



Findings of the sixth Global Environment Outlook

Freshwater Chapter

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Thanks to funders and partners

- 146 authors
- 700 page assessment
- 100 page GEO-6 Technical Summary
- 30 page Summary for Policy Makers adopted at UNEA4 in 2019

3 broad sections :

- State and Trends
- Policy Responses
- Outlook

GEO-6 Funders

Producing an assessment of this scale requires many generous contributions. The following organizations provided funding directly or indirectly to the sixth *Global Environment Outlook*: The Government of Norway, the European Union, the Governments of Italy, Singapore, China, Mexico, Switzerland, Denmark, Egypt and Thailand. Together with UN Environment's Environment Fund and Regular Budget, these contributions allowed for the production of GEO-6 and its accompanying Summary for Policymakers, as well as subsequent outreach activities.



GEO-6 Partners

GEO-6 also benefited from the generous contributions of several partners, including: GRID-Arendal, World Conservation Monitoring Centre (WCMC), The Centre for Environment and Development in the Arab Region and Europe (CEDARE), The Big Earth Data Science Engineering Program (CASEarth), the European Space Agency (ESA), the Netherlands Environmental Assessment Agency (PBL), the Freie Universität Berlin and the Massachusetts Institute of Technology (MIT).



How we got here

Main report

- 146 authors, 78 members of advisory bodies
- 41 review editors
- From more than 70 countries
- 301 UN reviewers
- More than 1,000 technical reviewers
- 364 Intergovernmental reviewers
- 5 review periods, 2 of which were intergovernmental reviews

Summary for Policymakers

- Negotiated in January, 2019
- 95 countries, 250 participants, 4 days
- 37 page summary plus 'Key Messages'

We are pleased to share the good news that the **UNEP GEO-6** has won this year's prestigious **Award for Environmental Science** assigned by the **Association of American Publishers**

2020 PROSE AWARDS CATEGORY EXCELLENCE WINNERS

(see <https://publishers.org/wp-content/uploads/2020/02/2020-PROSE-CATEGORY-WINNERS-LIST-for-Press-Release.pdf>).



Environmental Science

Global Environmental Outlook – GEO-6: Healthy Planet, Healthy People

Edited by UN Environment - Cambridge University Press

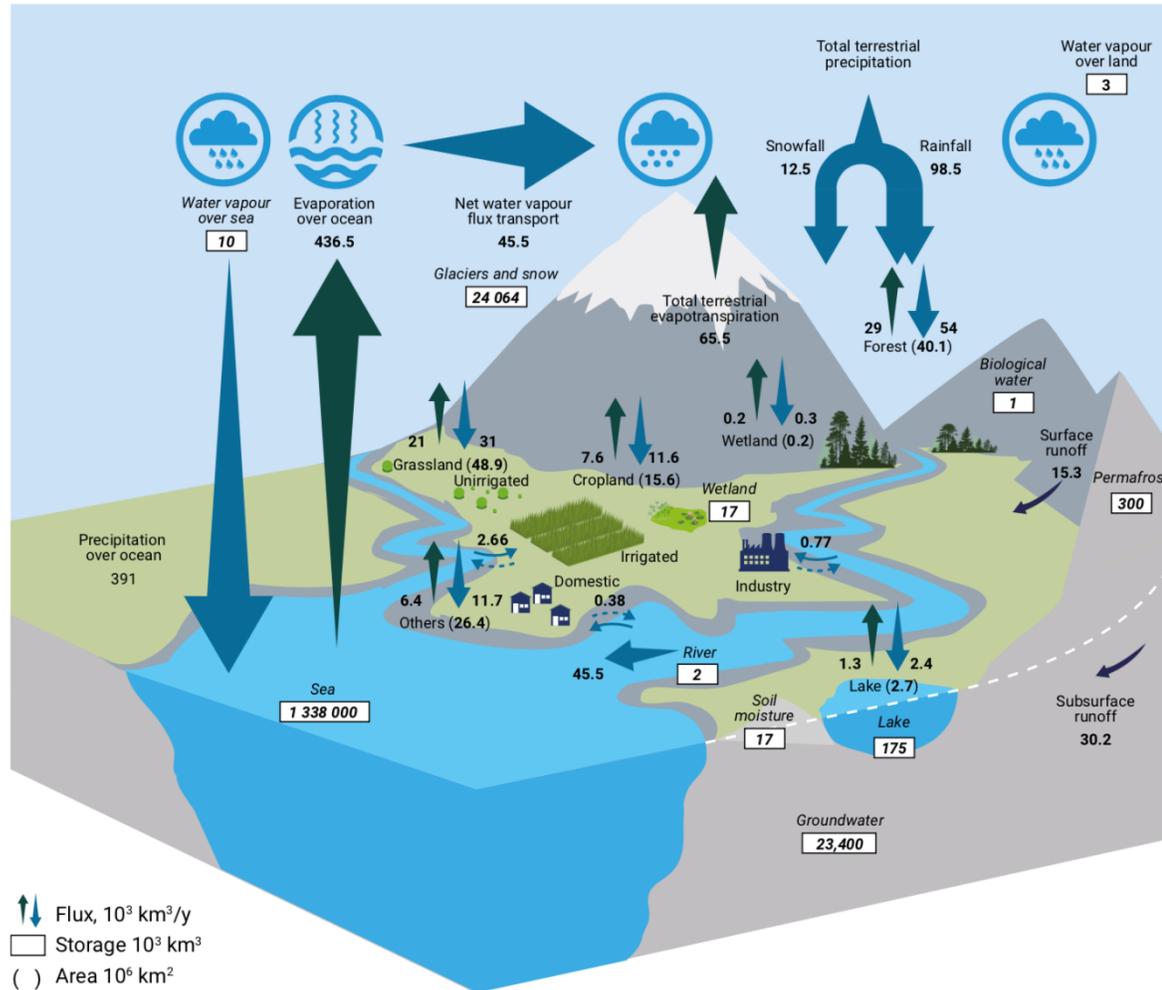
Rationale behind selecting main messages - freshwater

- Focus on health : Healthy Planet, Healthy People
- Grounded in science – recent data and peer reviewed literature
- Key risks and opportunities to freshwater



➤ **Freshwater is now simultaneously a global public good and a risk multiplier, affecting human and ecosystem health**

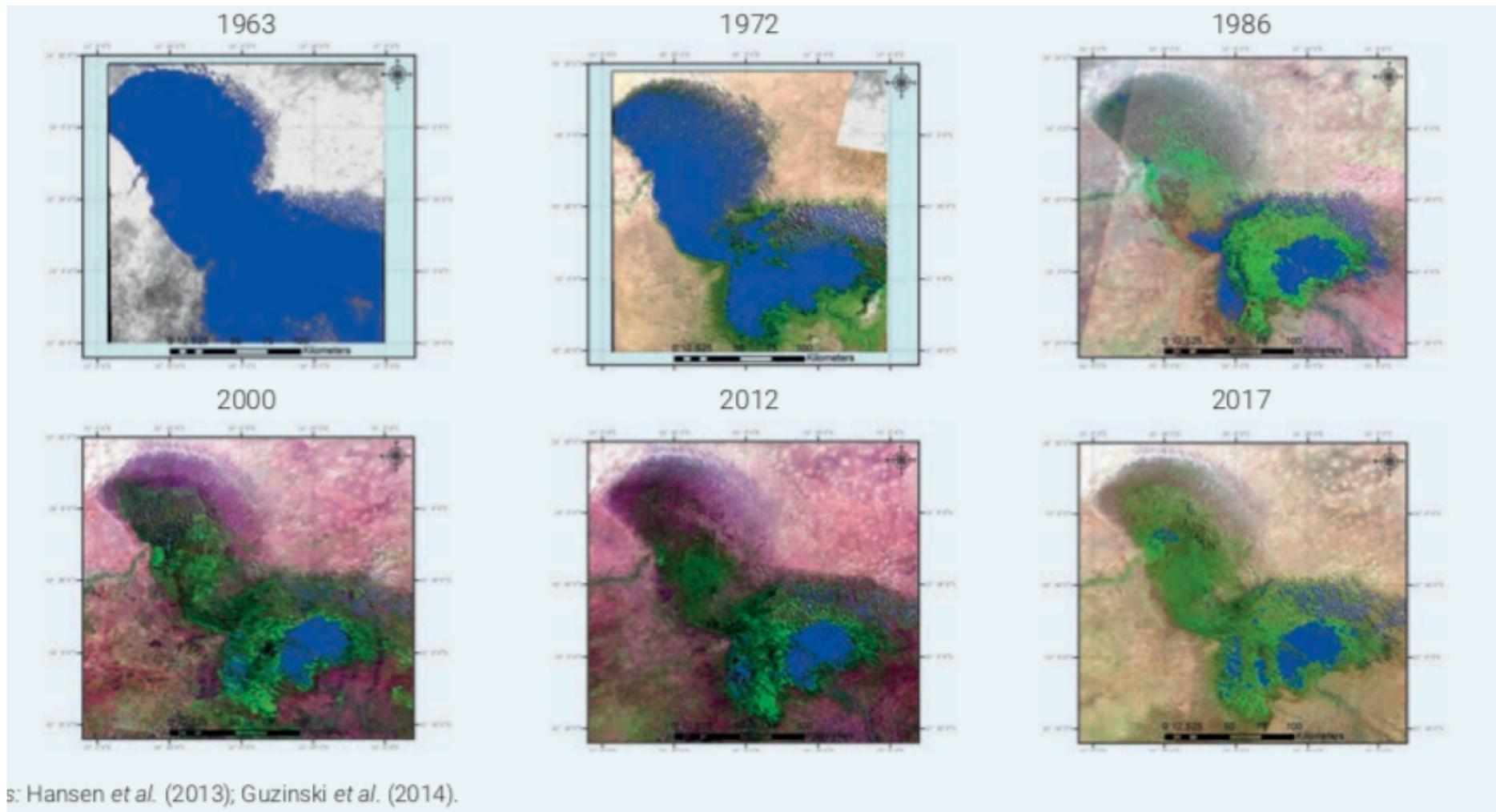
Altering the Global Water Cycle



Source: Oki and Kanae (2006).

- The global water cycle integrates terrestrial, aquatic and atmospheric interactions and impacts
- Population growth and climate change are increasing water related risks to human and ecosystem health.
- Pathogens, toxic chemicals and plastics are increasingly polluting freshwater in many regions, with downstream impacts on oceans
- Storms, floods, droughts and desertification of land are intensifying due to climate change. Rainfall patterns are changing. Snow caps are melting (approx. 70% of all freshwater).

The shrinkage of Lake Chad

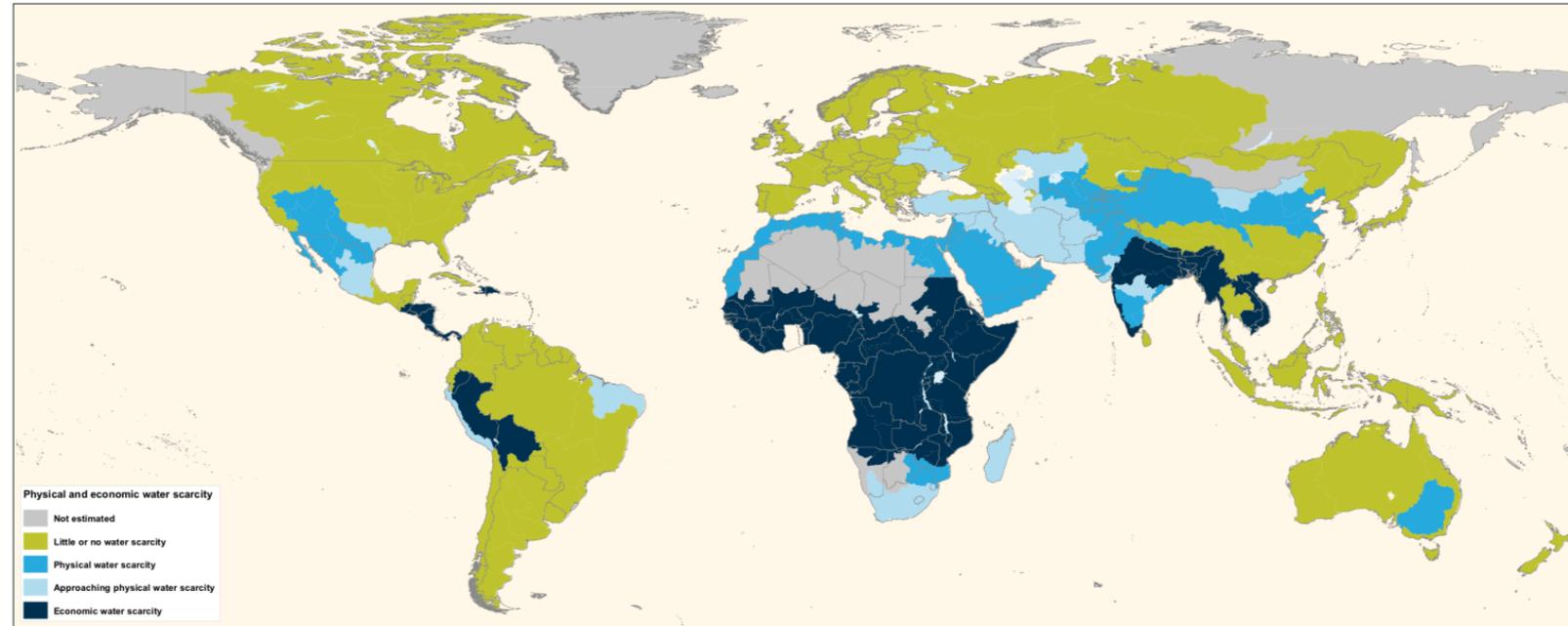


s: Hansen *et al.* (2013); Guzinski *et al.* (2014).

- Loss of 90% of surface area
- Cause estimation: 50% increased human water use
- 50% climate change
- Increased resource conflicts over land, water and fisheries
- Millions of people's livelihoods affected
- Drives changes in local microclimate, higher temperatures, less rainfall

Global Water Scarcity

- Freshwater availability (per capita) is decreasing
- Increasing risks of ‘slow-onset disasters’ such as water scarcity, droughts and famine due to climate change and mismanagement.
- Drives greater resource competition reflected in food insecurity, food prices and trade

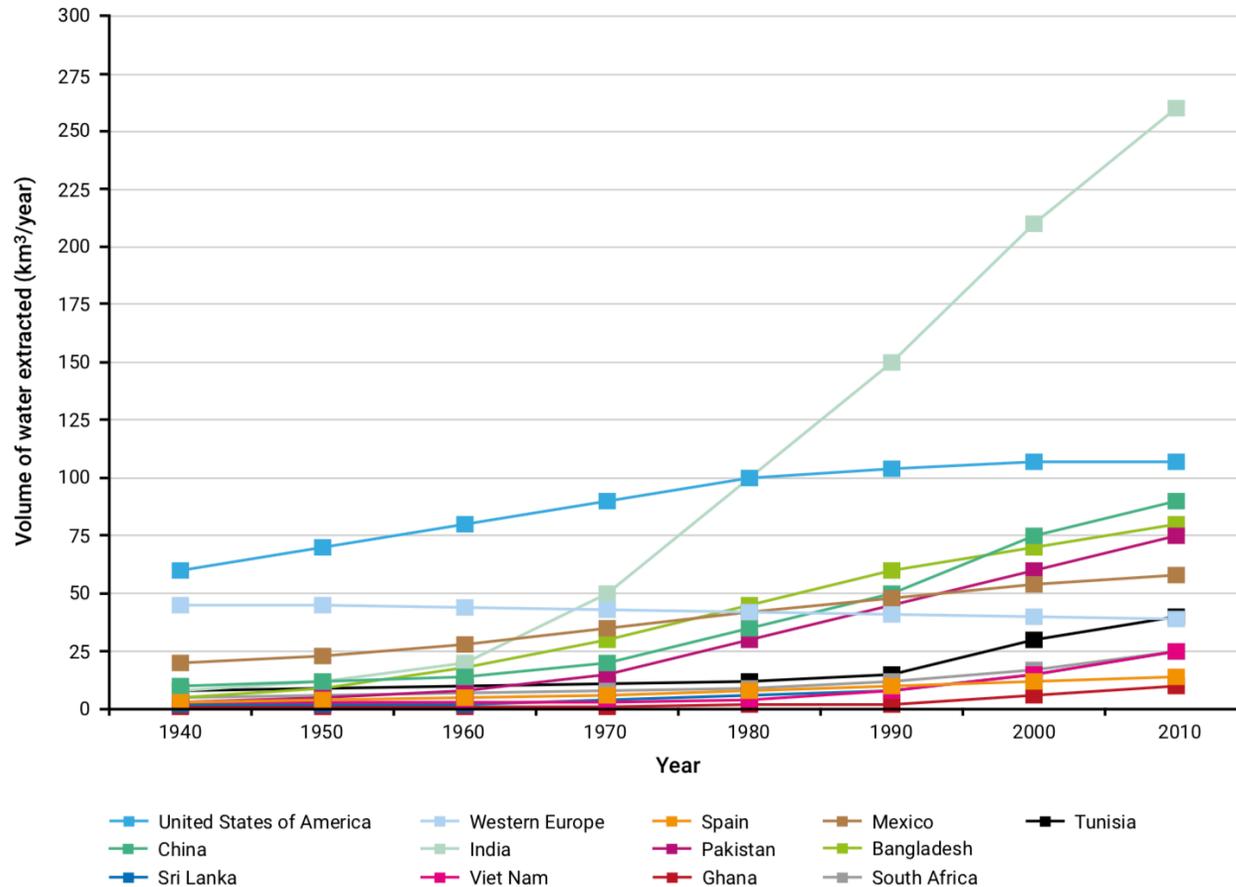


Source: WWAP (2012, p. 125).

Promoting water-use efficiency, water recycling, water storage and rainwater harvesting is becoming increasingly important.

Groundwater

Figure 9.5: Global trends in increasing groundwater use



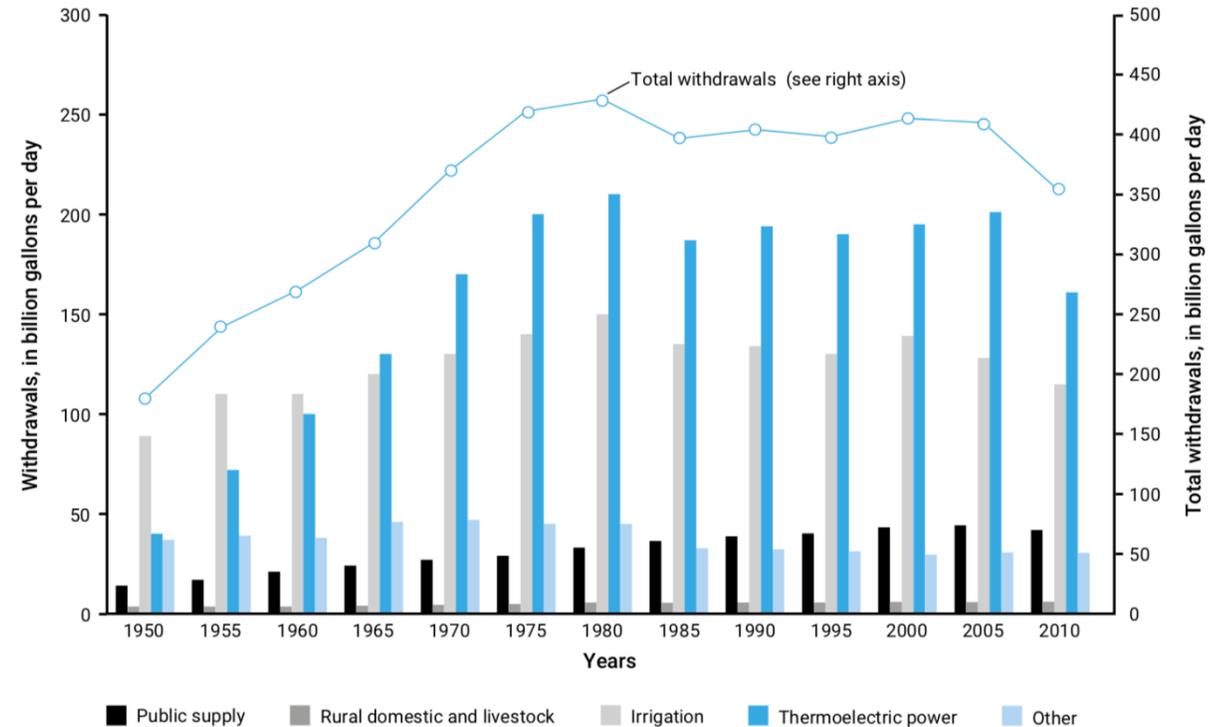
Source: Shah (2014, p. 12).

- Groundwater (approx. 30%) comprises larger volume of the world's freshwater than surface water (approx. 0.3%) and is increasingly important for water security in many regions.
- Major aquifers are threatened by
 - Unsustainable abstraction levels
 - Pollution
 - Salt water intrusion
- Need for more comprehensive and integrated monitoring and modeling to support good groundwater governance and management.

Water Use and Efficiency

- Agriculture is still the predominant user of water (70% globally).
- Water for cooling and public water supply are also important uses.
- Water withdrawals are increasing in most regions with increased reliance on groundwater sources.
- **The key is to decouple water withdrawals from economic growth**

Figure 9.3: United States water withdrawals from all sources (1950-2010)



Note: 1 billion gallons = 3.8 million m³.

Source: Maupin et al. (2014, p. 46).

Access to Water and Sanitation



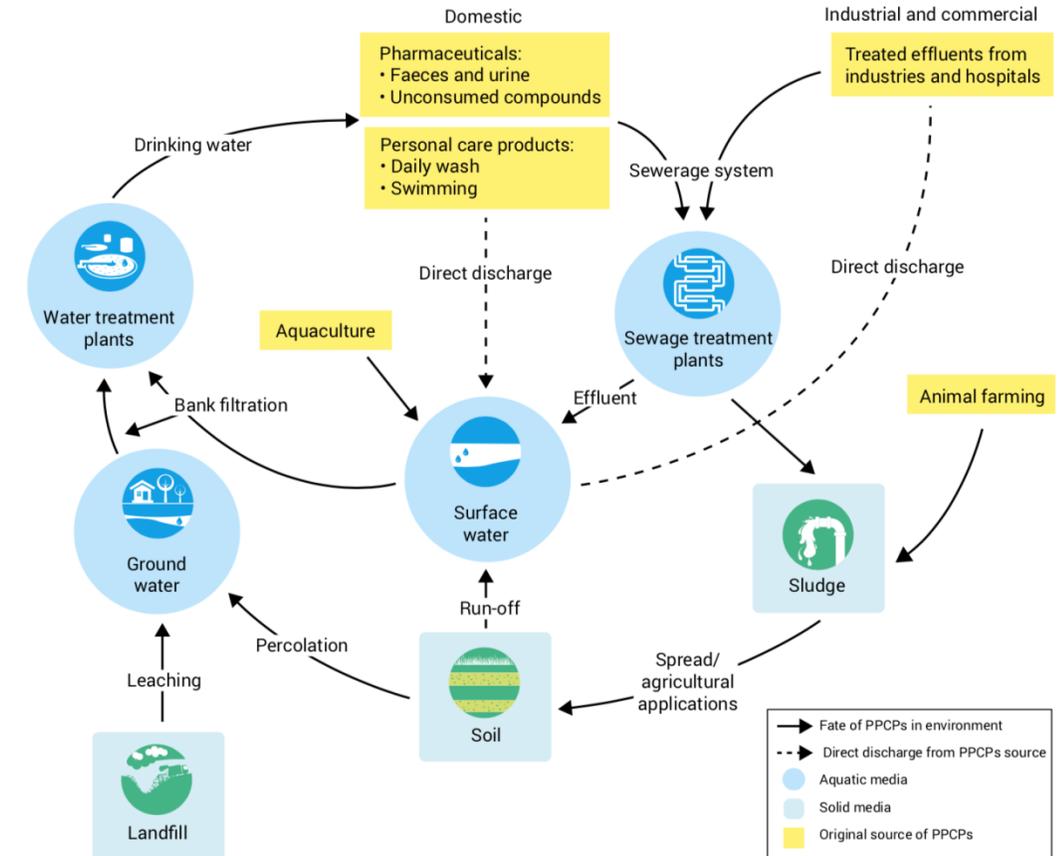
Water Quality

- **Water quality has significantly worsened worldwide since 1990**
 - Degradation especially in Latin America, Africa, Asia - Pacific
 - About 50% of US waters do not meet water quality standards.
 - Water quality in European rivers has improved over the past 2 decades.
- **Pathogens remain a major cause of human death and illness, particularly in developing countries.**
- **Eutrophication associated with nutrients and climate change are leading to more harmful algal blooms.**
- **Mining causes acute water quality problems in many parts of the world.**

Emerging Water Contaminants

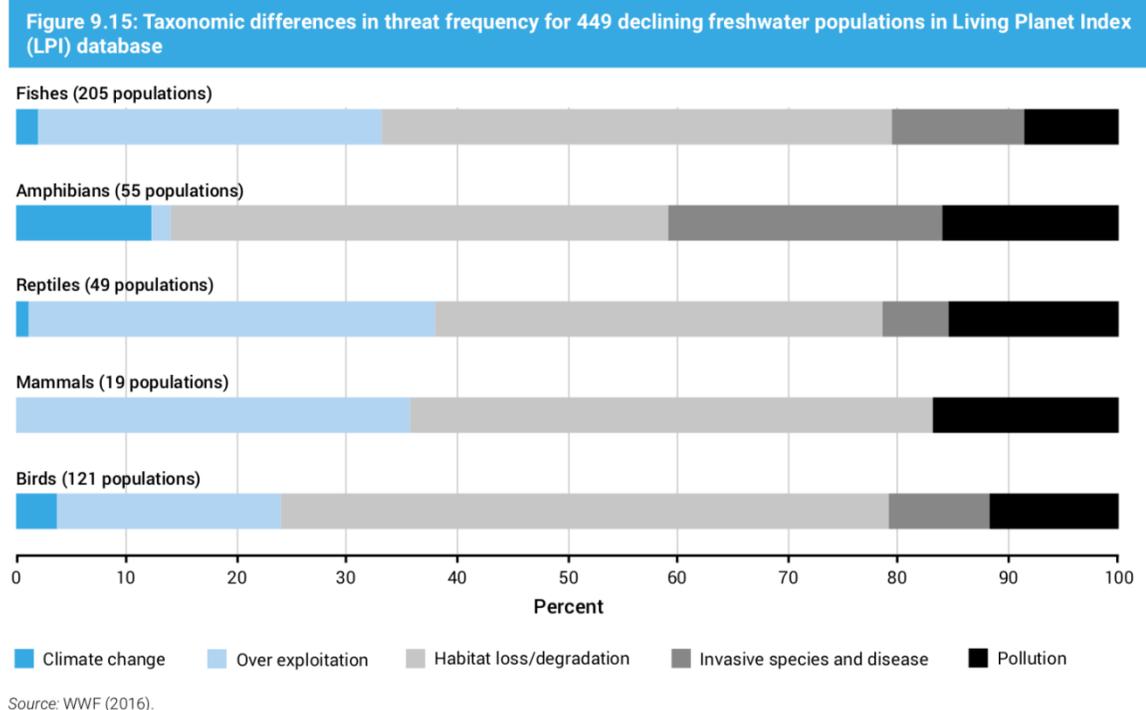
- Pharmaceuticals, pesticides, antimicrobials, flame retardants, detergent metabolites, and macro-, micro- and nano-plastics.
- Many of these not currently removed by current wastewater treatment technologies.
- Endocrine disrupting compounds are widely distributed through freshwater systems – affecting human and animal reproduction.. Long-term impacts on human health.
- Illnesses due to antimicrobial-resistant infections may become a main cause of death by 2050.

Figure 9.13: Source and pathways of pharmaceutical and personal care products (PPCPs) entering surface and groundwater, highlighting need for improved detection of commonly found PPCPs and their transformative products



Source: Adapted from Petrović et al. (2003); Mompelat et al. (2009); Yang et al. (2017).

Freshwater Ecosystem Loss



- Freshwater ecosystems are the most biodiverse habitats & valuable natural infrastructures.
- Freshwater ecosystems are disappearing rapidly : 3 x the rate of forests. 12% of all wetlands are now human made (eg. paddy-fields, dams, reservoirs and ponds)
- 35% of wetland habitats and 81% of freshwater species populations were lost between 1970 and 2011 (36% of coastal and marine species populations).

Emissions from drying peatlands contribute ~5% of annual global carbon emissions. Approx. 15% of peatlands worldwide have been drained. Hence rewetting peatlands is a high-stakes mitigation action.

Key Freshwater State and Trends Messages

- Population growth is increasing water risks, exacerbated by climate change.
- Water quality has worsened significantly since 1990.
- Illnesses due to antimicrobial-resistant infections may become the main cause of death by 2050.
- 1.5 billion people gained access to clean drinking water from 2000 to 2015.
- Agriculture is still the predominant user of water (70% globally).
- Freshwater ecosystems are biodiverse habitats and valuable natural infrastructure, but disappearing rapidly (35% of world's wetlands lost over 40 years).
- Decomposition of peatlands contributes approximately 5% of annual global carbon emissions.



Key Freshwater Policy Messages

- Promoting better river basin management, catchment management and aquifer management will be crucial to safeguard people's water security in coming years.
- Water recycling, treatment and reuse are becoming increasingly important for resilience.
- Innovative and integrated policy mixes are essential to manage complex problems, with integrated water resources management providing a basis for planning across sectors.
- Social equity and gender equality remain key aspects in achieving SDG6, to ensure that no one is left behind.





Thank you

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www.unenvironment/global-environment-outlook

Global Environment Outlook GEO-6 :

<https://www.unenvironment.org/resources/global-environment-outlook-6>

Both the full report, individual chapters and the Summary for Policy Makers are available here in the 6 UN languages

Global Wetland Outlook :

<https://www.unwater.org/the-global-wetland-outlook/>