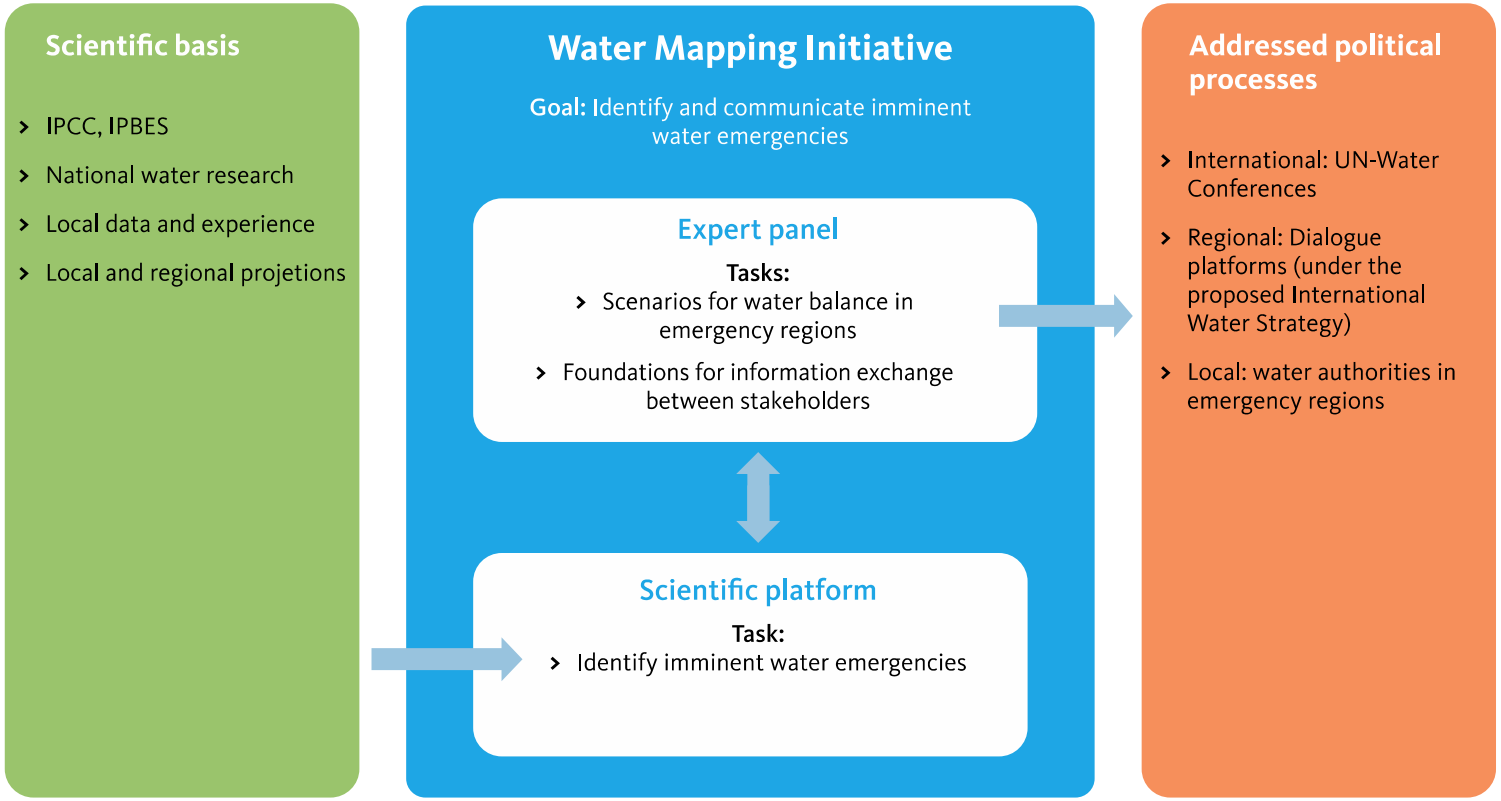

Source: www.nutzwasser.org

# Message 1: New quality of risks and uncertainties

## A new role for science

- Preparation of scenarios and model predictions
- Foster exchange with all stakeholders (politics, business, civil society …)

**Set up a Water Mapping Initiative and identify regional water emergencies**

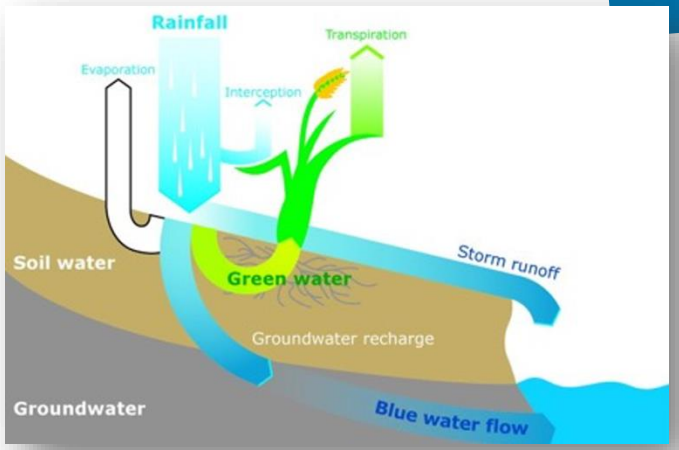



Source: WBGU

# Message 2: Climate-resilient water management

## Manage blue & green water across sectors

- **Solution spaces:** Agriculture, ecosystems and cities
- **Pay more attention to green water:** crucial for plant growth, evaporation and groundwater recharge
- **Green water** refers to the soil moisture available to plants. When it rains over land areas, some of the water is absorbed in the soil and is available to plants.
- **Restore a climate-resilient landscape water balance**
  Reshape land use in rural and urban areas




Ecosystem restoration measure

| Ökosystemtypen | Seen und Uferzonen | Moore | Sumpfgebiete | Flüsse und Auen | Wälder | Graslandschaften | Gebirgslandschaften | Urbane Ökosysteme | Kultur- und Agrarlandschaft | Küstenökosysteme |
|---|---|---|---|---|---|---|---|---|---|---|
| Ansiedlung von Ökosystemingenieuren | • | • | • | • | • | • | • | | | • |
| Wiedervernässung | • | • | • | • | | | | | | |
| Wiederherstellung natürlicher Wasserläufe | • | • | • | • | | | • | • | • | |
| Wiederaufforstung, Agroforstwirtschaft | • | | • | • | • | | • | | • | |
| Sedimentmanagement | • | • | • | • | | | | | | • |
| Strukturierung von Uferböschungen | • | | | • | | | | • | • | • |
| Anlage von Gewässerrandstreifen | • | | | • | | | | • | | |
| Bau technischer Fischwanderhilfen | | | | • | | | | • | | |
| Infrastrukturrückbau und -umbau | • | • | • | • | | | • | • | | • |
| Einbau naturnaher Strukturelemente | • | • | • | • | | | | • | • | • |

Source: Geertsma et al. 2009; WBGU 2024

# Message 2: Climate-resilient water management

## Water- and climate-sensitive cities


Copenhagen, Denmark


Source: WBGU 2024; Brückmann (2023), Henning Larsen (Ramboll Gruppe)

# Message 3: Strengthen international water governance

## Interacting strategies at several levels

International environmental and sustainability policy

### International Water Strategy

- complementary to existing agreements, multilateral meetings and regional platforms
- blue and green water in times of climate change
- joint preparedness for water emergencies, Water Mapping Initiative

### National climate-resilient water strategies

- societal negotiation of acceptable risks & precautionary adjustments
- laying down frameworks for transformations
- ongoing further development with scientific support

**Local climate-resilient water management**

- prevention-orientated, adaptive, systemic
- state and self-organized

**Disaster relief and crisis management**

- e.g. response to droughts, floods
- technical, institutional, financial

SUSTAINABLE DEVELOPMENT GOALS

United Nations Framework Convention on Climate Change

Convention on Biological Diversity

United Nations Convention to Combat Desertification

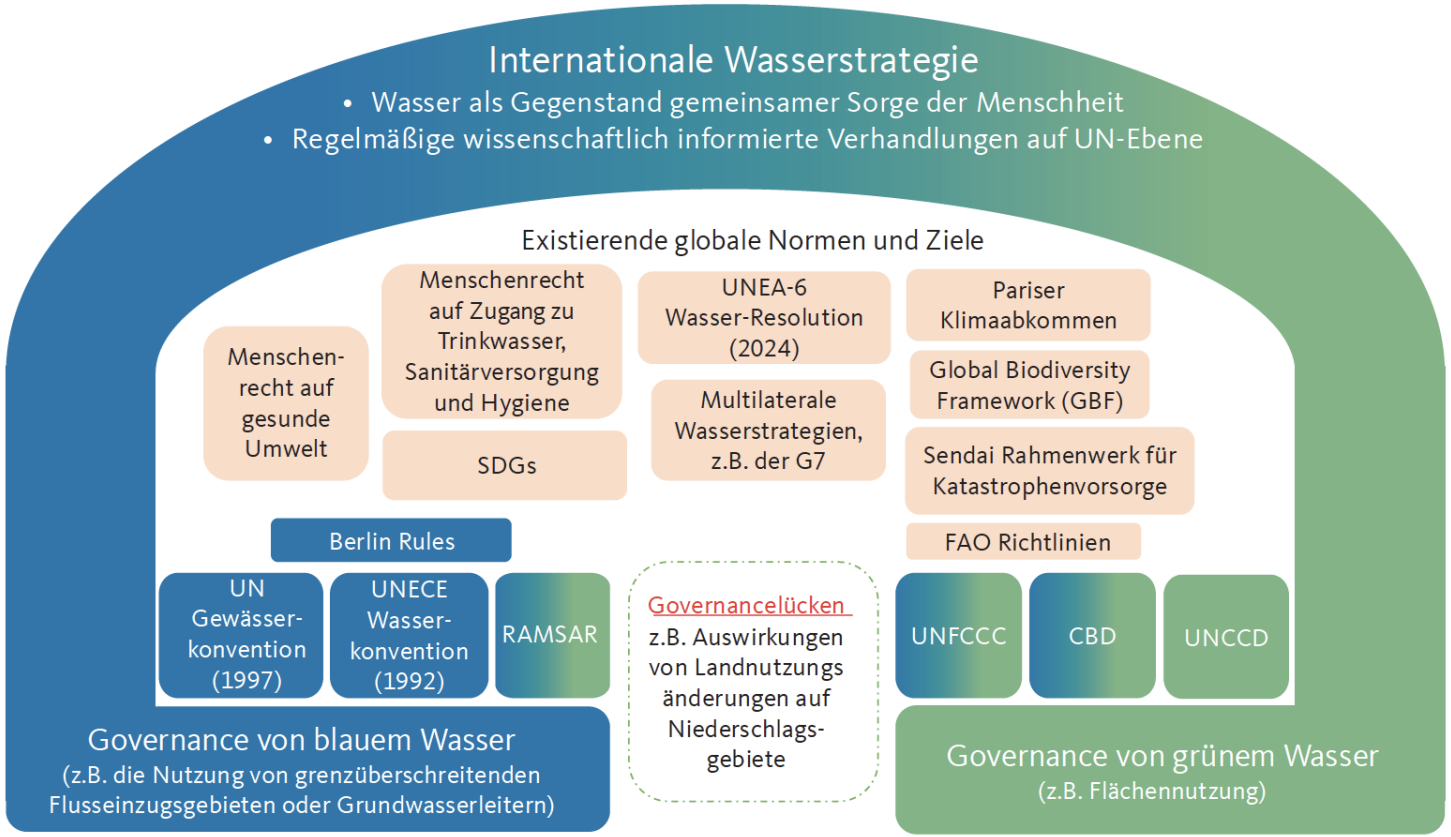

Source: Nationale Wasserstrategie 2023; WBGU 2024

# Message 3: Strengthen international water governance

## Set up an International Water Strategy

**Set new impulses with an International Water Strategy**

*„The WBGU recommends that international water governance should be further developed through a new International Water Strategy that builds on existing targets, content and measures of international water law. (…) The long-term goal should be a binding agreement under international law.“*



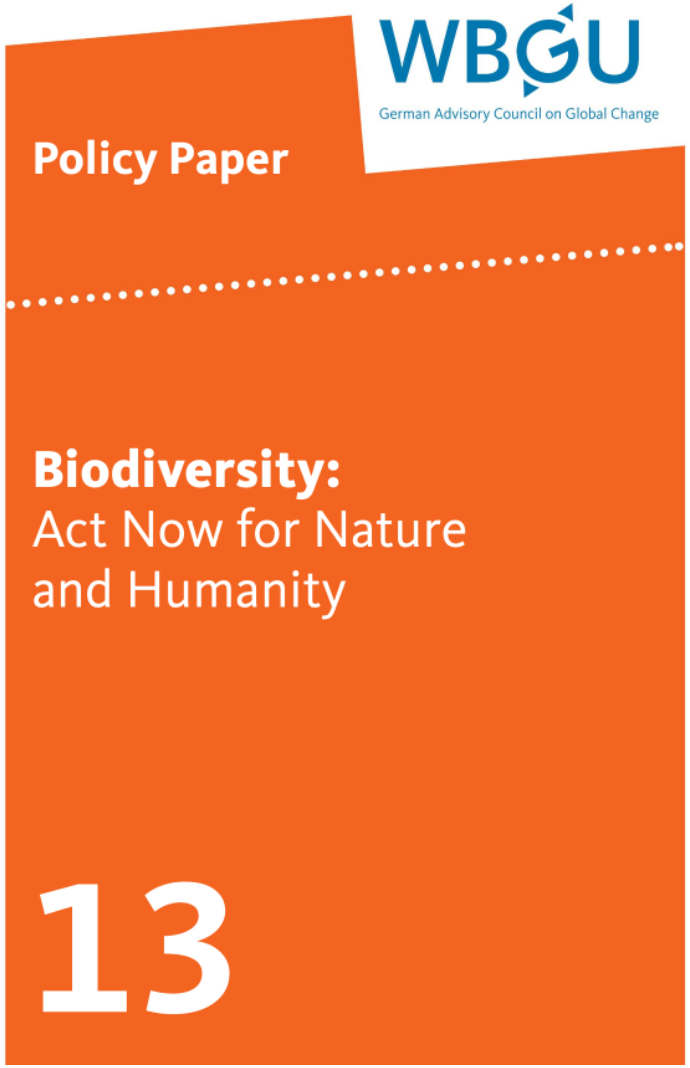
# Takeaways Water Report

> Extreme events are increasing worldwide, risks and uncertainties of a new quality
> Avoiding water crises: proactive action and transformative policies

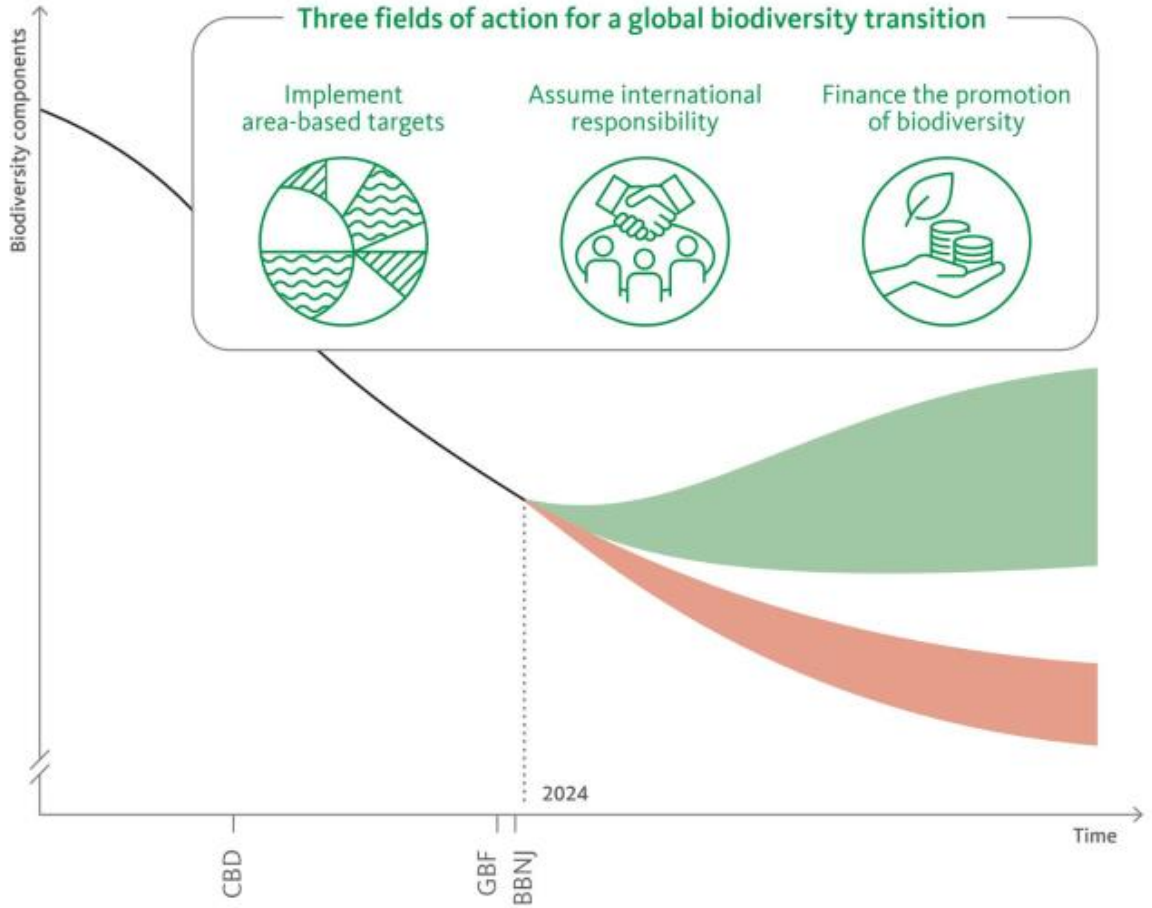
**The WBGU recommends:**

> Limit changes to the global water balance: climate and ecosystem protection
> Increase adaptive capacity: climate-resilient, socially balanced water management
> Strengthen international water governance

# **Latest Policy Paper**: Biodiversity: Act Now for Nature and Humanity (2024)

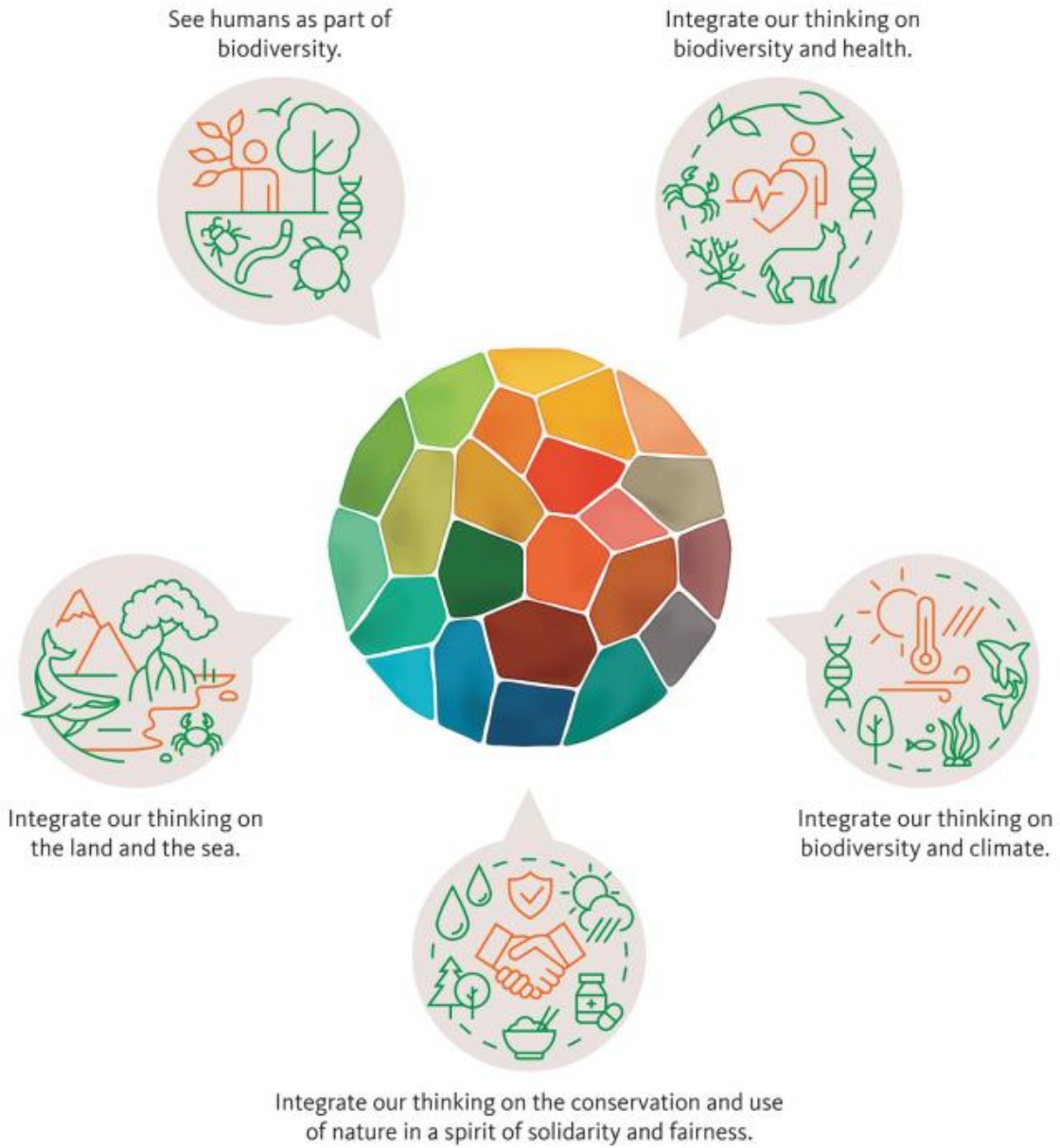


# Biodiversity – now

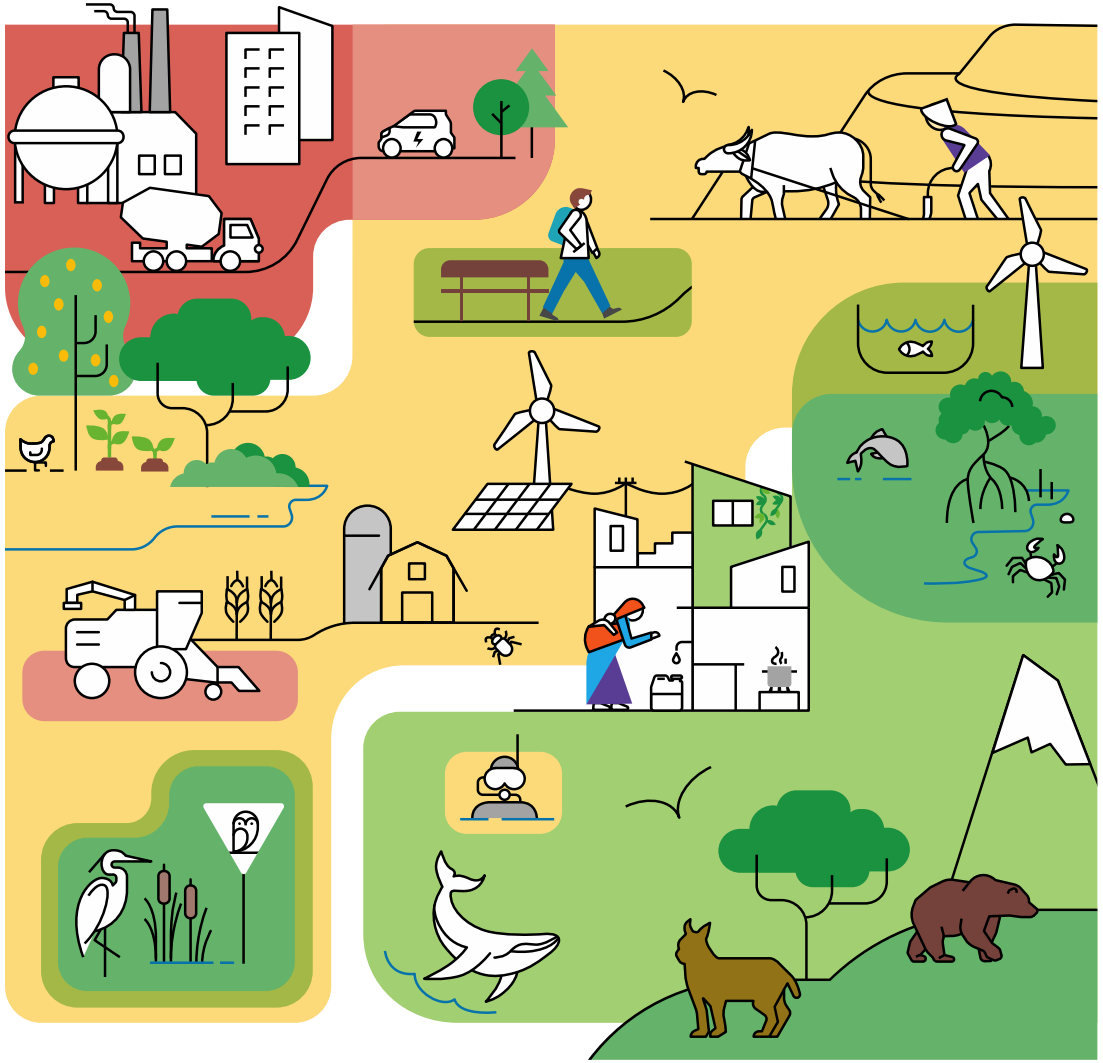



- By 2030, protect an additional 13% of land and 23% of oceans surface or take other effective area-based conservation measures (OECMs)
- Start capitalizing on the political window of opportunity opened by BBNJ and GBF to bend the curve of biodiversity loss

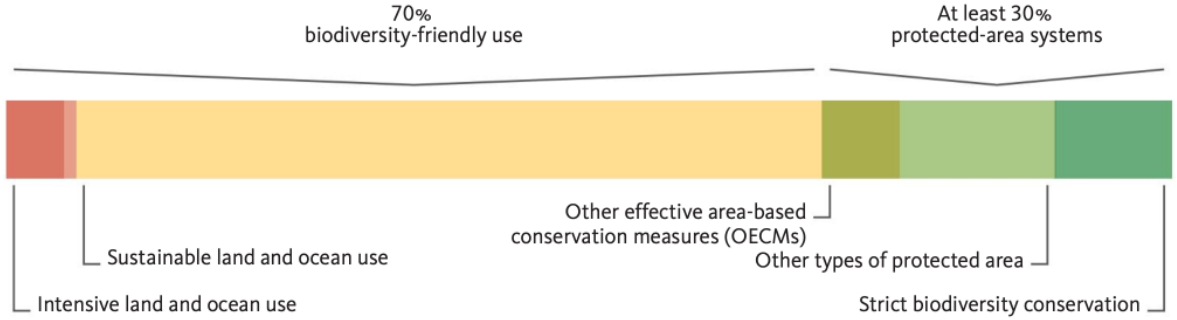
# Five principles for dealing with biodiversity



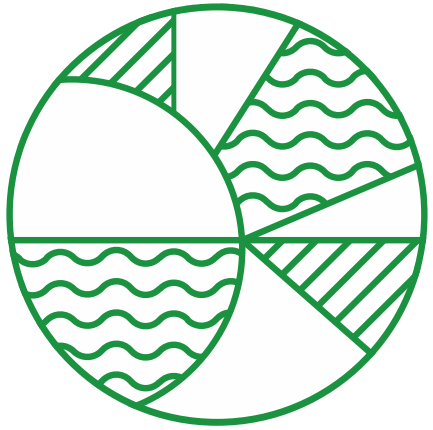
# Multifunctional mosaic of land and ocean uses as a guiding concept



- Integrate our thinking on conservation and use of biodiversity in a way that creates multiple benefits for nature and people
- Combine areas of sustainable use with biodiversity-promoting areas of nature conservation



# Five proposals for implementing the area-based targets



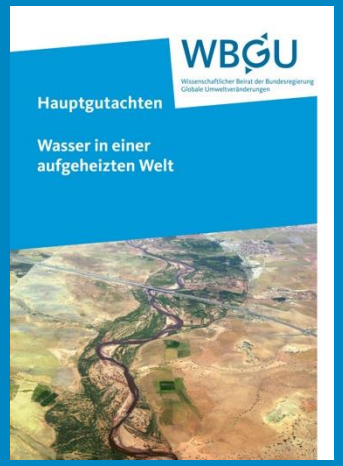
1. Enable and promote a multifunctional mosaic approach
2. Protect at least 30% of terrestrial and marine areas worldwide through protected-area systems
3. Define and take other effective area-based conservation measures
4. Involve all stakeholders in implementation
5. Strengthen Indigenous and local communities

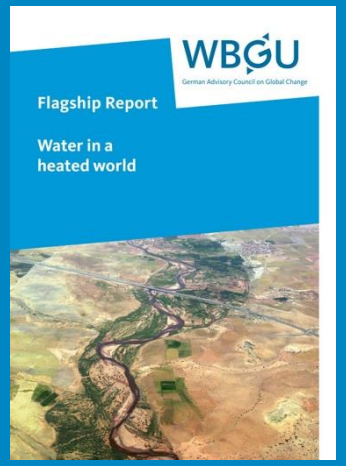
# Germany‘s international role: five suggestions

1. Move forward resolutely, specify the content of the GBF and BBNJ and coordinate implementation
2. Initiate and design dialogue forums and collaborations across thematic silos
3. Create pioneering coalitions
4. Prepare the first BBNJ Conference of the Parties
5. Launch and education and communication offensive for biodiversity

# Five proposals on how promoting biodiversity can be financed

1. Strengthening international biodiversity financing
2. Reallocating environmentally harmful subsidies in favour of biodiversity and quantifying the costs of inaction
3. Promoting international cooperation using both market-based and non-market-based instruments
4. Making the private sector take responsibility for financing through clear reporting and taxonomy
5. Prioritizing biodiversity in international financial instruments

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16th October 2024