

## Understanding connection between water and climate change

People In Need thematic learning

### Acknowledgement

As a source of information this paper uses document issued by Water commission: (2023) Turning the Tide - Global Commission on the Economics of Water ([www.watercommission.org](http://www.watercommission.org))

### Introduction

A key driver of climate change is global warming—a global energy imbalance that intensifies the water cycle, adding about 7% of moisture for each 1°C of global mean temperature rise.

In addition, land use change (predominantly deforestation, wetland depletion, land degradation and infrastructure development) is now impacting precipitation patterns, and how rain is partitioned between green (soil moisture/vapor) and blue water (runoff/liquid) flows.

### Water as a victim

About 90% of climate impacts are related to water – too much, too little, or too dirty – yet only 3% of climate finance is currently dedicated to the world’s water systems. “We are pushing the entire water cycle out of balance, with climate change shifting the freshwater supply. We can now no longer rely on the freshwater supply every year.”<sup>1</sup> We are seeing the consequences not of freak events, nor of population growth and economic development, but of mismanagement of water globally for decades. Rainfall patterns have changed and nations failed to preserve freshwater ecosystems, to manage demand to avoid overuse, to prevent contamination, to

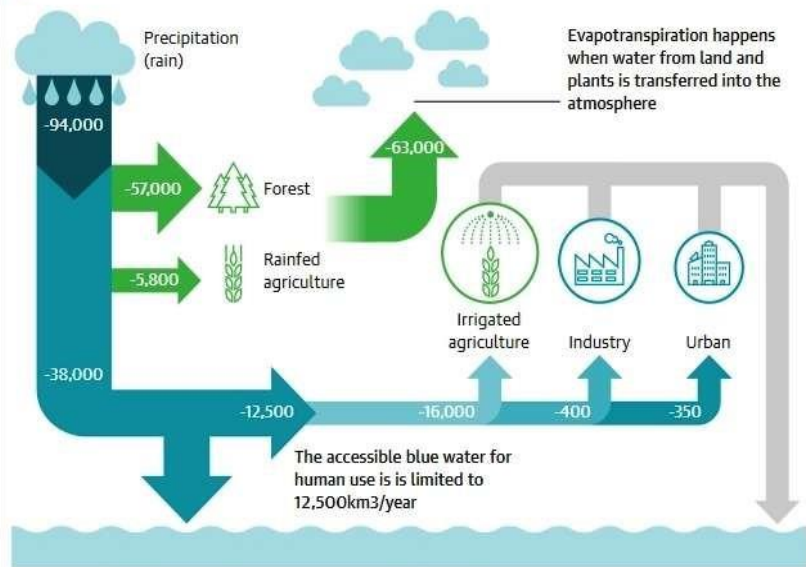
foster recycling and to develop and share water-saving technologies. Extreme water events cause an immediate loss of carbon uptake in nature. Droughts lead to fires massive loss of biomass, carbon and biodiversity. We must recognize the interdependence of countries through the global water cycle: water is increasingly intertwined with climate change and the depletion of the planet’s natural capital.

### Human survival depends on a sustainable water cycle for both blue and green limits

Figures mentioned below are km<sup>3</sup>/yr

■ 'Blue water' refers to surface and ground water

■ 'Green water' is what is available to plants from the soil



Guardian graphic. Source: Global Commission on the Economics of Water

Figure 1 - Blue and green water cycle

<sup>1</sup> Professor Johan Rockström, Director of the Potsdam Institute for Climate Impact Research

## Shortsighted solutions

We have dealt with growing **demand for water by depleting the natural capital**. The hidden cost of this depletion today, such as through excessive groundwater extraction, is the reduction in water's ability to create future value.

Our efforts remain largely focused on blue water<sup>2</sup> (streamflow and stored water) and rest on the assumption that supply shocks are within bounds of natural variability and thus manageable (for example) through more irrigation and groundwater extraction. Water is underpriced and its value is not recognized. Development of solar powered solutions and close-to-zero operation costs mislead into conception that water is free.

## A way forward

### Preconditions

- Understand the processes and the management of the water resource in an integrated manner. Combine blue, green and grey water, and balance and prioritize the various elements.
- Recognize the interdependence of regions and countries in the global water cycle.
- Recognize the value of the water resource and halt underpricing it. Development of solar powered solutions and close-to-zero operation costs can bring out the misled message that water is free.

### Solutions in building water resilience

1. Invest in freshwater **retention** and storage **systems** (man-made or natural based), which have been depleted to the point of being greatly inadequate even in meeting today's needs.
2. Stop dealing with growing demand by increasing abstraction. Use of technologies to **monitor groundwater** and help stabilize aquifers. Many countries use more water than is available to them.
3. Invest in optimizing and better maintenance of ageing water facilities and in expanding **infrastructure** in the developing world. Move from an inefficient, fragmented approach, and an institutional bias towards large built infrastructure in many countries.
4. Reduce massive **inefficiencies** in water distribution and the leakages that constitute NRW. Some 40% of piped water in cities is wasted due to leakage caused by ageing water pipelines. Prioritizing sustained maintenance and use of existing technologies and leak-detection and advanced metering tools, can significantly lower water leakage.
5. Increase and improve water **recycling** and develop the urban circular water economy. Today's largely untreated industrial and urban wastewater results in immense pollution, with high economic and social costs. Industrial water accounts for about 20% of today's global water withdrawals but only 20% is currently treated and much less is recycled.
6. Scale up **smart irrigation** solutions and farming of less **water-intensive crops**. Today, agriculture uses 80% of the world's consumed water. There is scope for much greater use of micro irrigation and smart agriculture, which is a win-win for both ordinary farmers and the environment.
7. Reduce the water footprint of **manufacturing**. Implement water-efficient processes such as closed-loop systems, which capture and recycle the water used in the production process.

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<sup>2</sup> Green water is the water transpired by the plant that comes from rainwater stored in soil. Blue water is the water in our surface and groundwater reservoirs. In irrigated agriculture, blue water is abstracted to maintain transpiration.

## Public private partnership (PPP) models

Globally, the water sector has been dominated by the public sector. However, public investment in water has been a low priority for many governments. Many have taken a short-term approach to water infrastructure and neglected asset health, unsurprisingly leading to high rates of service disruptions and leakage and to non-revenue water (NRW). Private sector involvement—either through contracting or concessions (for fixed terms) or less commonly through outright privatization—poorly designed contracts and regulatory failure are common.

There is **chronic underinvestment** in water sector. It must be made attractive for private investment and various models of public private partnership should be allowed.

High capital and long payback facilities (such as pipeline systems) are typically taken by public authorities while quick yield can deliver returns to private investors, such as treatment plants.

Accepted long term investment, balanced risk sharing, absence of political pressure, fair competition and transparency create enabling environment of PPP models

## Reducing water scarcity and intermittent supply

Many regions around the globe face economic water scarcity. Economic scarcity, as opposed to physical shortage, is often represented by intermittent water supply and occurs in places where water is abundant but unavailable due to institutional system failures – lack of adequate infrastructure, operation and maintenance, mismanagement, corruption, lack of transparency and accountability. Sustainable water services can be achieved only through systems strengthening.

## Energy consumption and GHG emissions

Depending on abundance (availability) of water, water and wastewater utilities can contribute 30-40% of municipalities' energy consumption. Water scarce regions use more energy to abstract, treat and distribute water. Therefore, water supply is more dependent on energy supply: more power cuts lead to intermittent water supply. Rising water demand (20-30% by 2050) means rising energy consumption and therefore GHG emissions.

Energy consumption can be achieved by optimizing water delivery and reduction of non-revenue water. The cleanest energy is the one which is not produced and reduction of NRW will reduce pressure on increased water production.

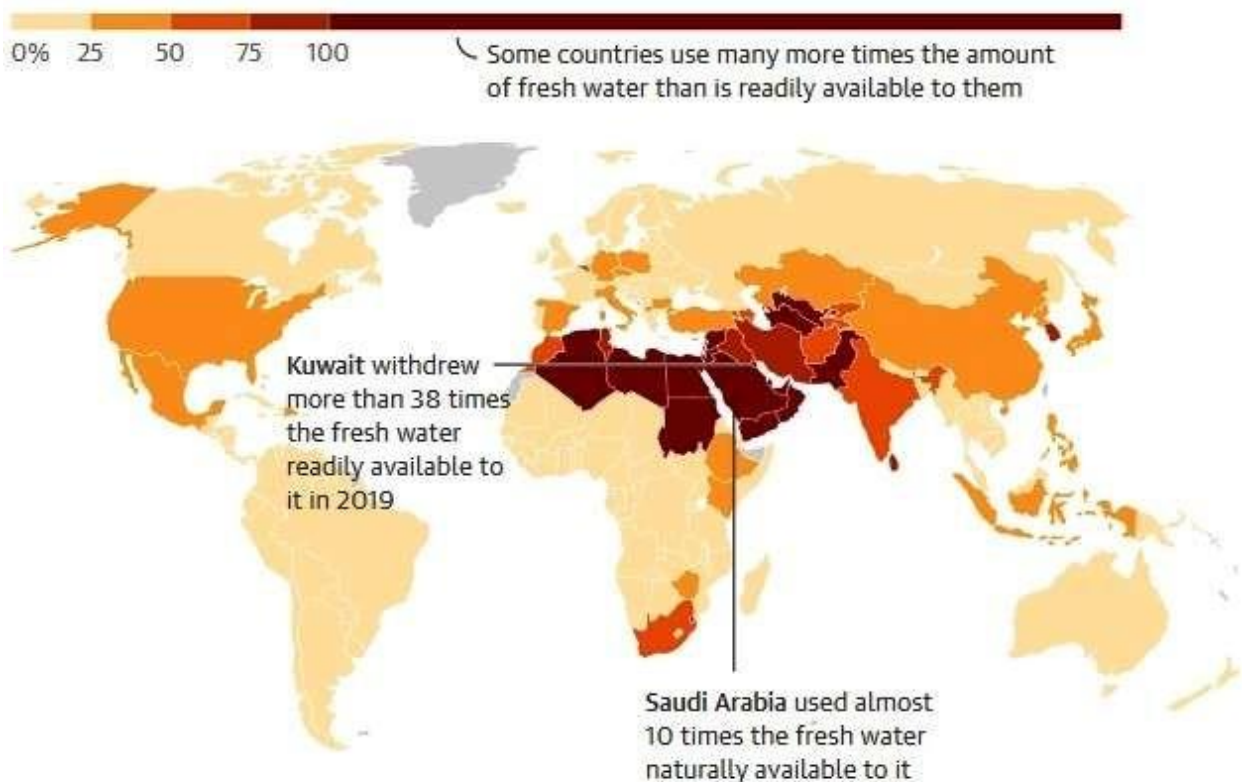
### Tips & tricks

1. While priority remains access, try to look at overexploiting water resources especially in economic water scarcity areas
2. Look at effectiveness and efficiency of water supply (mainly NRW reduction)
3. Reduce production of GHG emissions by optimizing energy needed for abstraction, treatment, transportation, distribution
4. Focus on climate advocacy

### Water neutrality – offsetting & decreasing demand

Water neutrality can be achieved by reducing water use, reusing and recycling water onsite and finally by offsetting the remaining water demand in the same water supply zone or aquifer catchment area. As much as over exploitation of water occurs in the natural environment causing adverse impact, this is also true in social and economic settings. Water equity can be achieved by halting over abstractions of finite water resources and implementing policies and tariffs that require high water users and new water demands to offset their proposed water uses. All offset schemes will require a water efficiency audit and a detailed water efficiency retrofit design. Neutrality hierarchy steps include reduce & reuse of water i.e. retrofitting existing infrastructure with efficient devices, smart metering or establishing water saving culture. Water reuse systems include rain water collection as well as gray and black water recycling. New development should not increase the overall demand for water in a specific region or catchment. Demand should first be minimized by implementing efficiency measures and reduction of usage in existing infrastructure, so that the total demand on the public water supply (mains, treated or abstracted) in this catchment / region is the same after development as it was before the development was built.

### Water stress: freshwater withdrawal as a proportion of available freshwater resources, 2019



Guardian graphic. Source: Food and Agriculture Organization of the United Nations

Figure 2 - Are we using more water than available to us?

### **Fair water footprint, neutrality & stewardship**

Common understanding is that access to safe water and sanitation are basic human rights. That the sustainable and equitable use, management and governance of freshwater is a fundamental requirement for the future of humanity.

Water stewardship is defined as the use of water that is socially and culturally equitable, environmentally sustainable, and economically beneficial, achieved through a stakeholder inclusive process that includes both site- and catchment-based actions.

Definition of water footprint: Recognizing that the water footprint of consumer society, economic activity, and international trade binds us together through a shared responsibility and opportunity to ensure sustainable and equitable water use for the benefit of current and future generations.

### **Disclosure of water footprints**

Transparency is key in channeling resources, both credit and investments, towards activities that enhance rather than degrade the water ecosystem. As in green and transition finance at large, we must build on current initiatives to develop water accounts, high-integrity **data on water footprints** and frameworks for disclosure of risks and impacts of water insecurity on economic activities. A critical priority must be to strengthen capacities to collect water-related data and use it to track progress and adapt actions.

## 5-point vision

1. Access to safe water, sanitation, and hygiene: All people will have access to reliable and safe drinking water, toilets and washing facilities, and effective collective action will reach communities in need.
2. Sustainable withdrawal and equitable allocation of water: Abstraction and use will take place within the hydrological limits of sustainability and will not compromise the human right to water, the needs and livelihoods of downstream communities and future generations. (Reduction of excessive groundwater extraction and water-intensive irrigation methods, and the incentivization of technologies like direct-seeded rice and new crops that consume less water.)
3. Zero water pollution: There will be no deleterious effect on the aquatic environment or adverse impacts on other water uses and functions arising from untreated wastewater or process discharges, diffuse pollution, contaminated run-off or spillages.
4. Protection of nature: Ecosystems and landscapes, and their services will be valued, protected, and sustainably managed, and nature-based and regenerative solutions will be prioritized.
5. Resilience to drought, floods and water conflict: Effective plans, policies, governance and investment will be in place to mitigate the risks of water related disasters and conflict, and legal compliance and water tenure for all users will be secured.

### **Contact:**

People in Need, Šafaříkova 635/24, 120 00 Prague 2, Czech Republic; [www.peopleinneed.net](http://www.peopleinneed.net)