

WATER DILEMMAS:

THE CASCADING IMPACTS OF WATER INSECURITY IN A HEATING WORLD



Photo: Nasima Khatun and her child represent thousands of climate vulnerable communities living in the coastal belt of Bangladesh. Adding to their burden to cope with the impact of climate crisis, a significant portion of their time and labour is spent fetching fresh water to meet their basic necessities. This photo highlights the gendered impact of the water crisis, as it is often women and children who bear the burden of collecting water for their families.

Photo credit: Jahangir Alam/Oxfam in Bangladesh

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The climate crisis is, in essence, a water crisis. This briefing paper presents findings from Oxfam's recently commissioned research on climate predictions for 2040 and 2050 in the Middle East, the Horn, East and Central Africa, West Africa and Asia regions. Analyses show how temperature increases will influence water insecurity in these regions and the potential impacts on food security, spread of diseases and other factors. This briefing paper also shows the severe under-investments by national governments and donors in water, sanitation and hygiene systems, which has critical implications not only for water security but also poverty and inequality. Oxfam is calling for urgent action to increase investments in sustainable, climate-adapted water management for the people who are most at risk from the worsening climate crisis.

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For further information on the issues raised in this paper please email advocacy@oxfaminternational.org

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SUMMARY

The climate crisis is a water crisis. As the world heats, increased evaporation leads to more moisture-laden air, heavier storms and shifting patterns of rainfall. In a cruel twist, this increase in moisture will also mean that more people will lack access to clean water, as predictable rainfall gives way to cycles of drought and flooding, and disease-carrying insects move to new areas. The impact of these changes will be greatest on women, who bear the responsibility for the management of water supply, sanitation and health within the household. In many countries, decreasing water availability, accessibility and sustainability – also referred to as ‘water insecurity’ or ‘water stress’ – is leading to failed or delayed harvests, livestock losses, increasing poverty, growing conflict (at local and geopolitical scales), increased risks of sexual and gender-based violence and forced migration of households and communities.

The backdrop of this water crisis is a bleak climate injustice story. Rich polluting nations continue to heat our planet, while the nations that are least responsible for global warming bear the brunt of its consequences. Water insecurity is not only caused by climate change and its effects, but also by countries and donors having grossly under invested in water management systems for decades. It is vital that countries act now to take measures to prevent and mitigate the impacts of climate change and also significantly increase their investments into water management for the long term.

This briefing paper reveals the water-critical scenarios facing 20 climate hotspot countries in four regions of the world under the so-called ‘middle of the road’ scenario in which the global temperature rises to 2.7°C by the end of the century. The regions covered by this paper are the Horn, East and Central Africa (HECA), West Africa, the Middle East and Asia. Findings show that the climate crisis will have dramatic effects on water insecurity through changes in temperature, precipitation, surface runoff, river discharge, crop yields and disease burden – all of which will make life even more precarious for people in marginalized or vulnerable contexts.

The paper describes how today’s water management systems are particularly underfunded in these regions, and how the COVID-19 pandemic put them to a test. Water insecurity is not just driven by climate change, but by countries and donors’ woeful spending on water management systems. The paper builds Oxfam’s case that, with proper investment, countries will not only build water systems that are more resilient to climate change, but also tackle hunger, poverty and inequality.

Oxfam calls on governments to cooperate urgently to:

- Drastically reduce emissions;
- Invest in water security and sustainable water management;
- Prioritise efforts to reach Sustainable Development Goal 6;
- Support those most at risk through early warning and anticipatory action;
- Compensate those most affected by the climate crisis; and
- Provide emergency assistance to save lives and support development.

INTRODUCTION

The climate crisis is a water crisis. The world's insatiable appetite to extract and burn fossil fuels to fire their economies has resulted in carbon pollution that has created a global greenhouse effect that is causing weather patterns to change (both in timing and intensity) across geographies. Weather patterns are defined and influenced by many factors, but they are primarily about the relationship between evaporation and precipitation. The impacts of the growing climate crisis are far-ranging, but one of the main ways that people will experience – and are already experiencing – climate change is through the lack of, or excesses of, water.¹

Water security definition: 'the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human wellbeing, and socioeconomic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability'.¹

Despite many areas of the world experiencing more, and more severe flooding, it is estimated that as the climate crisis deepens, people will have even less access to safe drinking water. Terrestrial water storage is projected to drop; sea level rises will extend salinization of groundwater and decrease freshwater availability for humans and ecosystems in coastal areas; and higher water temperatures and more frequent floods and droughts will exacerbate water pollution.²

Access to water is not only a fundamental human right (as highlighted in Sustainable Development Goal (SDG) 6 on Clean Water and Sanitation),³ but access to clean

water and sanitation is also key to attaining all of the other SDGs. Goals on peace, health, education, gender equality, sustainable cities and economic growth all rely on people having access to clean water.⁴ If national governments, donors and civil society actors do not address the drivers of water insecurity and go beyond direct water service provision, we risk failing all of our development goals. Achieving SDG 6 will require significantly greater financial commitments and investments in water security (see box for definition), as well as investments in sanitation and hygiene, especially in the face of worsening socioeconomic and health inequities.

We are already witnessing the impact of decreasing water security in many low-income countries, which is linked to negative outcomes in food security, health, living standards and peace.⁵ Countries and regions with increasing water insecurity (or water stress) are witnessing failed or delayed harvests, livestock losses, increasing poverty, growing conflict (at local and geopolitical scales), increased demand in household care responsibilities for women and girls, and forced displacement of individuals and households. This paper presents findings from Oxfam's research on the impacts of climate change on water security in 20 climate hotspots – where climate projections show potentially devastating impacts on food security and the spread of diseases. It demonstrates the urgent need for countries and donors to invest in water security and water, sanitation and hygiene (WASH) services, to tackle the climate crisis and compensate the countries that are on the frontline of the climate crisis.

METHODOLOGY

Oxfam commissioned research on the links between water security and climate change, and how climate change-driven water insecurity may influence food security, human health and wellbeing in the coming decades.⁶

Using literature, secondary data, climate models and observations, the paper presents a range of climate scenarios with expected changes in temperature and precipitation by the years 2040 and 2050. The paper shows how climate change in the Middle East, Horn, East and Central Africa (HECA), West Africa and Asia regions may affect water security, food security and the spread of disease. The climate projections presented in the paper are drawn from two main sources: the

Intergovernmental Panel on Climate Change (IPCC) Working Group I (WGI) Interactive Atlas and the Climate Impact Explorer (CIE) by Climate Analytics.⁷ This data was complemented with a literature review and interviews with experts on water security and climate change.

The countries covered by this analysis are a sample of countries where Oxfam works and that are at high risk of climate change-induced water insecurity. Some are also classified as 'fragile and conflict-affected', characterized by extreme and entrenched poverty, precarious livelihoods, forced displacement, and low institutional capacity.

A key limitation of the study is that the analysis is based on global predictions and trends, and therefore is not able to account for the different local and national contexts that may affect water security in those five regions. As such, the findings presented here must be interpreted as indicative.

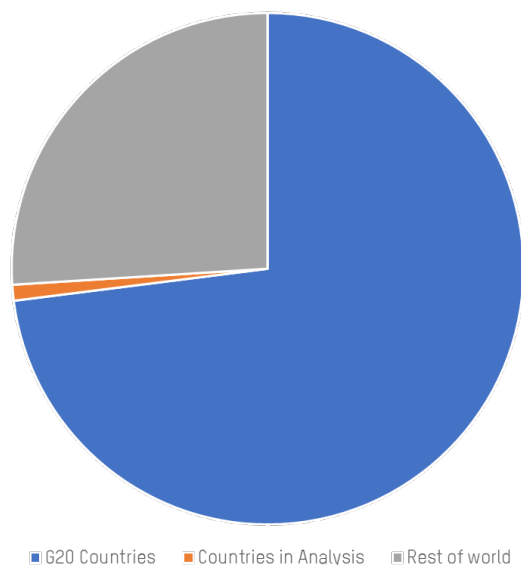
WATER SECURITY, CLIMATE CHANGE AND INEQUALITY

Access to water is a human right and indispensable for life and dignity. Yet as with the climate crisis, inequality lies at the heart of water insecurity. Poverty and water security are closely interlinked at the household, community and state levels. The world's poorest countries tend to be water insecure because they cannot afford the large investments required to achieve water security.⁸ In some countries, borderland and rural areas face water security issues both as a result of ecological constraints but also due to historical marginalization and neglect from urban-focused central governments. The poorest households tend to bear the burden of water scarcity as wealthier households may be able to buy water and buffer against risks of water shortage.

Wealth and income inequality also intersects with gender, race, ethnicity and disability to produce differential impacts of water security and access to WASH services. Longstanding evidence shows that women and girls are disproportionately affected by water insecurity. In rural areas they may have to walk long distances and to remote and unsafe areas to access water. In urban areas, the lack of affordability of clean water has major health implications for children, and when children are sick, women are typically tasked with taking care of them, at the expense of their own schooling or employment. As they often have primary responsibility for household nutrition, women and girls' access to water (or lack thereof) has crucial implications for safety, wellbeing and poverty; women and girls are more likely to eat least and last when household food supplies are scarce and are more at risk of gender-based violence as food insecurity worsens. The time spent collecting and storing water and on other WASH-related domestic tasks increases the care workload and reduces women and girls' ability to access education, employment, leisure, and civic and political engagement opportunities.⁹ Evidence also shows that climate change-induced water stress can accelerate gender-based violence against women and girls¹⁰.

Many of the world's climate hotspots are low-income countries that have contributed very little to global carbon emissions, which have a direct and devastating impact on water security in those countries. The G20 countries account for 73% of global carbon emissions (2021 data) – a level 45 times greater than the combined emissions from the 20 countries included in this analysis (which account for 0.94%).¹¹ Low-income countries face a double burden of disease (predicted over the next few decades) and water insecurity – even though they are typically the lowest carbon emitters.¹²

GLOBAL CARBON EMISSIONS (2021 Data)



Box 1: Water crisis in Kenya

Although Kenya is among the countries with the lowest carbon emissions, it is bearing the brunt of climate change. For more than four years, parts of Kenya have experienced drought, which has killed more than 2 million livestock, fundamental to livelihoods and resilience of communities. Rains eventually came in March 2023 but were so heavy that they caused flooding, exacerbating an already dire situation.

Ahmed Haji Mahamud, aged 47, who lives in Tula village, Wajir county, says: 'I was living a good life before the drought. The land had good rain and pasture. I would sell my livestock to provide for my family and pay for my children's education. After the drought, I was left stranded. Over the last 30 years, there used to be both dry and rainy seasons. We used to get rains every three months. But now we only get one month of rain over a whole year and this is evidence of climate change in the region.' He said that when rains do finally come they can be very heavy, causing floods: 'I would not say heavy rains guarantee availability of food because they cause flooding and damage to farms.'

CLIMATE PREDICTIONS

In view of the fundamental ways in which the climate crisis will affect water availability, accessibility and sustainability, understanding the interlinked impact of climate change and water security is crucial. Oxfam's research explored how the expected rise in global temperature and change in precipitation will affect surface runoff, river discharge, populations exposed to heatwave, food insecurity, displacement and disease diffusion in the years 2040 and 2050. The research examined climate predictions in 20 countries across four regions (see Table 1). The 20 countries are in the bottom third of the Fragile States Index and the Notre Dame Global Adaptation Initiative (ND-GAIN), which rank countries according to vulnerability and readiness to successfully adapt.

Table 1: Countries included in the analysis

Middle East	Iraq, Lebanon, Palestine, Syria and Yemen
Horn, East and Central Africa	Democratic Republic of Congo, Ethiopia, Kenya, Somalia, Sudan, South Sudan and Uganda
West Africa	Burkina Faso, Central African Republic, Chad, Niger and Nigeria
Asia	Bangladesh, Myanmar and Nepal

The analysis explored the impact of climate change in the shared socioeconomic pathway (SSP) scenarios 1, 2 and 5.

Shared socioeconomic pathways (SSPs), jointly developed by an international team of climate scientists, economists and energy systems modellers, provide a toolkit for the climate change research community to carry out multidisciplinary analysis. The SSPs describe the broad socioeconomic trends that could shape future society and include five scenarios. These are: a world of sustainability-focused growth and equality (SSP1); a 'middle of the road' world where trends broadly follow their historical patterns (SSP2); a fragmented world of 'resurgent nationalism' (SSP3); a world of ever-increasing inequality (SSP4); and a world of rapid and unconstrained growth in economic output and energy use (SSP5).

Of these five scenarios, SSP2 is said to be characteristic of current conditions, whereby social, economic and technological changes do not shift markedly from historical patterns. Results reported in this paper are for SSP2, the 'middle of the road' scenario (box 2).¹³

In the SSP2 scenario, global CO₂ emissions remain at around current levels, and the global temperature rises by 2.7°C by the end of the century.

Box 2: Shared socioeconomic pathway 2: 'middle of the road' scenario

The world follows a path in which social, economic and technological trends do not shift markedly from historical patterns. Development and income growth proceeds unevenly, with some countries making relatively good progress while others fall short of expectations. Global and national institutions work toward, but make slow progress in achieving, Sustainable Development Goals. Environmental systems experience degradation, although there are some improvements and overall the intensity of resource and energy use declines. Global population growth is moderate and levels off in the second half of the century. Income inequality persists or improves only slowly, and challenges to reducing vulnerability to societal and environmental changes remain.¹⁴

According to research commissioned by Oxfam, in the SSP2 scenario, temperatures will increase by 2040 in all regions (see Table 2): by 1°C in Asia; by 1.4°C in HECA and in West Africa; and by 2°C in the Middle East. Precipitation will also increase in all four regions, with the highest increases in HECA and in West Africa (approximately 7% in both regions). While more precipitation may seem like good news for water availability, the research shows that it will instead result in more surface runoff in many areas. Without significant investment in infrastructure to manage it, it will lead to less clean water, and wash away crucial topsoil.

Surface runoff is the flow of water that occurs when excess water (such as from rainfall) can no longer be absorbed by the soil. River discharge (also called streamflow) is the volume of water that flows through a river or stream channel. Surface runoff and river discharge will increase significantly in Asia, HECA and West Africa (while decreasing in the Middle East). Increased surface runoff will not only deplete the soil of nutrients – thereby affecting food security – but also increase the risk of water pollution by picking up sediment, dirt and contaminants. These may end

up in bodies of water or in the water supply, causing harm both to people and wildlife. Increased river discharge, as projected in three of the four regions for 2050, will increase the risk of flooding. In such a scenario, even livelihood systems that have long been well adapted to the ecological context will be greatly strained, and people’s capacities for resilience will be undermined.

Table 2: Climate change impact on water (under SSP2)

Region	Temperature increase (2040)	Precipitation (2040)	Surface runoff (2050)	River discharge (2050)	Soil moisture (2050)
Horn, East and Central Africa	+ 1.4°C	+ 6.7%	+ 24.53%	+ 20.23%	+ 1.79%
Middle East	+ 2.0°C	+ 1.1%	- 3.08%	- 8.33%	- 3.28%
West Africa	+ 1.4°C	+ 7%	+ 28.28%	+ 25.31	+ 2.52%
Asia	+ 1.0°C	+ 1.1%	+ 9.28%	+ 5.15%	- 0.31%

Changes in food systems: Food security will be significantly affected by these climatic changes, not just as soil moisture changes, but also through varying effects on different crop yields. Wheat is a staple crop for a significant portion of the global population and plays a key role in global food security, yet wheat yields will be greatly affected by climate change. For example, wheat yields are expected to decrease in West Africa by 24.61% and by 3.03% in the HECA region. For East and West African countries looking to boost wheat production with a view to becoming more self-sufficient and less reliant on imports, the effects of climate change may prove a significant obstacle. Maize – another key staple for many people worldwide – will also be significantly affected. In this ‘middle of the road’ scenario, maize yields are forecast to decrease across all four regions: by 0.9% in the HECA region; by 5.45% in the Middle East; by 4.2% in West Africa; and by 2.61% in Asia. These impacts will be felt globally but particularly hard in countries of sub-Saharan Africa and elsewhere where maize is a staple.

Overall, however, it is important to note that crop yields will be affected differently and some could even be boosted under this scenario in certain areas. Wheat yields could rise in the Middle East countries by 7.97% and by 2.25% in the countries in our Asia sample. Similarly, rice yields could rise in West Africa by 9.5% and by 5.7% in the HECA region. As different crops become more or less favourable, this will necessitate significant change in local agricultural practices and methods, and in infrastructure and markets, so that food production systems can adapt to climate change.

Heatwaves: In all regions, the population at risk of heatwaves also increases by 13.19 percentage points (pp) for HECA, 7.95 pp in Asia, 12 pp in the Middle East and 6.35 pp in West Africa. This is likely to have a range of significant impacts on human life and wellbeing in these regions, including limiting people’s ability to work outdoors. In addition to diminished labour productivity, this will also have disproportionate impacts on women, with higher heat stress on pregnant women and those working outdoors, such as in agricultural labour.

Displacement: The ability to manage the impacts of the climate crisis will also have a severe impact on internal migration and displacement trends. The World Bank’s Groundswell reports¹⁵ show that by 2050, as many as 216 million people could be internally displaced because of climate change. In sub-Saharan Africa, there could be as many as 85.7 million internal climate migrants (4.2% of the total population); in East Asia and the Pacific, 48.4 million (2.5% of the total population); in South Asia, 40.5 million (1.8% of the total population); and in North Africa, 19.3 million (9% of the total population).

Disease: The research also indicates that rising temperatures and changing precipitation patterns will have a significant impact on the spread of disease vectors. In particular they will create favourable conditions for mosquitoes (*Aedes aegypti* and *Aedes albopictus*), which will increase the risk of diseases such as malaria, dengue, chikungunya, yellow fever, Zika virus, West Nile virus and Japanese encephalitis. In the Middle East, the population at risk of mosquito-borne diseases is projected to increase by 37 million by 2050. In the HECA region, an additional 56 million people will be at risk from mosquito-borne illnesses by 2050. Cases of Leishmaniasis (transmitted by sandflies – also known as *kala azar*) and Schistosomiasis (commonly known as bilharzia and caused by a parasitic worm living in freshwater) will also increase in the Middle East region.

For malaria alone, across the 20 climate hotspots included in this research, 141 million people are projected to get malaria by as early as the 2030s with a global temperature rise of 1.5°C. This includes between 50 million and 62 million people in East and southern Africa alone. In East and Central Africa, up to 30,000 diarrhoeal deaths among children (below the age of 15) may occur by 2050 under the 1.5°C to 2.1°C scenario. In Asia, an increase of 125% per year (on average) in malaria cases is expected by 2050. Analyses also show an increase in (until now uncommon) ticks and Lyme disease in the region.

Box 3: Water crisis in Iraq

Iraq – the world’s fifth-most vulnerable nation to the effects of climate change¹⁶ – is in the midst of one of the worst water crises in living memory. Drought is ravaging swathes of the country, leaving at least 7 million people without water, food or electricity, and forcing farmers to abandon both their land and their dying animals so that they can migrate to towns and cities.

The Diyala governorate in northern Iraq, stretching from Baghdad to the Iranian border, is one of the areas worst affected by years of devastating drought. High temperatures have depleted water supplies, including the artificial Lake Hamrin that connects to the Diyala river. The lake has dried up so much that part of it has become a desert plain. With drastically lower water levels, supply slows to a trickle long before it reaches the end of canals farming villages that rely on water for themselves, their crops, and their animals. Many farmers like Khalida have relied on the lake their whole life. After her husband died, she worked on their land with her children, but the drought forced her to sell her animals and killed everything she grew.

‘We had lots of land, there was enough rain, and the rivers were full. Not anymore. We depend on the land to get our food and to feed our animals. Our animals would produce and then we would sell them. Now, the land is so dry we sold the sheep and cows. Not only us but everyone.’

Khalida said the situation is dire and her biggest hope for the future is for her children to find reliable jobs away from farming. Many families like hers are considering moving to the city, but she doesn’t want to do this. ‘I don’t want to leave, where would I go? But going back to relying on farming our land doesn’t seem like an option in the near future.’

FUNDING GAPS FOR WATER AND SANITATION

Achieving universal access to safe WASH services (as called for in SDG 6) in the 140 low and middle-income countries is estimated to cost approximately US\$1.7 trillion from 2016 to 2030, or US\$114bn per year.¹⁷ However, failing to meet these needs would cost even more: the economic losses (such as healthcare costs, productivity losses, etc.) associated with inadequate WASH services in 136 low and

middle-income countries is estimated at US\$260bn.¹⁸ Failure to provide clean water can also have fatal consequences for people in low-income countries; it is estimated that there are 829,000¹⁹ deaths per year due to diarrhoea as a result of unsafe drinking water. The current lack of prioritization for WASH in national budgets as well as official development assistance (ODA) is therefore critically flawed and must be addressed urgently.

In addition to the need to strengthen humanitarian funding, our research reinforces the urgency for greater long-term investment in WASH.²⁰ National governments must allocate significant budget to strengthen WASH investments. Analyses of national budgets show that in many countries, government expenditure on WASH is not only very low in relation to overall spend, but also as a percentage. For example, only 0.8% of GDP in Uganda and 0.5% of GDP in Bangladesh is allocated to WASH²¹. Conversely, in 10 of the countries examined in this briefing paper, spending on the military is more than double that for water and sanitation. In one of the most extreme cases in Africa, Nigeria is spending 21 times more on its military forces than on water and sanitation.²² Water and sanitation infrastructure that are sustainable and resilient require not only good governance, but also financial resources to implement WASH plans. This requires an urgent change in how governments prioritize their public spending.

Although greater investment by national governments remains a key requisite, inequalities in the global system have left many low and middle-income countries without the resources required to invest in WASH. Long-term goals on water security and WASH require significant funding, and ODA has not kept pace with rising needs. The COVID-19 pandemic laid bare the extent to which the world's WASH systems were unprepared – with funding for WASH having stagnated just prior to the outbreak of the pandemic. In 2022, a report from Action Against Hunger (ACF) found that only 30% of United Nations (UN) appeals for WASH (across 41 countries) were met.²³ The ACF report also found that no country experiencing a hunger crisis had any of its WASH appeals fully funded; countries experiencing hunger crises only had 38% of their WASH-related needs met. Oxfam's own research shows that humanitarian appeals linked to extreme weather have risen significantly over the past two decades,²⁴ particularly in countries in the Global South and many that are classified as 'fragile' contexts.²⁵ The highest number of recurring appeals involving extreme weather between 2000 and 2021 were from Afghanistan, Burkina Faso, Burundi, Chad, Democratic Republic of Congo, Haiti, Kenya, Niger, Somalia, South Sudan, Sudan, Uganda and Zimbabwe.²⁶

The short-termism of humanitarian funding towards WASH is a critical barrier in achieving water security. Short-term financing for long-term crises can, in fact, increase costs, decrease efficiency, and render interventions unsustainable – for instance, it is estimated that 60%²⁷ of water projects in Africa fail due to a lack of long-term investment. As such, long-term, flexible and predictable funding to WASH programmes, in line with national plans for recipient countries, remains urgent and indispensable. Considering the disease burden caused by WASH under-investments and the climate crisis, there remains an urgent need to bolster public health systems. Improving water security, sanitation and hygiene has significant potential to positively influence poverty, hunger, gender equity, health, education and cooperation, among other socioeconomic indicators.²⁸ It is urgent, now more than ever, for governments and donors to increase investments in WASH.

CONCLUSION AND RECOMMENDATIONS

The climate crisis is already having severe consequences for global water security and those impacts are being felt disproportionately by the most vulnerable regions and the most vulnerable people within them. Rising food insecurity, the spread of disease, forced migration and displacement, and a poorer future are all clear and predicted consequences of increased water insecurity driven by climate change.

It is critical that governments rally together in the face of this seismic challenge to honour their promises to deal with the drivers of climate change and invest sufficiently in the resources needed for water, sanitation and hygiene, particularly for marginalized and at-risk communities so that they can adapt and maintain their livelihoods.

Oxfam is calling on governments globally to:

Reduce emissions drastically: All countries, especially rich polluting nations, must rise to their responsibilities and resubmit ambitious nationally determined contributions (NDCs) in line with their fair share to limit the global temperature rise to below 1.5°C.

Invest in water security and sustainable water management: Ministers responsible for Finance, Health and Water of all national governments, together with donors, should unlock economic benefits and promote economic resilience by increasing long-term, flexible and predictable funding for climate-adapted WASH programmes. National planning and policy around WASH must commit to women's leadership, participation and decision-making at all stages.

Prioritise efforts to reach Sustainable Development Goal 6: This should be done with a particular focus on hard-to-reach populations, and ensure that these efforts take a rights-based and gendered approach, rebalancing historical and current inequities to access and investment in water. Promote gender mainstreaming in water management, security and sanitation by linking this to the SDG 5 Goal on Gender Equality targets and indicators.

Support those most at risk through early warning and anticipatory action: Governments globally must commit to anticipatory action and early preparedness ahead of climate shocks. Funding must be secured so that it is ready to be dispatched ahead of climate-related disasters. Social protection systems should be strengthened to mitigate people's chronic vulnerabilities to shocks. Locally led early action must be supported with sufficient funding.

Compensate those most affected by the climate crisis: Rich countries must meet longstanding promises to provide US\$100bn per year to help poorer countries cope with climate change and to compensate low-income countries for the damages and losses they caused them due to climate change. Governments must impose taxes on rich individuals and corporations, particularly those making record profits from the climate crisis such as fossil fuel companies. Where relevant, governments must consider cancelling the debts of low and middle-income countries that require support to adapt to climate change and water insecurity.

Provide emergency assistance to save lives and support development: Donors, especially rich countries, must immediately fill the UN humanitarian appeal gap to help the countries and people that are being hardest hit by the climate crisis. Donors must meet their commitments to provide 0.7% of gross national income (GNI) to ODA.

NOTES

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² United Nations Climate Action. 'Water – at the Center of the Climate Crisis'. Accessed 7 August 2023. <https://www.un.org/en/climatechange/science/climate-issues/water>

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⁴ UNESCO. (2019). *Water Security and the Sustainable Development Goals (Series 1): Global Water Security Issues (GWSI) Series*. United Nations Educational, Scientific and Cultural Organization (UNESCO).

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⁶ The research was done by Saaf Consult BV, Ele Jan Saaf and Valerio Nicolin- unpublished

⁷ The IPCC WGI Interactive Atlas and the CIE are complementary tools for climate projection studies thanks to their distinct features, datasets, and areas of focus. The IPCC WGI Interactive Atlas emphasizes physical climate change aspects such as temperature, precipitation and sea-level rise. The CIE goes beyond physical climate variables and provides information on climate impacts on various sectors such as agriculture, water and health. Thus, combining the two databases enables users to visualize and customize regional patterns and variations in climate change projections.

⁸ D. Grey and C. Sadoff. (2007). 'Sink or Swim? Water Security for Growth and Development'. *Water Policy*, 9, 545–71.

⁹ L. Rost. (12 March 2018). *How improving access to water can help reduce care work*. Views & Voices blog. Accessed 7 August 2023. <https://views-voices.oxfam.org.uk/2018/03/access-water-care-work>

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¹¹ Calculated from Our World in Data. 'CO₂ and Greenhouse Gas Emissions'. Accessed 7 August 2023. <https://ourworldindata.org/co2-and-greenhouse-gas-emissions>

¹² Oxfam. (21 September 2020). *Carbon emissions of richest 1 percent more than double the emissions of the poorest half of humanity*. Press release. Accessed 7 August 2023. <https://www.oxfam.org/en/press-releases/carbon-emissions-richest-1-percent-more-double-emissions-poorest-half-humanity>

¹³ The internal paper commissioned by Oxfam investigated SSP1, SSP2 and SSP5.

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