Review paper

Water Crisis and Security Challenges in the Era of Climate Change

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Abstract: *The water crisis and climate change are global issues affecting billions of lives on Earth. Extreme weather conditions such as heatwaves, floods, hurricanes, and droughts, resulting from climate change, lead to the extinction of plant and animal species. All these changes drastically alter the supply and quality of drinking water, crucial for agriculture, human consumption, industrial production, and nature conservation. When the supply of drinking or technical water exceeds demand, a water crisis occurs. Hunger, conflicts, diseases, and migrations are possible outcomes of such a crisis. To better cope with climate change and water crises, measures need to be taken at all levels of government, from local to national, as well as internationally. The paper explores the connection between climate change and water crisis and how global warming, precipitation changes, and extreme weather conditions shape the availability and quality of water, especially in arid regions. Special emphasis is placed on the necessity of adaptation and efficient water resource management to mitigate the negative impacts of climate change on water supply, agriculture, ecosystems, and human health. Through concrete examples from different parts of the world, current challenges and approaches to addressing the water crisis in the context of increasingly pronounced climate change are investigated.*

Keywords: *water crisis, climate change, conflict, security, migration*

1. INTRODUCTION

Throughout its rich history, the Earth has been subject to climate change, which is not a new phenomenon that has appeared in our lifetime. Today, we ourselves are witnesses to these changes, which have or may have serious consequences on the environment and ultimately on our society. The average global temperature is increasing, ice is melting, and sea levels are rising, which negatively impacts marine plant and animal life, as well as coastal areas that will be flooded due to the aforementioned influence. Climate change and the water crisis cause negative consequences for the entire population, plant, and animal environment. Climate change and the water crisis as such have a negative impact on the social and economic development of the nation since they directly affect the economic sectors present in individual countries (Kovačević & Kovačević, 2018; Ray, 2011).

Climate change and the water crisis are two interconnected global problems that affect the lives of billions of people. Climate change leads to higher global temperatures and more frequent extreme weather events such as heat waves, droughts, floods, storms, and migrations. All these changes affect the availability and quality of drinking water, which is essential for human

consumption, agriculture, industry, and nature conservation. Growing focus on extreme weather events has sometimes overshadowed long-term changes, such as the expanding aridification of arable land and the increasing variability of the water cycle across months, seasons, and years, which significantly impact all water use sectors (Douville et al, 2022).

A water crisis occurs when the water demand exceeds the supply or when water becomes polluted and people cannot use it (Wang et al, 2021). This can lead to hunger, disease, conflict, and migration. Addressing these issues requires urgent and coordinated measures at local, national, and international levels (Rogers, et al, 2005; Jury & Vaux Jr, 2007).

2. CLIMATE AND CLIMATE CHANGE

Climate is defined as the average state of the atmosphere over a certain area during a long period of time, determined by long-term measurements of meteo elements such as temperature, atmospheric pressure, humidity, precipitation, and wind. It can also be defined as the overall climate composition of the atmosphere, cryosphere, hydrosphere, lithosphere, and biosphere (Paillard, 2008). The IPCC defines climate as the average weather or statistical description of the mean and variability of relevant quantities over a period of time ranging from a month to several thousand years or millions of years (Kovačević & Kovačević, 2018).

The increase in carbon dioxide concentration has been the main factor causing planetary warming over the past 50 years. Since industrialization in the mid-1700s, carbon dioxide concentration has been increasing due to the burning of fossil fuels and deforestation (Karl et al, 2009). Human activities also increase the emissions of greenhouse gases such as nitrous oxide, halocarbons, and methane, which trap heat in the atmosphere, causing a rise in surface temperatures (Aldi et al, 2020).

Over the past century, human activities have significantly impacted climate change by increasing the concentration of heat-trapping gases. Urbanization often coincides with rising incomes, driving higher energy use and GHG emissions (Kumar, 2012). This has resulted in the rise in the global average temperature and sea levels, and changes in precipitation patterns. Human influence is also evident in changes in the ocean heat index, precipitation, atmospheric moisture, and Arctic sea ice. It is predicted that the annual average global temperature will continue to rise during this century, depending on heat-trapping gas emissions and the climate's sensitivity to those emissions. Natural greenhouse gases contribute the most to climate change: water vapour, carbon dioxide, ozone, methane and nitrous oxide (Wei et al, 2016).

Climate change seriously affects life on Earth. The increase in average air temperature causes ice to melt and sea levels to rise, affecting plant and animal life as well as coastal areas. The effects of climate change include the reduction of agricultural yields, loss of ecosystems, more frequent fires, heatwaves, changes in climate patterns, and the spread of infectious diseases. The melting of Arctic ice causes an increase in moisture in the atmosphere, which further contributes to global warming. Climate change negatively affects the quality of seawater, forcing marine animals to migrate to deeper seas and oceans that are less affected by climate change (Kovačević & Kovačević, 2018; Karl et al, 2009; IPCC, 2014; Ray, 2011).

3. WATER AND THE WATER CRISIS

Climate change significantly alters the water cycle, affecting water availability for all purposes. Floods and droughts are becoming more frequent and intense due to changes in regional and seasonal precipitation patterns. In areas dominated by snow cover, runoff will shift earlier in the spring, and flow will be lower in late summer, affecting the quality of surface water and the quantity of groundwater. Climate change further strains already vulnerable water resources. The availability of drinking water is essential for the survival of life. Water is the "liquid of life" and is necessary for the realization of other human rights, including the right to food, health, and housing. Water sustains agriculture and the food chain and is even more important than oil. Rational use and reuse of water are essential, given that large quantities of water are used in industry, such as for manufacturing silicon chips and producing electricity (39% of freshwater in the U.S.) (Morrison et al, 2009).

The destruction of resources leads to the extinction of humanity. The oldest human settlements were established along rivers, lakes, and seas due to the availability of resources. During the Neolithic period, humans began to live in groups, make tools and pottery, and changed their way of eating transitioning from foragers to food producers, which started the development of civilization.

Water is an essential component of the human body (about 70%), maintaining bodily functionality, regulating blood density, blood pressure, oxygen supply to the brain, and the function of muscles and organs. The human body cannot survive more than four days without water, and loss of water leads to dehydration and death. The WHO prescribes daily human water needs between 50 and 100 liters. Clean water is necessary for the hygiene, health, and life of humans, as well as for the cultural and civilizational development of humanity (Karl et al, 2009).

Although 70% of the Earth's surface is covered by water, only 3% is freshwater, and of this two-third is trapped in the form of glaciers, ice caps, and permafrost, or buried deep in the ground (Arora & Mishra, 2022). Around 1.1 billion people globally lack access to water, while 2.7 billion face water scarcity for at least one month annually. Additionally, 2.4 billion people lack adequate sanitation, increasing their risk of diseases like cholera, typhoid, and other waterborne illnesses. Each year, diarrheal diseases alone claim the lives of two million people, mostly children (WWF, 2024). Uncontrolled water consumption in households, industry, and agriculture negatively affects the essential needs of a large number of people, creating additional risks for global grain production and the lives of many (Morrison et al, 2009).

Figure 1 shows the share of the water footprint per capita on a global level.

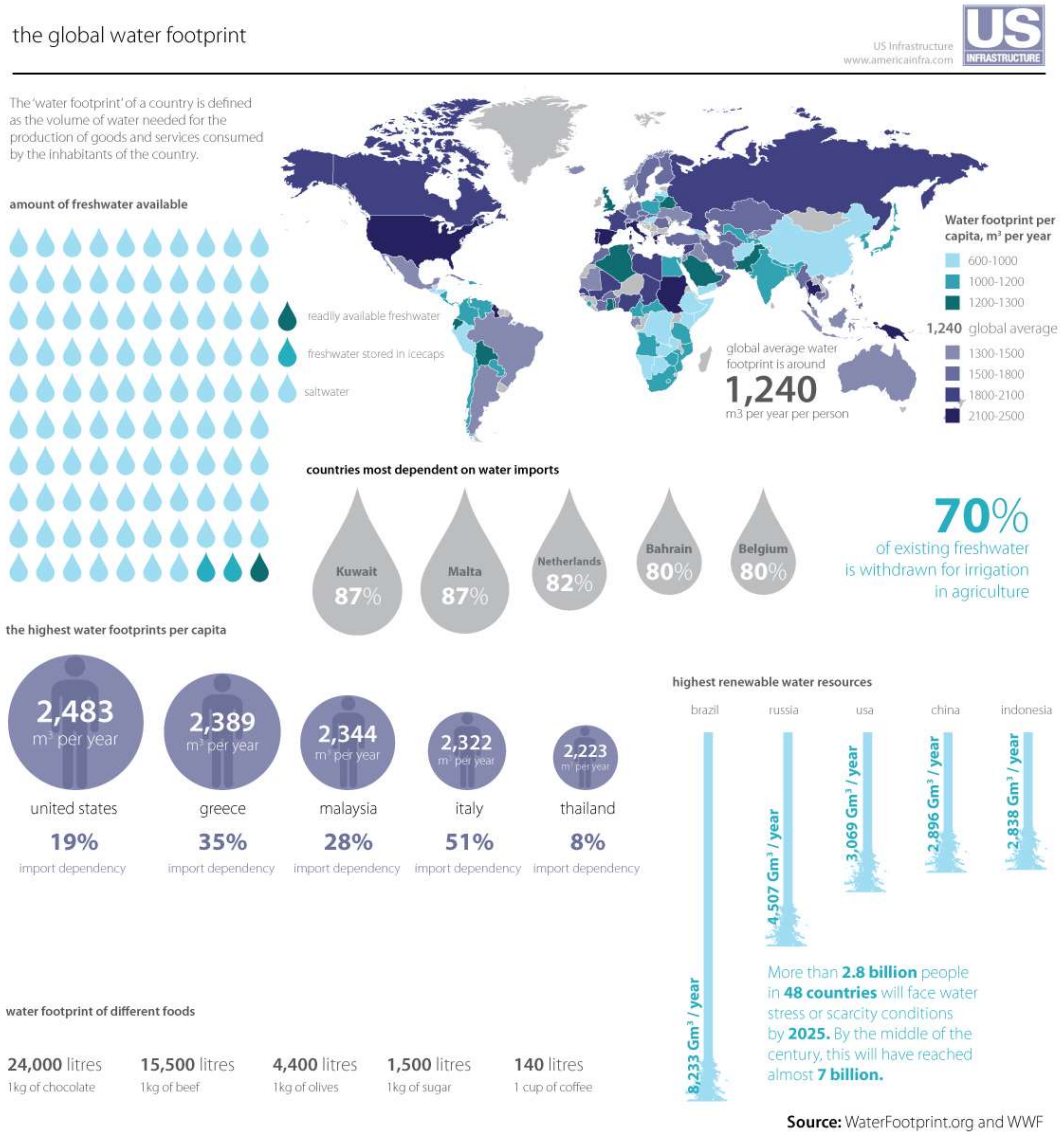

Figure 1. Global water footprint (Source: WaterFootprint.org and WWF)

It is evident that Kuwait with 87%, Malta with 87%, the Netherlands with 82%, Bahrain with 80%, and Belgium with 80% are the most dependent on imported water for their populations, meaning they do not have enough resources of their own. Countries with the most renewable water resources are Brazil with 8,233 Gm³/year (cubic gigametres per year), the Russian Federation with 4,508 Gm³/year, the United States with 3,069 Gm³/year, Canada with 2,902 Gm³/year, China with 2,840 Gm³/year, and Columbia with 2,132 Gm³/year. European Union have 2,051 km³/year. (WaterFootprint.org; WWF; Misachi, 2018).

Water and energy are key components of modern civilization. Without clean water, life cannot be sustained, and without energy, we cannot power computers and homes or manufacture products. As the global population grows in number and wealth, the demand for both resources is increasing faster than ever, with far-reaching implications for water scarcity and rising pollution levels caused by global warming. However, water and energy often compete with each other: we consume enormous amounts of water to produce energy and vast amounts of

energy to extract, process, and deliver clean water. We often value energy production more than water protection (Cosgrove & Loucks, 2015).

The rapid growth of the human population, economic development, the expansion of irrigated agriculture, and changing consumption patterns have led to severe global challenges, including water scarcity and pollution (Ercin & Hoekstra, 2014; He et al, 2018; Liu et al, 2017). These issues pose significant threats to human health, the environment, and sustainable development (Vörösmarty

It is predicted that the level of drinking water will decrease due to climate change, which will have negative consequences for humanity (Vorosmarty et al, 2000). Population growth increases the water demand, essential for food and basic human needs. Water supply and availability directly affect food production, as water is essential for crop growth and livestock survival. Inadequate use of pesticides and artificial fertilizers contaminates water reservoirs. Water is our most precious resource but threats to global water security continue to threaten the health of our freshwater resources IPCC, 2014; McNeill et al, 2017).

4. WATER CRISIS AND GLOBAL SECURITY

Water scarcity or the water crisis has fuelled conflicts between nations in the past, and this will continue in the future. Between 300 BC and 2600 BC, there were approximately 167 water wars, and 117 water wars between 1945 and 2006. The water crisis, triggered by climate change, negatively impacts people's lives and becomes a global problem. While water has so far been considered less important than oil, its scarcity is becoming an increasingly serious threat. The era of cheap access to water has ended, and companies must face water-related risks that will worsen due to climate change, including physical, reputational, and regulatory risks (Morrison et al, 2009).

Currently, four billion people worldwide live under conditions of high water stress (Wang, 2021), while four billion experience severe water stress for at least one month annually, and 1.8 billion for six months or more (Mekonnen & Hoekstra, 2016). Projections indicate that by 2050, more than half of the global population will reside in water-stressed regions (UN, 2015). Furthermore, millions of individuals die each year from diseases linked to water scarcity and pollution (Prüss-Üstün, et al, 2008; WHO, 2022; WHO/UNICEF, 2015). The increasing scarcity of clean freshwater has made it one of the most limited natural resources for humanity. The lack of adequate or safe freshwater resources already affects human and ecosystem health, energy production, food security, and livelihoods on a global scale (Vörösmarty et al, 2010; Bhaduri et al, 2016; Vanham, 2016).

The water crisis is not only the result of natural phenomena but also of human activities, including technical, political, and armed conflicts. Conflicts over water control are becoming more frequent, as can be seen in southern India where conflicts arose due to water diversion (Fernandes, 2018; Ranjan, 2020).

Water conflicts are growing with nations' needs for technological development, food and energy independence, and dominance over this resource. Figure 2 shows the increase in conflicts due

to the water crisis.

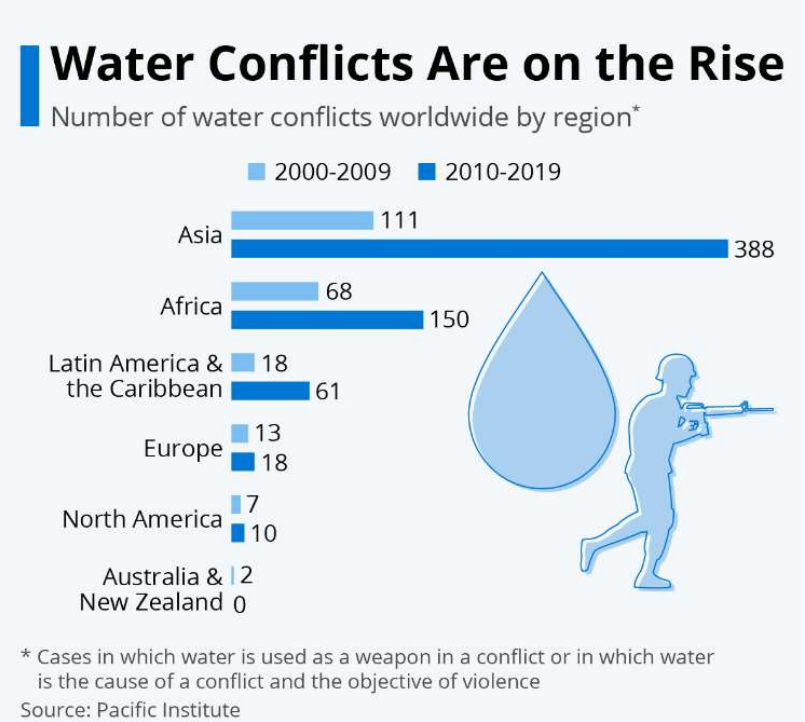

Figure 2. Increase in the number of conflicts due to water scarcity

(Source: Pacific Institute, 2022; https://www.statista.com/chart/27272/water-conflicts)

Asia leads in the number of "water conflicts" with 388 registered "water conflicts" between 2010 and 2019. Following Asia is Africa with 150 registered "water conflicts" in the same period. These countries are followed by Latin America, Europe, Australia, and New Zealand with 89 registered "water conflicts" between 2010 and 2019. The two most populous countries in Asia, China and India, are conducting armed operations to ensure their countries have fresh drinking water needed to achieve technological advancements and meet the increasing demands of their citizens for access to drinking water (Pacific Institute, 2022).

The Pacific Institute has documented over 1,300 water-related conflicts, dating back 4,500 years to ancient Mesopotamia. These conflicts, outlined in the Water Conflict Chronology, fall into three categories: Trigger, Weapon, and Casualty (Pacific Institute, 2022):

Trigger: Water often serves as a root cause or underlying factor in conflicts. Disputes over control, access, or scarcity of water can escalate into violence. In Iran, protests and riots from 2019 to 2021 were sparked by water diversions from the Zayanderud River in Isfahan. Similarly, severe droughts in India and Pakistan have led to deadly confrontations over irrigation access.

Weapon: In some cases, water becomes a tool of conflict. Armed groups in Libya have weaponized water by attacking pumping stations to cut off supplies to Tripoli. In 2019, Israeli settlers used sewage to flood Palestinian olive groves, and in the U.S., neo-Nazis were arrested

in 2020 for plotting to poison water supplies to incite violence.

Casualty: Water systems frequently become casualties of conflict, whether as intentional targets or incidental damage. In Yemen, civilian water infrastructure has been repeatedly attacked during the ongoing war. Palestinian irrigation systems and water tanks have been destroyed in recent years by Israeli settlers and military forces. Cyber-attacks have also targeted water infrastructure, such as those on Ethiopia's systems in 2020, opposing the Grand Ethiopian Renaissance Dam, and on Israeli water facilities the same year. Globally, attacks on water tanks, dams, and utilities highlight the vulnerability of these resources in conflict zones.

Figure 3 illustrates the yearly number of recorded incidents since 2000, categorized by the type. The data reveal a rising trend in incidents, with most involving water as a trigger for violence, while a significant portion also involves water and water systems being casualties or targets of violence Pacific Institute, 2022).

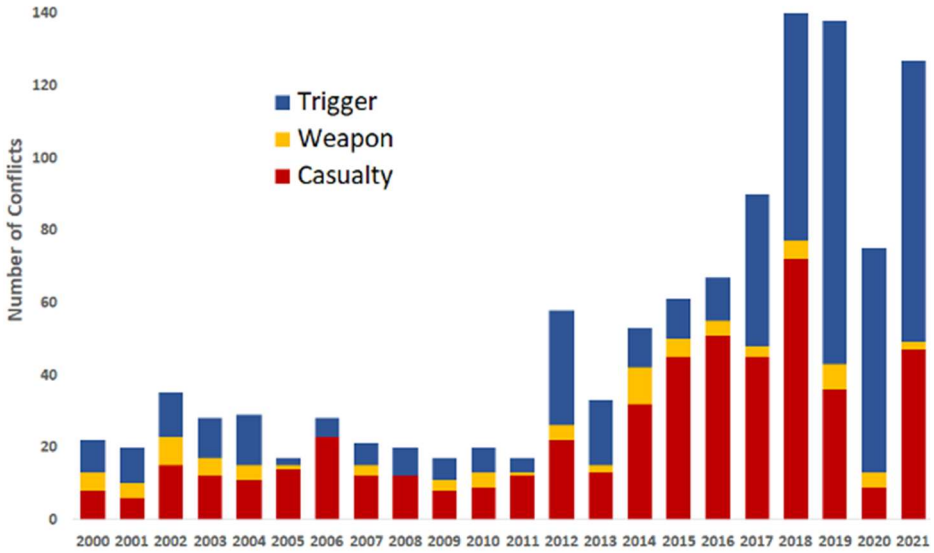

Figure 3. Water Conflicts by Year and Type (2000 to 2021)

(Source: Pacific Institute, 2022: Data from Water Conflict Chronology)

Access to drinking water enters the realm of geopolitics and is of significant importance for the national security of certain world powers, which use their military machinery to secure locations with drinking water that they later distribute to their territorial units. Water crises have long dominated discourse in policy and practice, encompassing issues such as the "drinking water crisis" (Mueller & Gasteyer, 2021), water-related extreme events or "natural disasters" (Swatuk, 2021), geopolitical conflicts framed as "water wars" (Chellaney, 2013; Biswas & Tortajada, 2019), and the deterioration of water quality (Biswas, 1999). Although the scientific links between water and climate change are well-established, the discourse on the interconnections between water and climate crises has emerged more recently (Wilson et al, 2024).

Urbanization significantly alters the global water cycle, reducing the availability of fresh water, decreasing groundwater recharge, and increasing stormwater runoff. Also, the conversion of natural vegetation to agricultural areas and the inadequate use of fertilizers and pesticides degrades water quality. Climate change increases risks in urban areas, including heatwaves, extreme precipitation, and floods. Rural areas will be affected by reduced water availability, food security, and agricultural production. Terrorist activities can further destabilize water resources through pollution and infrastructure sabotage (McNeill, 2017; Bildirici et al, 2022).

4. CLIMATE CHANGES AND CONTEMPORARY CHALLENGES IN CRISIS MANAGEMENT

Climate change drives numerous natural disasters, including droughts, wildfires, floods, and storms, and contributes to rising sea levels, threatening human and animal safety, health, and well-being. It also forces migrations and impacts crops reliant on rainfall. Crisis management involves planning, organizing, and coordinating activities to prevent, mitigate, or resolve crises, requiring a multidisciplinary approach and the involvement of governments, NGOs, civil society, the private sector, and the media. Continuous monitoring, risk assessment, and learning are crucial to improving response capacity. As water is a vital resource, effective strategies at local, national, and global levels are essential to reduce climate change impacts and adapt to new conditions. Addressing this challenge demands long-term vision, proactivity, flexibility, and innovation. Key actions include establishing early warning systems, strengthening community and infrastructure resilience, promoting sustainable development, and fostering cooperation across sectors. Climate change, while a threat, also presents opportunities to create new values, knowledge, and solutions for better living and social cohesion. The increase in average temperature on Earth and rising water temperatures increase the concentration of various waterborne pathogens. Climate change and global warming have a negative impact on crops that heavily depend on rainfall and green water (Eckstein, 2009).

A warm climate will also encourage wildfires during longer summers. Sub-Saharan African countries will be more vulnerable to increased exposure to diseases. Food insecurity due to shortages will become a growing concern in Africa, as well as in other parts of the world. Without food aid, affected countries are likely to face a greater risk of various instabilities, particularly violent ethnic conflicts (Fingar, 2008).

Global warming increasingly reduces crop production and affects food security. Despite the projected expansion of irrigation to counteract the negative effects of anthropogenic warming on crop yields, rainfed agriculture will remain a major component of global food systems. However, rainfed agriculture is highly sensitive to climatic conditions due to its heavy reliance on rainfall patterns. Figure 4 shows the most vulnerable places on Earth regarding the water crisis, indicating future places of conflict and population migration areas.

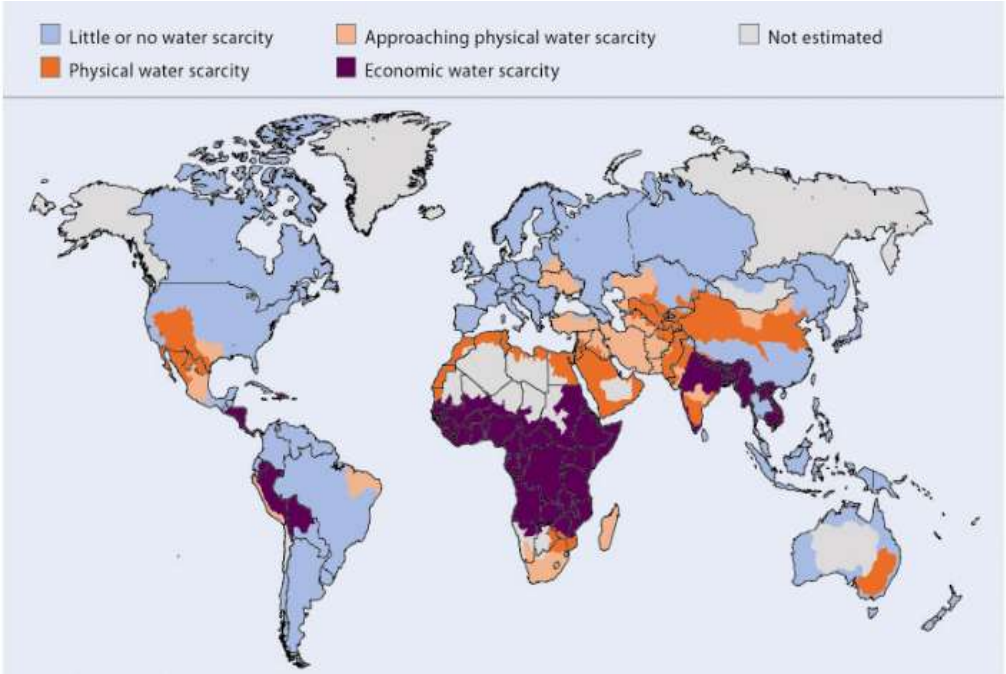

Figure 4. Water crisis on a global scale (Source: De Fraitur et al, 2007)

Population growth in certain countries increases the global demand for drinking water, food, and energy. The growing scarcity of freshwater has led to the development of new conservation technologies, including wastewater recycling. Despite advancements in agriculture, global food supply continues to be affected by climate changes which affect water and land resources (Dinar et al, 2019; Eckstein, 2009).

Rising temperatures affect people's health by enabling the development of bacteria, viruses, and disease vectors. Climate change affects human health through changes in global temperature, winds, ocean currents, precipitation, humidity, and vegetation. Droughts can cause rodent infestations that carry diseases, while warmer climates favour mosquitoes that transmit dengue fever, malaria, Zika virus, West Nile fever, yellow fever, and Chikungunya fever. Floods and droughts contribute to the spread of hantavirus, which causes mouse fever. Climate change also increases the risk of epidemics. According to the World Health Organization, in 2018, six deadly viruses circulated globally at the same time, including the Ebola epidemic that killed 11,300 people. Recommendations for future prevention include guidelines for viruses such as MERS, Ebola, Nipah virus, Zika, Rift Valley fever, and Lassa fever. Climate fluctuations can increase the frequency of respiratory diseases, heat shocks, UV radiation, extreme temperatures, cardiac arrests, disturbances in the regulation of sugar and blood pressure, sunstroke, cramps, dehydration and headaches (Mraz, 2021; He & Rosa, 2023).

Climate fluctuations bring increasingly extreme weather conditions, including temperature shocks and hurricanes. Temperature shocks are becoming more frequent, stronger, and longer which negatively impacts mortality. By the end of the 21st century, northern China could become the zone of the deadliest heatwaves, affecting approximately 400 million people. Extreme heat and high humidity can have fatal consequences even for healthy populations.

Water, soil, and air contamination, as well as floods, contribute to the spread of infectious diseases. Rising temperatures may lead to the emergence of malaria in new areas, the spread of Asian tiger mosquitoes, tick habitats, and vectors of diseases such as West Nile virus, Lyme disease, dengue fever, tick-borne encephalitis, chikungunya fever, and leishmaniasis (He & Rosa, 2023). Figure 5 shows the connection between climate change and mortality rates on a global scale.

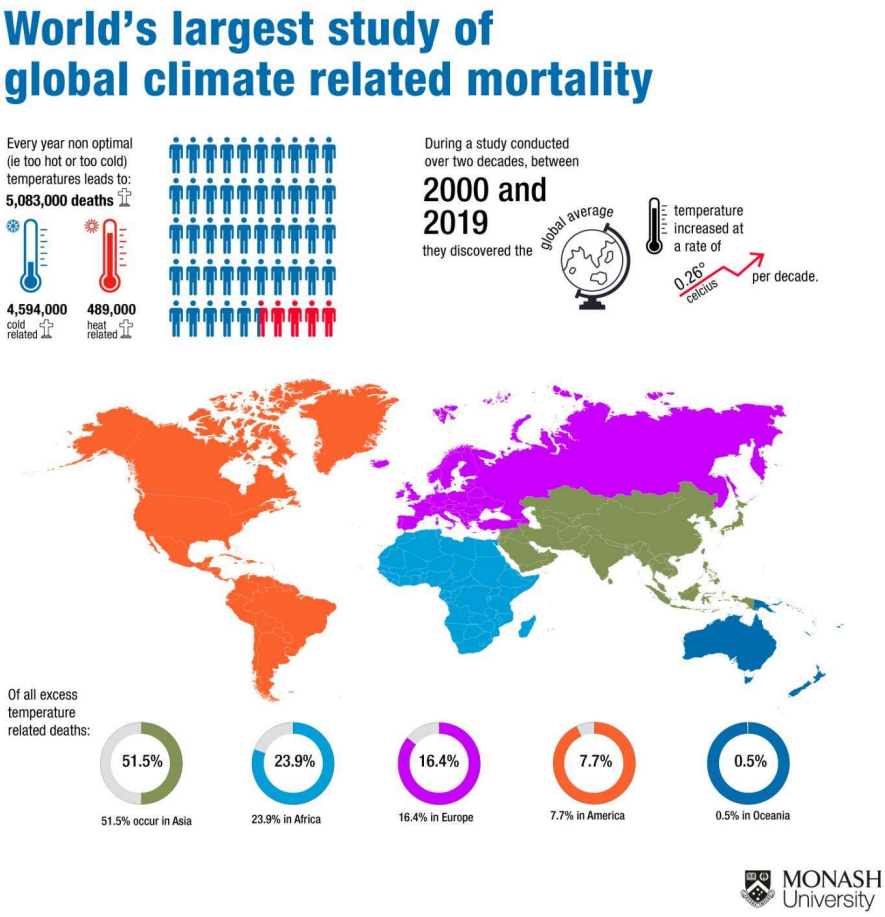

Figure 5. The connection between climate change and mortality rates globally (Guo, 2021)

According to the study by Zhao et al. (2021), globally, 5,083,173 deaths per year were associated with non-optimal temperatures, representing 9.43% of all deaths. This translates to 74 temperature-related excess deaths per 100,000 residents annually. The mortality burden varied significantly across regions, with 51.49% of excess deaths (2,617,322 cases) occurring in Asia. Eastern Europe reported the highest rate of heat-related excess deaths, while Sub-Saharan Africa exhibited the highest rate of cold-related excess deaths. Between 2000–2003 and 2016–2019, the global cold-related excess death ratio decreased by 0.51 percentage points, whereas the heat-related excess death ratio increased by 0.21 percentage points, highlighting shifting patterns in temperature-related mortality (Zhao et al, 2021).

In Europe, rising temperatures have led to an increase in cases and deaths from West Nile fever, with warnings from the World Health Organization about the dangerous spread of this virus. High temperatures and heavy rains promote mosquito breeding. Clean water is essential for health, while contaminated water is a source of disease and death. Climate fluctuations cause outbreaks, endemic diseases, and pandemics that threaten human health. Without effective protection and adaptation measures, climate change could reduce the global food supply by one-third by 2050, increasing mortality due to global warming and disrupted climate patterns (He & Rosa, 2023).

If global warming is not stopped, approximately 350 million Europeans will be exposed to the effects of climate change. Rising temperatures impact human health and the quality of food, and water. Warmer winters reduce cold-related mortality but increase illnesses due to bacteria spreading infectious diseases. Higher temperatures lead to increased mortality from heatwaves, UV radiation, skin cancer, and food poisoning. Increased temperatures cause pneumonia, asthma, bronchitis, influenza, cardiovascular diseases, and the spread of malaria to new areas. Water pollution and deteriorating water quality due to floods endanger people's health through waterborne diseases. Health experts warn of the growth of bacterial resistance to antibiotics (He & Rosa, 2023).

Various factors, including limited or inadequate irrigation systems due to extreme climate changes, will result in shortages of essential resources for life, potentially causing population migrations and other issues. Figure 6 shows the average number of climate migrations by region.

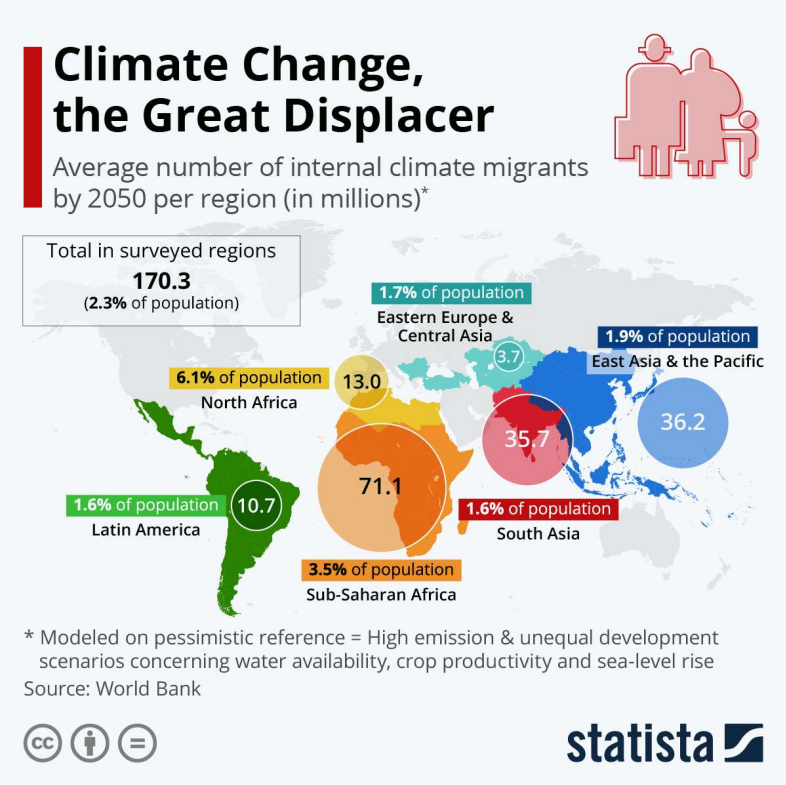

Figure 6. The impact of climate change on human migration

(Source: https://www.statista.com/chart/26117/average-number-of-internal-climate-migrants-by-2050-per-region)

According to the projections shown in Figure 6, approximately 170 million people, or 2.3% of migrations, will be affected by water shortages by 2050. From the African continent alone, a wave of around 71.1 million migrants can be expected, possibly moving towards Europe. Several countries, from Morocco to Saudi Arabia, recorded extreme temperatures in 2016. The Middle East will face rising temperatures and water shortages in the coming decades in addition to already existing problems. Rising temperatures could lead to internal social conflicts in some countries or regions, with an increased risk of violent conflicts caused by increased poverty (Kovačević & Kovačević, 2018).

Climate change may further increase displacement, especially among those without resources for organized or legal migration, making them more vulnerable to extreme weather conditions, particularly in developing countries. Expanding mobility options can reduce vulnerability and migration can be an effective adaptation strategy to climate change. Water scarcity can negatively impact human health, food security, economic growth, social stability, and environmental sustainability (Wilson et al, 2024). Thus, adopting effective crisis management strategies to address water scarcity and ensure equitable access to this vital resource is crucial (IPCC, 2014; Alcamo, 2007).

Mortality rates due to the lack of safe water sources vary among countries and over time. High mortality rates are observed in lower-income countries, especially in sub-Saharan Africa and Asia, where rates often exceed 50 deaths per 100,000 people and in the Central African Republic and Chad rates even surpass 100. In comparison, high-income countries, such as those

in Europe, have mortality rates between 0 and 10 per 100,000 people. Therefore, the problem of unsafe sanitary conditions is predominantly present in countries with extremely low financial standards, where the poor financial capacity of citizens affects living conditions (Figure 7).

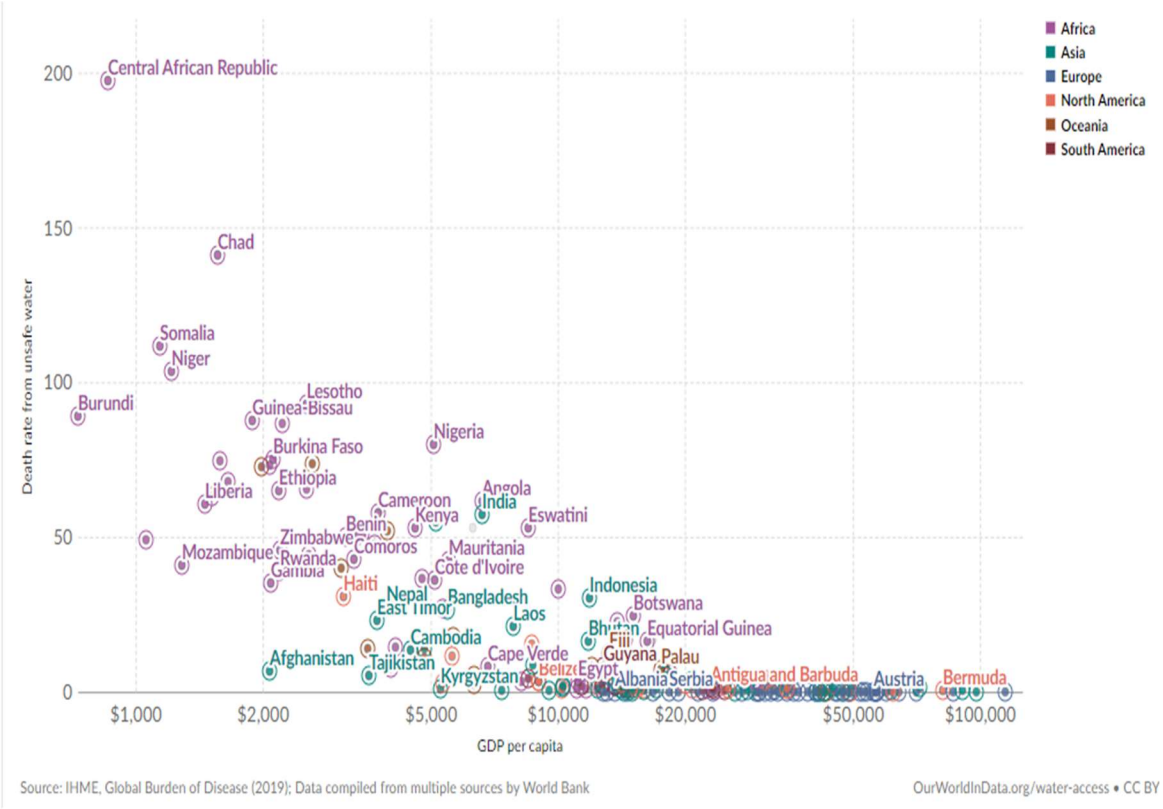

Figure 7. Mortality rate due to lack of safe water sources by GDP per capita (Source: IHME, Global Burden of Disease, 2024); World Bank, 2023)

Due to the scarcity of water resources in regions such as North Africa and Southwest Asia, people are forced to migrate to regions with secured means of livelihood. In recent years, the European Union has faced an influx of illegal economic migrations. Croatia itself, located on the so-called Balkan route, witnesses enormous numbers of people participating in mass illegal migrations. Scientists and experts from the United Nations predict that climate change will increase health problems, including deaths, particularly in less developed countries. Changes in the hydrological cycle can increase the number of water- and vector-borne diseases, as increased rainfall and floods can overwhelm sewage and treatment systems, encouraging the growth of bacteria, parasites, and algae such as Cryptosporidium, hepatitis A virus, and E. coli. According to the World Health Organization (WHO), nearly three million deaths annually can be attributed to unsafe water, poor sanitation, and lack of hygiene. With rising temperatures, vector-borne diseases such as malaria and dengue fever could spread to new regions, and by 2030, climate change-related deaths could reach 300,000 annually. Also, global warming is linked to food-borne infectious diseases. In continental Europe, 30% of reported salmonella cases are associated with temperatures higher than average. Furthermore, floods and droughts

can drastically affect human health. Over 7 million people have died as a result of floods since 1900, while those who have suffered health impacts, personal tragedies, and property losses number in the billions. In particular, the frequency of deaths and people affected by floods has increased due to more frequent flooding in recent decades and greater vulnerability to floods. Similarly, a decrease in precipitation combined with an increase in temperatures will also be disastrous to human health. The heatwave that ravaged Europe during the summer of 2003 was responsible for between 22,000 and 45,000 heat-related deaths (Eckstein, 2009).

6. CONCLUSION

Climate change, whether caused by natural events or human actions, has a direct effect on the availability of drinking water, which is essential for meeting societal needs and industrial use. It affects the global supply of drinking water, its quality, and consequently, the quality of life for those who depend on it and as such it has a direct impact on human health, food safety and quality, ecosystems, and also the socio-economic development of individual countries. Furthermore, water is essential for mitigating and adapting to climate change as it is used in energy production, agriculture, and industry.

A water crisis occurs when the demand for drinking water exceeds the supply or when drinking water is contaminated and/or inaccessible. It leads to conflict, human migration, poverty, and humanitarian crises. Therefore, it is essential to understand the interplay between climate change, water, and the water crisis, as well as what measures can be taken to reduce the risk of a water crisis and increase resilience to climate change, given that a water crisis poses a risk to global security.

Any changes in the availability and quality of natural resources, such as water, food, and energy, which are critical for the survival and development of human communities, can trigger security threats. The water crisis also influences migration waves caused by the lack of drinking water in the home countries of migrants and these migrations lead to water stress and/or water crises in host countries, potentially causing instability in those countries.

Climate change is one of the biggest global problems, affecting all aspects of social and economic development and posing a complex and dynamic threat that requires an integrated and multidisciplinary approach. Climate change and contemporary challenges in crisis management demand continuous attention, engagement, and collaboration among all stakeholders at all levels. Only through such efforts can sustainable development and the well-being of humanity be ensured in the future.

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