# WATER SECURITY:
## MULTIDIMENSIONAL THREATS AT A GLOBAL SCALE

**Water security is globally recognized as one of the imperatives of global development and forms a crucial part of one of the 17 Sustainable Development Goals of the UN (Goal 6: "Clean Water and Sanitation") and is considered a necessary condition to achieve any of the other sixteen goals.**

👤 Blanca María Álvarez Román

The concept of Water Security has been gaining ground in the global political agenda in recent years. Samara López-Ruiz, author of an article introducing the concept of water security ("Una introducción al concepto de seguridad hídrica", published in the journal *Ensayos Militares* in 2019), reflects on how the use of definitions including the word security has evolved in recent decades, transcending the limitations that previously strictly linked it to military risks and conflicts. Within this paradigm, by embracing this concept we assume that water scarcity constitutes a threat to our security and has the legitimate capacity to present us with emergencies that are both environmental and social, economic, and related to public health.

In light of this idea, one of the broadest and most updated authorized definitions is found in the article "Climate Change and Threats to Water Security: A Review" (Gelfan, A.N, 2023), which defines water security as "the capacity of a population to ensure sustainable access to adequate quantities of water of acceptable quality to sustain livelihoods, human well-being, and socioeconomic development, to ensure protection against pollution and water-related disasters, and to preserve ecosystems in a climate of peace and political stability" (Tramblay, Y., Mimeau, L., Neppel, L., Vinet, F., and Sauquet, 2019).

Threats to water security are among the five global risks included in the 2020 Global Risks Report of the World Economic Forum. In general, threats such as floods, droughts, and others associated with water are recognized as the most significant of all potential threats posed by climate change to both society and the environment.

This same article reduces threats to water security to three main problems: water scarcity (hydrological droughts), water excess (floods), and poor freshwater quality. In addition to natural factors that influence the unequal distribution of water over the Earth's surface, these threats worsen due to demographic growth, socioeconomic, political, and gender factors that create unequal access to freshwater, inefficient governance, and institutional problems leading to irrational policies and extensive use of water resources, etc.

Hydrological drought is the main and oldest threat, as more and more countries are showing an increase in drought and desertification, and water scarcity affects over 40% of the world's

> **Water scarcity has the capacity to present us with emergencies that are environmental, social, economic, and related to public health**

population (UN Water, 2017). The World Water Forum held in 2018 in Brasilia reported that more than 1.7 billion individuals live in river basins where water demand exceeds recharge capacity, leading to ecosystem degradation. Following current consumption patterns and population growth projections, various estimates suggest that by the year 2025, two-thirds of the global population will reside in nations facing water stress, with access to less than 1,700 m³ per capita. Additionally, according to the report "Drought in Numbers" (UN, 2022), this trend will multiply by the year 2050, affecting more than three-quarters of the world's population.

On the other hand, overflowing abundance in the form of floods also endangers the water security of regions. According to the Development Bank of Latin America and the Caribbean (CAF), having abundant watercourses, without the necessary infrastructure, does not guarantee water security, considering it essential for "states to improve their capacity to generate regulatory, normative, and economic frameworks in favour of efficient public policies."

Regarding poor freshwater quality, the training manual for decision makers on water security and the SDGs prepared by UNESCO in 2020 ("Manual de capacitación para tomadores de decisión: La seguridad hídrica y los Objetivos de Desarrollo Sostenible") ensures that even in areas where water is abundant, whether surface or groundwater, it may lack the necessary quality for various uses (drinking, for

## Threats to water security can be boiled down to three main problems: water scarcity, water excess, and poor freshwater quality

animals, irrigation, etc.) or have suffered degradation due to human activity. For example, in many places, high levels of arsenic or salinity in aquifers exceed recommended limits for human or livestock consumption. Even for irrigation, these high concentrations can cause soil salinization, jeopardizing its productivity. On the other hand, activities such as solid and liquid waste disposal, the use of agrochemicals in agriculture, livestock farming, mining and oil activities, and transportation, among others, also pose serious pollution threats. According to the manual, to ensure water security for the population, an integrated water resources management (IWRM) approach is necessary, addressing both water supply and demand in terms of quantity and quality. This implies understanding available water volumes and quality, knowing current and future demand, optimizing water use, and regulating human activities to reduce pollution. Continuous monitoring of water quality through measurements and sampling is essential to make informed and evidence-based decisions.

**Threats to water security do not solely stem from natural phenomena or the impact of human activity and its interactions with them**

### Efficiency in management can override natural threats
However, threats to water security do not solely stem from natural phenomena or the impact of human activity and its interactions with them. The Global Water Security Index (GWSI) already showed in 2015 that more than 50% of the Earth's population lived under conditions of permanently low water security, mainly in Africa, the Middle East, South, and Southeast Asia. However, at the same time, regions with high water resources availability also exhibited low levels of water security, such as the northern regions of India or Bangladesh. The greatest threat, in these cases, seems to bear the stamp of political corruption and inadequate

water resource management. In this regard, the economic, social, political, and institutional characteristics of a country could be added as a fourth vector working against water security, along with the three main problems Gelfan reduces threats to in his above-mentioned article.

Furthermore, in the words of this same author, "anthropogenic climate change, supported with great confidence by experts, has rendered natural threats obsolete," by posing a new global paradigm that intensifies both such threats and those of a political and socioeconomic nature.

Indeed, the Global Water Security 2023 Assessment report (United Nations University Institute for Water, Environment and Health - UNU IN-WEH) considers the lack of integrated and sustainable management of water resources, including the conservation of aquatic ecosystems, protection of water sources, and proper water use planning, to be closely related to overexploitation and degradation of these resources. Additionally, the document also contemplates, as one of the underlying causes of water insecurity, the proliferation of

**113 countries are classified as "water insecure", while another 24 countries are in a situation of critical water insecurity**

conflicts and disputes over access to and control of water resources, a factor that increases the chances of experiencing water scarcity, especially in regions whose rivers, lakes, and aquifers traverse political borders. On the other hand, the lack of adequate infrastructure and safe and accessible drinking water and sanitation services can expose communities to waterborne diseases and perpetuate poverty and inequality in water quality.

This same report presents a quantitative preliminary assessment of the state of water security globally, including 186 countries and 7.78 billion people, and employing indicators defined by the United Nations Sustainable Development Goals (SDGs). Specifically, the assessment utilizes ten vital components that influence water security:

★ Drinking water
★ Sanitation
★ Good health
★ Water quality
★ Water availability
★ Water value
★ Water governance
★ Human safety
★ Economic safety
★ Water resource stability

Each of these components received a score out of 10, and the overall water security score is calculated from the sum of these values. Nations are classified into different levels of water security according to their scores: 75 and above are classified as "water secure"; 65-74 is classified as "moderately secure"; 41-64 indicates a country is "insecure," and 40 or less is considered "critically insecure."

**Water availability is unevenly distributed worldwide; this is where the use of non-conventional water sources comes into play**

The findings of this assessment depict an alarming reality: most of the world's population today lives in countries facing critical water security issues, with a significant number of people in critically insecure or insecure countries. In total, 113 countries are classified as "water insecure," including the two most populous countries in the world, India and China. Another 24 countries are in a situation of critical water insecurity, such as Pakistan and Ethiopia. The least secure regions are located in Africa, Asia-Pacific, and Small Island Developing States (SIDS), with the latter assuming the most critical levels. These worrying figures result in approximately 4.3 billion people affected only in the Asia-Pacific region, and another 1.3 billion people across Africa.

The report proposes lines of action aimed at strengthening both infrastructure and water resource management systems, through the adoption of advanced technologies and the promotion of research. Thus, the proposals can be summarized as:

★ Improve drinking water and sanitation infrastructure by investing in the construction and improvement of drinking water supply and basic sanitation systems to ensure adequate access to clean and safe water for the population.

★ Promote sustainable water resource management through policies and practices of integrated water resource management that consider water availability, quality, and equitable use, as well as the conservation of aquatic ecosystems.

★ Foster efficiency in water use in sectors such as agriculture, industry, and domestic spheres, thus reducing water demand and minimizing waste.

★ Strengthen water governance through the development of robust legal frameworks and policies for water management at national and local levels, promoting the participation of all stakeholders and ensuring equity and transparency in water distribution and use.

★ Increase investment in research and development of innovative technologies for water purification, water quality monitoring, and efficient water resource management.

★ Empower local communities, focusing on empowering them to actively participate in water management and conservation, providing education, training, and resources to promote sustainable water use practices.

★ Promote international collaboration through cooperation between countries to address transboundary water-related challenges, such as shared watershed management and adaptation to climate change.

While human factors, although part of the threats, contain the necessary capabilities to ensure water security, it is true that the availability of water sustainably in the long term is unevenly distributed worldwide. Furthermore, this is dangerously compromised by the impact of climate change. This is where the use of non-conventional sources, such as reuse, desalination, and rainwater harvesting, comes into play.

Desalination has seen greater development in countries facing higher water stress, such as Saudi Arabia, Israel, the United Arab Emirates, Morocco, and the United States (SWM, 2024). According to the article by Alberto del Villar García looking at the economic and environmental implications of desalination in a water security strategy ("La desalación en la estrategia de seguridad hídrica. Implicaciones económicas y ambientales", University of Alicante, 2023), desalination, along with the reuse of regenerated waters, plays a crucial role in diversifying traditional water sources, as a sustainable and complementary alternative.

However, the author asserts that the water security provided by desalination must be accompanied by the financial sustainability of economic activities and supplies to populations sustained by these resources. This approach is related



to the water-energy-food nexus, linked to both water security and food security. In this regard, addressing desalination poses challenges such as its high production costs, along with other aspects derived from the desalination process, such as technologies and energy use. However, the author advocates for desalination as an environmentally and economically viable tool to address water scarcity, as reducing the water footprint and minimizing the extraction of freshwater from limited sources would avoid long-term environmental costs. Additionally, the author also highlights the economic and community benefits, such as job creation and local development, improving the quality of life of the community, and reducing dependence on increasingly scarce freshwater sources.

Meanwhile, the global capacity for water reuse increased from 33.7 gigalitres per day (GL/d) in 2010 to 54.5 GL/d in 2015, and its technologies have reached a higher level of development in countries affected by higher water stress, such as Australia, China, Cyprus, Spain, the United States, Greece, Israel, Italy, Japan, and Singapore. However, the integration of wastewater into municipal systems remains low. In North America, for example, the annual reuse of treated wastewater represents only 3.8% of treated wastewater in the region (Lee and Jepson, 2020).

In conclusion, water security, intrinsically linked to human well-being, plays a fundamental role in the global landscape and in socioeconomic development and the preservation of vital ecosystems. From the inclusion of UN Sustainable Development Goal 6 to contemporary analyses, the urgency of addressing this issue from various perspectives is evident. Threats to water security, from water scarcity and poor quality to floods, are exacerbated by factors such as excessive demographic growth, socioeconomic insecurity, and poor political management, as well as anthropogenic climate change.

The path to guaranteeing water security lies in a comprehensive and collaborative approach that recognizes the connections between water, energy, food, and socioeconomic development. Only through concerted and sustainable actions can we ensure a future where everyone has access to clean and safe water, an essential component for life and human development.

**The water security provided by desalination must be accompanied by financial sustainability of economic activities and water supplies**