



# DRIED UP FUTURES



How population growth  
is driving drought,  
land degradation  
and desertification

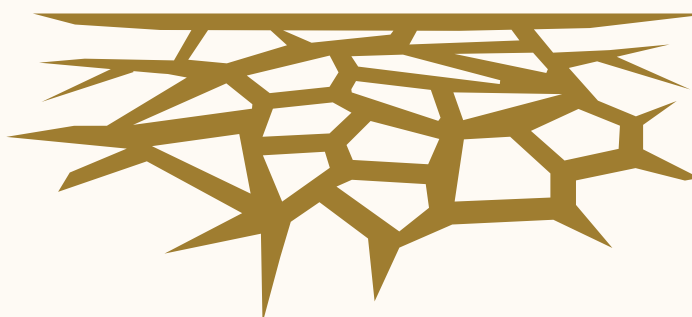
A Population Matters report



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# DRIED UP FUTURES

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# INTRODUCTION

We live in a world where no other set of hazards claims more lives, causes more economic losses, with effects across multiple sectors, than **drought**, **land degradation**, and **desertification**. Drought is both a driver and consequence of land degradation, whilst land degradation starts the process of desertification.

All three of these environmental crises exist within a complex interconnected cycle, that shapes and devastates the livelihoods of billions of people worldwide. Environmental crises exacerbate existing inequalities and social injustices, the poorest and least resilient to these crises are always hit the hardest, with the heaviest burden placed upon women and girls.

The United Nations Convention to Combat Desertification (UNCCD), is a treaty that has been in effect since 1996 and is ratified by 196 countries. In addition, there is the International Drought Resilience Alliance (IDRA), that convenes intergovernmental organizations, development banks, NGOs, private sector organizations, and indigenous groups.

Since 1970, the global human population has increased from 3.7 billion to now over 8 billion in 2024<sup>1</sup>, the resulting rise in demand has strained the earth's water and land systems and contributed to the higher risk of droughts and acceleration of land degradation.

Current UN projections predict that the human population is set to increase through to the end of the century. The UN's medium projection is for a population of 10.4 billion in 2100, with a 95%



*“Only if we **understand**, will we **care**. Only if we **care**, will we **help**. Only if we **help**, shall all be **saved**.”*

**Dame Jane Goodall,**  
Population Matters Patron.

certainty range of 8.9–12.4 billion.<sup>2</sup> All these extra billions of people will require more food and water, both fundamental resources at risk of scarcity in some areas due to the effects of drought and land degradation.

Population growth combined with rising per capita consumption has meant that humanity now exceeds the earth's biocapacity, surpassing the earth's capacity to generate a sustainable supply of natural resources (water, productive land, timber, fish stocks etc) and resulting in vast amounts of pollution, waste, and greenhouse gas emissions causing climate change. The Global Footprint Network estimates that we are currently in ecological overshoot, with humanity demanding 70% more than the earth's ecosystems can regenerate, the equivalent of using the resources of 1.7 earths.<sup>3</sup>

The International Drought Resilience Alliance is clear in its 2023 Global Drought Snapshot, when it stated, *“Nothing in nature can survive unlimited growth. Nothing in nature exists independently. Everything is interconnected and we are starting to realize this only now. We are not separated from nature, but are an integral part of this fragile web that evolved over millennia.”*<sup>4</sup>

We must recognise that continued high population growth, particularly in areas most vulnerable to drought and land degradation, increases the risk and severity of these crises. In addition, we must focus on reducing our overconsumption of resources, particularly in the Global North. The UN’s Global Resources Outlook 2024 made clear that an unsustainable demand for resources, such as land and water, is the main driver of the triple planetary crisis: climate change, biodiversity loss, pollution, and waste. The report stated, *“Over the past twenty years, affluence explains 40 percent of the global increase of material extraction, while population contributed to 27 per cent. Technology is found to only mitigate global material extraction by five per cent.”*<sup>5</sup>

We can no longer consider natural resources as a free or infinite commodity, instead humanity is putting itself in debt to the earth, resulting in the devastation of drought and land degradation.

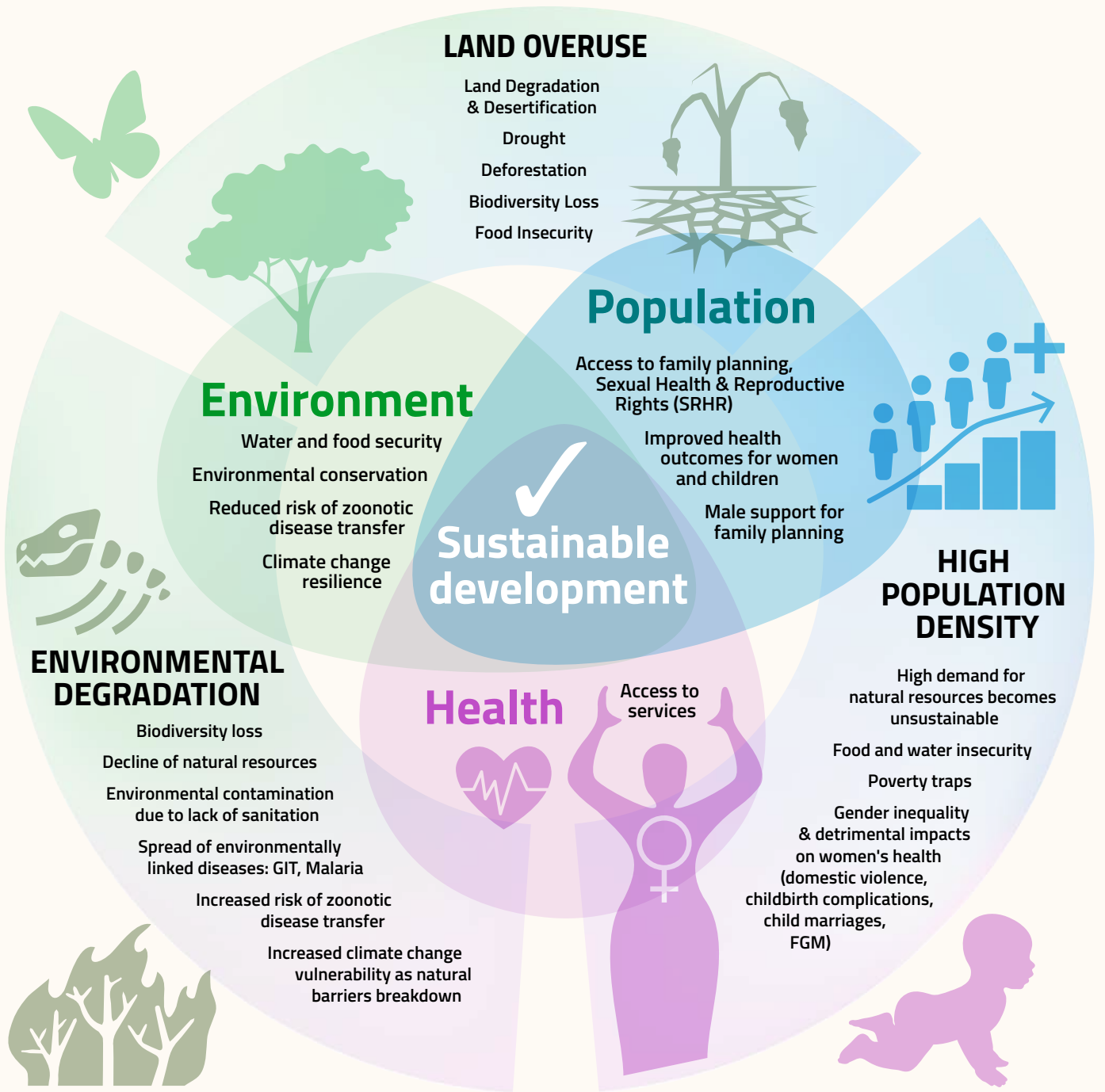
Despite wide recognition of population growth as a factor contributing to droughts and land degradation, there persists a taboo around addressing population as an effective long-term

preventative solution. This report will address the impacts of population growth on drought and land degradation, and emphasise that curbing population growth can be done through positive, ethical means, that focus on empowering women and girls. This report will place a great emphasis on Population Health Environment (PHE) solutions, and so it’s worth explaining what PHE is.

PHE projects operate with the understanding that people, their health, and the environment are interrelated and interdependent. PHE’s holistic approach to choice-based family planning integrated alongside education on sustainable natural resource management and environmental conservation, can achieve better results for health and environmental outcomes than single sector approaches. Long-term lowering local fertility rates through PHE programs can effectively reduce the pressure of high population density on strained natural resources, acting as a preventative approach to drought and land degradation.

The following sections of this report will outline the destructive cycles caused by drought, land degradation, and desertification, and the need to break those cycles by addressing the underlying drivers: continued population growth, unsustainable resource demand, and gender inequality.

# What Is Population Health Environment?



# DROUGHT

## The Silent Crisis

Just as life is dependent on water, so too is life devastated when water is scarce. Droughts have been described as “misery in slow motion”, an apt phrase that describes the long-term and detrimental impacts of drought, and the often-slow responses to them.

Unlike wildfires or floods, droughts don’t present an immediate or dramatic crisis, as a result they don’t dominate news coverage. Yet droughts remain a global issue, affecting both high-income and low-income countries. In 2022, Europe experienced its hottest summer and second warmest year on record, resulting in an over 200% increase in drought-impacted areas.<sup>6</sup>

The principal cause of drought is low rainfall over an extended period. Droughts are made worse by climate change, deforestation, increased urbanisation, and groundwater depletion, all in turn driven by population growth and our unsustainable demand for resources.

Droughts exacerbate pre-existing inequalities. Low to middle-income countries, especially those located in the Global South, are already at higher risk of drought due to hotter climatic conditions, the effects of drought compounded by low-

income countries’ lack of resources to be resilient to them. Within local communities, droughts disproportionately impact the most vulnerable members, women and girls.

## Climate Driven Drought

Climate change is leading us into a hotter, drier future, with more irregular rainfall, and more frequent droughts. A study by the World Bank found that dry episodes have been growing in frequency over the past half century, consistent with the projections of most climate change models.<sup>7</sup>

Every factor of a degree of global warming increases the risk and severity of future droughts, impacting the lives of millions of people worldwide. The IPCC reports that a warming of 3°C above pre-industrial levels, would cause an estimated 170 million people to experience extreme drought. By limiting the warming to 1.5°C, the population exposed to such conditions would decrease to 120 million (IPCC, 2022).<sup>8</sup>

Population Matters has run a dedicated campaign on climate change for several years, to raise awareness of the link between population growth and climate change. The IPCC’s Sixth Assessment Report, *Climate Change 2022: Mitigation of*

## The Horn of Africa Drought

Drought has been an ongoing crisis in the Horn of Africa since 2020.

The drought has affected about 50 million people in the region directly, and another 100 million in the wider area. In 2022, 23 million people in the region faced food insecurity, due to water shortages and crop failure.

The region is home to a population of roughly 206 million, 60% of which is concentrated in Ethiopia.

Over the next 10 years, the Horn of Africa’s population is projected to grow to 241.3 million by 2030, with over 200 million people in Ethiopia alone.

High population growth in the region will increase strain on scarce water resources, making the current drought even harder to solve. The impacts of drought cascade across all areas of life, lead to conflict and displacement, and violence inflicted on women and girls.

Source: Global Drought Snapshot 2023

Climate Change, clearly cited “Globally, Gross Domestic Product (GDP) per capita and population growth remained the strongest drivers of CO2 emissions from fossil fuel combustion in the last decade.”<sup>9</sup>

The IPCC has identified potential future high population growth as a “key impediment” to hitting the critical target of limiting global warming to 1.5°C above pre-industrial levels.<sup>10</sup>

### Water Scarcity and High Population

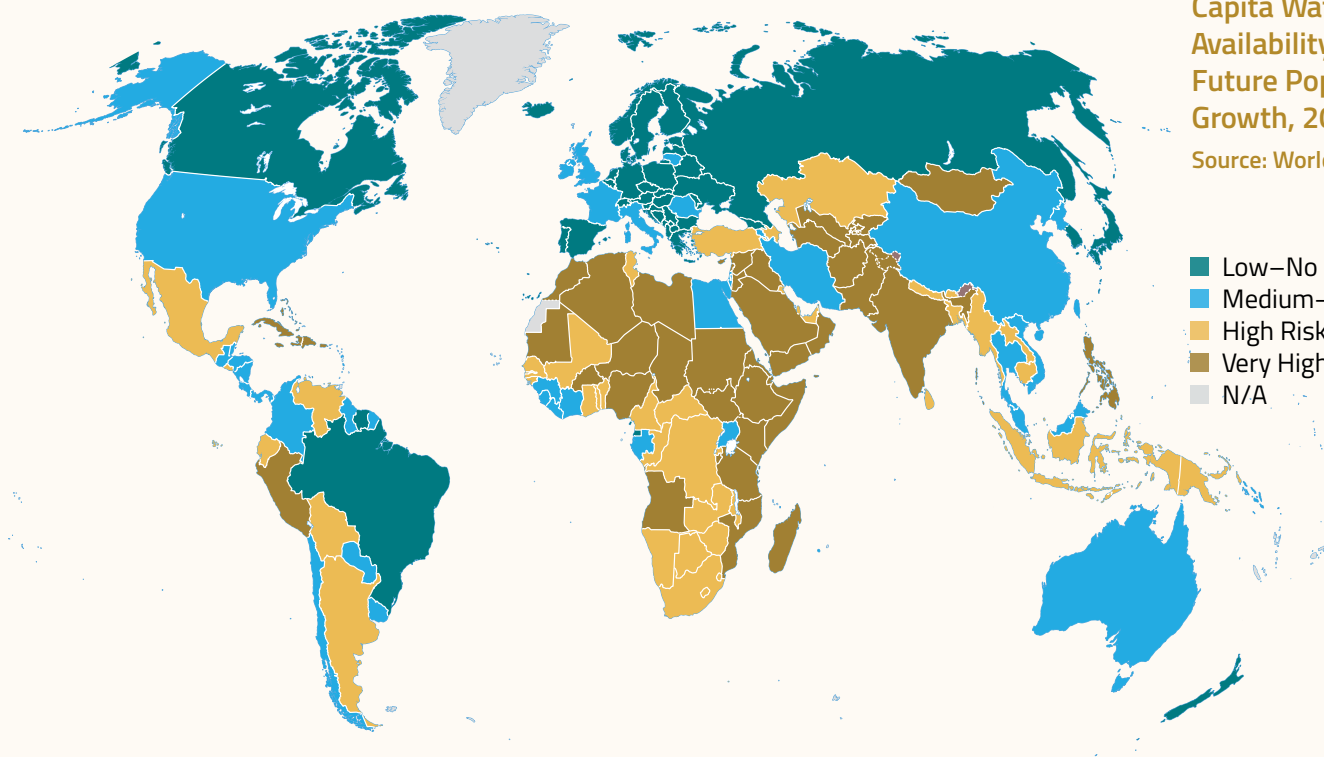
The World Bank stated in its Droughts and Deficits 2023 report, “Water deficits will soon become the new normal through much of the world. With rising human populations and growing prosperity, water demand is growing exponentially, while damaging human activities are degrading and diminishing water supplies (watersheds, rivers, lakes).”<sup>11</sup>

Water, the most abundant resource on our planet, is now becoming a strained resource due to our unsustainable demand and our growing numbers. The ecological limits of the planet are being enforced, and so too must we recognise to end

drought, we must curb population growth and reduce our unsustainable demand.

The World Bank has created a map that identifies the areas at highest risk of drought, it overlays projected population growth with the future availability of water in 2050. It starkly illustrates that the regions with the highest rates of population growth will become the driest, and most vulnerable regions to the impacts of climate change and drought, endangering millions of lives.

The largest areas identified on this map at very high risk of drought are India and Sub-Saharan Africa. India has recently overtaken China as the most populous country in the world, with a population of 1.4 billion.<sup>12</sup> According to UN projections, India’s population is expected to peak at about 1.7 billion in 2064.<sup>13</sup> Whilst India has taken significant strides to reduce the proportion of its population living in extreme poverty from 63.5% in 1977 to 12.9% in 2021<sup>14</sup>, population growth will still mean a greater number of people



**Map 1: Global per Capita Water Availability and Future Population Growth, 2050**

Source: World Bank

- Low–No Risk
- Medium–Low Risk
- High Risk
- Very High Risk
- N/A

born into extreme poverty, who will face the harsh conditions of drought.

The population of Sub-Saharan Africa is currently 1.4 billion and is expected to grow by 2050 to over 2 billion.<sup>15</sup> A recent study published by The Lancet, Global fertility in 204 countries and territories, noted, “Broadly, over the coming decades, the majority of livebirths will become concentrated in the areas of the world that are most vulnerable to climate change, resource insecurity, political instability, poverty, and child mortality. High numbers of births in these regions will further strain all areas of vulnerability.”<sup>16</sup>

The UNCCD’s report, Drought in Numbers 2022, was clear on the direct drivers of drought when it stated: “Within the next few decades, 129 countries will experience an increase in drought exposure mainly due to climate change alone – 23 primarily due to population growth and 38 mostly due to the interaction between climate change and population growth.”<sup>17</sup>

The report identified 23 countries that experienced drought emergencies between 2020 and 2022, all identified as low-income countries with high rates of population growth, including Afghanistan, Niger, Madagascar, and Ethiopia.<sup>18</sup> Whilst the United States and Europe have also dealt with droughts in the last few years, these wealthy nations are better equipped to reduce the impacts of drought through agricultural subsidies and imports, than low-income countries who lack the same resources.

### Loss of Green Water

Dense canopies of trees provide a natural umbrella that traps rainwater, slowing the pace of rainfall and allowing it to be absorbed into the soil, reducing the chance of flooding. Forest roots act as natural sponges, absorbing and retaining water, and recharging groundwater. Over time, forests slowly release this water, increasing river flows during the dry seasons. In addition, forests provide shade and cooling through transpiration and evaporation of water, reducing

local temperatures and helping to conserve water sources.

In this way, forests act as a buffer against droughts, as they can absorb water when it’s plentiful, and release water when it’s scarce. However, deforestation continues at a high rate worldwide.

The relationship between population growth and deforestation is complex, with both direct and indirect drivers. The most direct driver of deforestation from population growth is land-clearing for agriculture and habitable space, due to the expansion of local communities as population density increases in and near forested areas. In addition, mass deforestation is caused by both commercial and illegal logging, as well as land-clearing for cattle-grazing, both indirectly driven by demand from continued population growth as well as rising per capita consumption. Deforestation leads to the loss of forests as a regulator of local water sources, and compromises the ability of forests to act as a natural barrier against droughts.

Whilst large-scale afforestation is taking place, such as Africa’s Great Green Wall project, it should be noted that young plantations of forests use more water than older, natural forests which are established and able to conserve and regulate local water sources.<sup>19</sup> To utilise forests as a nature-based solution against drought it’s imperative to preserve old-growth forests, which becomes impossible to do with continued timber and land-use demand due to population growth and rising per capita consumption.

### Disappearing Groundwater

Until recently, groundwater has been utilised as a coping strategy for droughts. Groundwater is stored in underground reservoirs known as aquifers. However, unsustainable demand for groundwater has resulted in 21 out of 37 of the largest global aquifer systems being depleted faster than they can be recharged.<sup>20</sup> The water



level in these aquifers is in danger of dropping out of the reach of available pumps and wells. Without groundwater to rely on as an alternative water source, this will significantly worsen the future effects of droughts.

### Urban Droughts

More than half of the world's population live in urban areas, and this is set to increase to over two-thirds of the global population living in urban areas by 2050.<sup>21</sup> Urbanisation increases the risk of droughts, as urban areas are marked by impermeable surfaces, such as concrete and tarmac, which prevents rainwater from being absorbed into the ground. On average, only 15% of rainwater is absorbed into the ground in urban areas compared to 50% in rural areas.<sup>22</sup> Lack of rainfall absorption into the ground prevents groundwater reservoirs from recharging, and results in water run-off causing flooding.

Rising affluence is also commonly cited as a cause of higher rates of water consumption, contributing to droughts. Aesthetic preferences such as green lawns lead to wasteful water consumption. To counteract this, environmental movements have sprung up to raise awareness of the need to conserve water over aesthetic preferences, such as the World's Ugliest Lawn Competition.<sup>23</sup> The World's Ugliest Lawn Competition an annual event for lawn owners who conserve water, with their parched lawns celebrated as a sign of efficient water use.

Cities can introduce eco-urban planning that creates more green spaces and permeable surface areas, allowing for more rainwater collection and sustainable water management. However, for many low-income countries, high population growth drives rapid urbanisation, with infrastructure built quickly and cheaply, not in mind of sustainable urban planning that will conserve rainwater or be sensitive to environmental conditions, leading to more frequent urban droughts.

### Cascading Effects of Drought

Drought is one of the most expensive natural disasters. In the past 50 years, drought-related hazards have led to economic losses of over 70 billion USD in Africa.<sup>24</sup> Crop failure due to drought is one of the biggest sources of economic loss. In high-income countries, governments can subsidise farmers to buffer against the impacts of drought. However, for smallholder farmers in low-income countries, which constitute 84% of the world's farms<sup>25</sup>, droughts can be devastating, causing food insecurity, and driving people below the poverty line. The FAO (2011) is clear when it stated, "Water security is a prerequisite for food security"<sup>26</sup>, without reliable access to safe, clean water, this heightens the risk of food scarcity.

Droughts don't just impact communities, but also wildlife. Ranging animals, such as elephants, will be drawn to available sources of water, which leads to increased conflict with humans as elephants encroach upon human settlements, competing over limited resources. As outlined in Population Matter's *Vanishing Icons* report, population growth is a driver of increased human-wildlife conflict, undermining conservation efforts of endangered species like elephants.

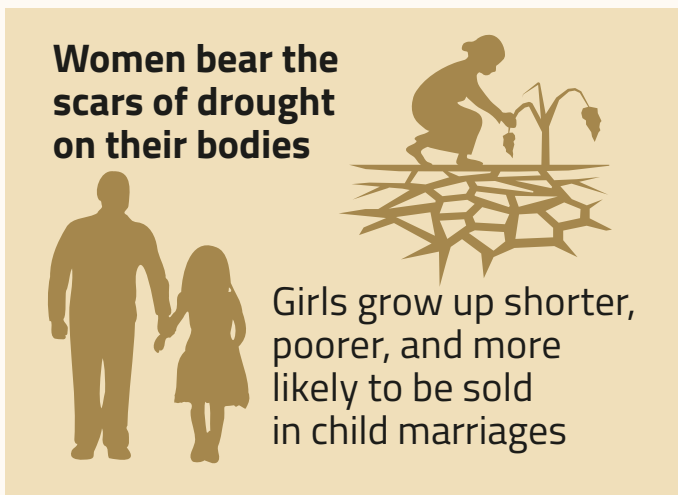
Faced with crop losses and declining land productivity due to droughts, smallholder farmers often expand or relocate their cropland, this coming at the expense of natural habitats and forests. Land cleared for agriculture results in biodiversity loss, threatening hundreds of wildlife and plant species with extinction, and degrades the ability of natural ecosystems to act as barriers to drought. In turn, droughts can be incredibly destructive to ecosystems. Long dry periods can result in vegetation die-off, with droughts increasing deforestation by 7.6% compared to years of normal weather.<sup>27</sup>

Land degradation and desertification are aggravated by drought, with dry spells causing soil erosion and declining soil fertility. In turn, land degradation and desertification, can impact

the ground's ability to absorb and retain water during rainfall, resulting in run-off and flooding, followed by periods of droughts. Drought, land degradation, and desertification, all intertwined in a negative feedback loop, triggering ever worsening effects upon each other.

### Impacts of Drought on Women and Girls

The impacts of drought are devastating on communities, but research has found that droughts disproportionately impact women and girls. In rural Africa, female infants born during severe droughts will grow up physically shorter, receive less education, and ultimately become less wealthy.



In community settings, women and children are typically tasked with sourcing water for the household to use for drinking, cooking, and washing. During times of drought this places a greater burden on women and girls who are tasked with walking further distances to collect and carry water. Data sourced by UNICEF, has found that women globally spend a total of 200 million hours every day collecting water.<sup>28</sup> Long-term this can have negative effects on women's health; one study found that water-carrying methods impose physical loads with the potential to cause musculoskeletal disorders and related disabilities. The occurrence of spinal (neck or back) pain was 69%, and back pain was 38% for women carrying containers on their head (mean container weight

19.5 kg) over a mean distance of 337 meters.<sup>29</sup> The time spent collecting water, erodes the time available for women and girls to dedicate themselves to other activities, such as education, paid work, leisure, or rest.

Droughts cause crop losses, triggering food scarcity, with women and girls more likely to skip meals to ensure food is given to others in the family.<sup>30</sup> Malnutrition in the early years of a girl's life can impact cognitive development, including impaired attention, decreased IQ scores, and reduced working memory<sup>31</sup>, effecting a girl's ability long-term to pursue higher education.

A study by Save the Children, suggests that between now and 2030 almost 60% of girls globally – 931 million girls – will experience at least one extreme climate event, with 23.5 million girls likely to experience drought.<sup>32</sup> Droughts have been linked to an increase in child marriages. Food and water scarcity can push families to arrange marriages for young girls in exchange for dowries or to have one less mouth to feed. In Ethiopia, rates of child marriage rose by 119% in 2022 in areas worst impacted by drought.<sup>33</sup>

UNICEF has called for an end to child marriages, as it violates girls' rights, placing them at higher risk of violence, exploitation, and abuse. A 2021 study of child marriages in Indonesia found that, "Girls who marry before 18 years of age have increased risks of school dropout, gender-based violence, social isolation, poverty, non-use of contraception, high fertility, short birth intervals, unintended pregnancy, reproductive morbidities including obstetric fistula, maternal mortality, poor mental health, sexually transmitted infections, and HIV/AIDS."<sup>34</sup>

Child marriages are also a driver of high fertility rates and population growth in low and middle-income countries. A study by the World Bank found that "on average women who married at age 13 are likely to have 26.4% more live births than if they had married at 18 or later, all other things being equal"<sup>35</sup>. This is due to the fact that

child brides begin having children at a younger age, extending the window of their child-bearing years. There is also a pattern of reduced contraception use linked to child marriages, which leads to shorter intervals between births, and negative health effects with a higher risk of childbirth complications.

Population growth has been recognised as a driver of droughts, and a factor set to make the effects of future droughts more severe. What is important to emphasise is the necessary need to empower women and girls, not only to protect them as the most vulnerable demographic to droughts, but by recognising that empowering women and girls is the most effective solution to curb population growth and mitigate against future droughts. The Lancet, Global fertility study notes, “Our projections suggest that improving access to modern contraceptives and female education – the two primary drivers of fertility – would reduce fertility rates in higher-fertility countries and territories, limiting the increasing concentration of livebirths in these areas.”<sup>36</sup>

### **Women at the Forefront of Drought Mitigation and Resilience**

Currently, the ability to predict when droughts will occur is limited in many parts of the world, but it’s with near certainty that we can predict that droughts will become more frequent, and more severe in the coming decades due to climate change.

Population growth is recognised as a driver of drought and is also a factor set to significantly hinder low-income countries’ resilience to future droughts, yet despite this the UNCCD stops short of acknowledging that curbing population growth is an effective long-term solution to mitigate against droughts. There is much to praise in the UNCCD’s Gender Action Plan, with its policies aimed at improving gender equality and securing women’s land tenure rights. However, the UNCCD fails to acknowledge that choice-based family planning programs is also a necessary component to empower women and girls.

A woman without access to safe, modern contraception lacks the power to be in control of her body, her fertility, and her future. It makes her more vulnerable to the effects of drought, as higher population density contributes to water scarcity, and the time consumed in pregnancies and childcare erodes the time available to women to contribute to drought-resilience efforts. If women can space their pregnancies with access to modern contraceptives, this ensures they can dedicate more time to education on water conservation and participate in nature-based solutions to drought, such as forest conservation and wetland restoration.

The UNCCD places an important emphasis on nature-based solutions to drought. Though the effectiveness of nature-based solutions is undermined if population growth continues to go unaddressed. Increased population density in at-risk areas to drought leads to land-clearing and deforestation, breaking down natural ecosystem barriers, and worsening the effects of drought. To achieve the full effectiveness of nature-based solutions against drought, then an approach such as PHE that integrates choice-based family planning programs alongside nature conservation and education on sustainable natural resource management, must be supported.

Population growth has long been recognised as a driver of drought, now it is time for addressing population to become part of the solutions too. To empower women and girls, we must enshrine their sexual and reproductive rights, increase their access to choice-based family planning and quality education. By doing this we can ensure women and girls are no longer the victims of drought, but the leaders at the forefront of drought resilience and mitigation.

# LAND DEGRADATION

## Foundation of Life

Land is the foundation upon which civilisation is built, it's one of the most valuable resources upon which we depend for our food, our shelter, and it plays a key role in the regulation of our climate. However, due to humanity's rapid expansion and cultivation of land, the resource upon which we all depend is increasingly degraded.

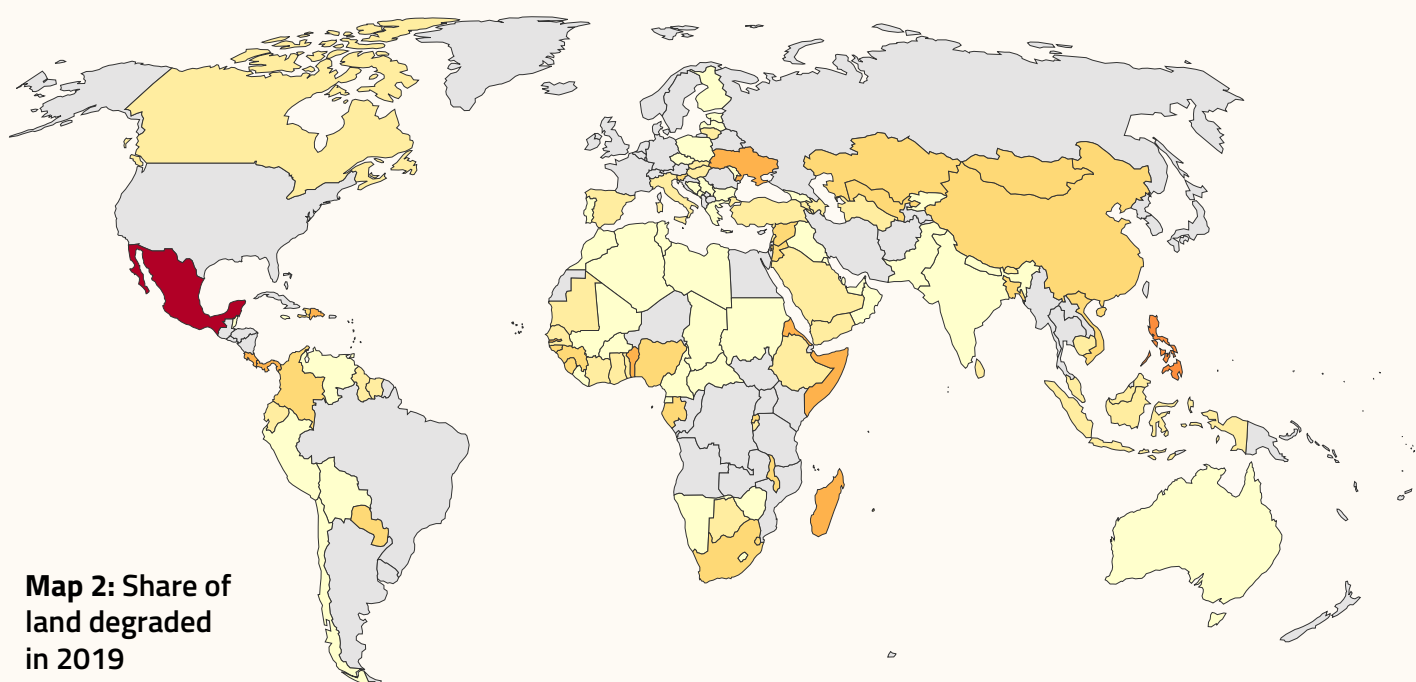
The UN's Global Land Outlook 2022 suggests that 20–40% of the earth's land is in a degraded condition.<sup>37</sup> With productive land being lost at an unprecedented rate, the UN's latest estimate suggests that at least 100 million hectares of land are lost annually to land degradation. This loss of productive land will result in crop shortages, rising food prices, and more detrimental climate impacts. Similarly to the impacts of drought, land degradation will exacerbate existing inequalities, disproportionately impacting the poorest globally and the most vulnerable members of those societies, mostly women and girls.

In sub-Saharan Africa and in South America, 163 million hectares and 108 million hectares respectively have been lost to land degradation since 2015.<sup>38</sup> The effects of land degradation already impact nearly half of the world's population. With continued global population growth, increasing pressure is placed upon the world's land to meet rising demand for housing, food, timber, and minerals, stretching the productive capacity of land beyond its limits and causing further land degradation.

## What is land degradation?

The IPCC defines land degradation as, “a negative trend in land condition, caused by direct or indirect human-induced processes including anthropogenic climate change, expressed as long-term reduction or loss of at least one of the following: biological productivity, ecological integrity, or value to humans.”<sup>39</sup>

Land in a degraded condition cannot support local plant or wildlife and has a reduced ability to absorb and retain rainfall, resulting in biodiversity loss, and increased risk of flooding and droughts.



**Map 2: Share of land degraded in 2019**

Source: Data from multiple sources compiled by the UN



The depletion of nutrients and microorganisms in the soil of degraded land renders it infertile and unproductive for agriculture, resulting in crop shortages and food insecurity. This in turn can result in an acceleration of habitat loss and deforestation, as farmers faced with infertile, degraded land either expand or relocate to new areas, cultivating previously untouched areas of forest or wetlands into agricultural land. However, unsustainable agricultural practices on these newly cultivated areas can result in more land degradation, continuing a worsening cycle of agricultural expansion, land degradation, and biodiversity loss.

Land degradation can become a permanent condition. Land in a permanently degraded condition is unable to be restored to its previous condition through natural processes over time, rather it requires significant intervention via artificial means for the land to recover.

***“Agriculture and clearing of land for food and wood products have been the main drivers of land degradation for millennia.”***

IPCC 2022.

### Cost of Agriculture

Since the dawn of agriculture during Neolithic times, land degradation has followed, and accelerated as agriculture has expanded and intensified, to meet the rising demands of our growing population now with over 8 billion mouths to feed.

For hundreds of years the effects of land degradation caused by agriculture have largely been contained by smaller local populations. For example, in Sub-Saharan Africa historically subsistence farmers ploughed land, harvested crops, then once the land's productivity declined, they relocated their farms to sow crops

**More people need more food**



Intensive agriculture drives land degradation, 100 million acres of land lost annually

elsewhere, leaving the departed land fallow to reclaim soil nutrients. However, due to rapid population growth, particularly in Sub-Saharan Africa, land-clearing is occurring at a faster rate than the process in which fallow land can recover. With deforestation and wetland clearance for agriculture removing the areas of natural habitat that provide nutrient renewal and restore productivity back into fallow land, resulting in soil nutrient depletion and land degradation.

The population boom in the late-20th century, when our population more than tripled from 2.5 billion in 1950 to over 8 billion today, is largely down to the agricultural revolution with the invention of artificial fertilisers, alongside improvements in public health. The expansion and industrialization of agriculture in the last 100 years has ensured millions more people can be fed, however it has also come with a steep environmental cost, with increased land degradation, deforestation, pollution, and greenhouse gas emissions. Food systems account for over a quarter (25–30%) of global greenhouse gas emissions.<sup>40</sup>

### Intensive Agriculture

Modern agricultural practices like overusing pesticides and artificial fertilizers have resulted in chemical run-off from farms, causing toxic algal blooms, polluting local waterways, and causing land degradation as surrounding habitat decays due to toxic chemical exposure.

### The Impact of Population Growth on Land Degradation, Rwamagana District (2000-2020)

- Land degradation is a major problem in Rwanda.
  - Researchers report that soil losses are between 35 and 246 tons per year, with local farmers reporting declining productivity in their fields.
  - To understand what was driving land degradation, researchers focused on a study of land degradation in the District of Rwamagana.
  - The District of Rwamagana has a population of 313,461 people, 53% of whom are under the age of 19 according to the 2012 census.
  - Agriculture accounts for the main form of employment in the area, with more than 57.3% of working-age residents registering as independent farmers and 11.7% as independent non-farmers.
  - The area is notable for its high population growth and population density, causing the expansion of agriculture into more remote, uncultivated areas.
  - Between 2010-2020, population density increased from 411 persons per km<sup>2</sup> to 499 persons per km<sup>2</sup>, a far higher figure than the average for the province which is 461 persons per km<sup>2</sup>.
  - Researchers noted following this high local population growth, agricultural practices extended into wetlands, forests, and marginal areas, resulting in increased deforestation, clearing of native vegetation, and larger areas of degraded land.
  - There was also a significant decline in the size of wetlands in the area, due to human activity such as sand mining, as well as clearing of swampy vegetation for agricultural expansion. The clearance of the wetlands left them exposed and susceptible to drying up.
  - Wetlands are important for ecosystem regulation, as wetlands break down sediments, nutrients, and toxins, improving local water quality. Wetlands also provide wildlife habitat and are important areas for biodiversity.
  - The presence of wetlands is an important barrier to droughts during the dry season. However, land degradation is causing wetlands to dry up – breaking down this natural barrier to droughts.
- Source: International Journal of Innovative Science and Research Technology (Volume 8, Issue 3, March – 2023)

Population growth combined with rising affluence has also meant a global transition to a more meat and dairy-based diet, with meat production having tripled over the last 50 years.<sup>41</sup>

Livestock farming places intense pressure upon the land, with livestock requiring grazing space, and thus requires more land to be cleared than arable farming. Croplands make up one-third of agricultural land, whilst grazing land makes up the remaining two-thirds.<sup>42</sup>

Livestock farming also causes the issue of overgrazing, when vegetation is exposed to intensive grazing for extended periods of time, without sufficient recovery periods, resulting in

vegetation die-off and nutrient depletion in the soil. In addition, soil compaction and removal of soil-protecting crops caused by the extended presence of livestock can result in soil erosion, causing land degradation.

#### Soil Erosion

Fertile soil is agricultural gold, it's the vital resource that we depend on to grow our food. Topsoil is the upper layer of soil, usually between 2 to 8 inches in depth, it contains the majority of the ground's nutrients that are required for crops to grow. Yet due to unsustainable land management, half of the world's topsoil has been lost in the last 150 years.<sup>43</sup> Soil erosion is a natural process, with topsoil typically displaced by water

and wind erosion. However, intensive agriculture, deforestation, increased urbanisation and roads, along with climate change, has increased the rate of soil erosion by 10–50 times worldwide.<sup>44</sup>

Forests preserve soil health, with mature root networks anchoring soil and reducing the rate of topsoil erosion. Forests also provide leaf litter, an important mechanism to re-introduce organic matter back into the soil and replenish nutrients. However, high rates of deforestation continue globally, with the UN FOA estimating that 10 million hectares of forest are cut down annually,<sup>45</sup> this attributed to rising demand for land use, primarily for agriculture and human settlement, both driven by continued population growth.

### Worsening Climate Impacts

Soil is an important carbon sink; the world's soils contain the second largest active store of carbon after the ocean. Carbon sinks absorb and lock in carbon from the atmosphere, reducing the effects of climate change caused by increased levels of carbon dioxide in the atmosphere.

However, soil erosion and land degradation cause organic matter in the soil to decay, breaking down soil's ability to act as a carbon sink, instead releasing carbon dioxide and other harmful greenhouse gases, such as nitrous oxide, into the atmosphere. An estimated two-thirds of all terrestrial carbon stores from soils and vegetation have been lost since the 19th century due to land degradation, making land degradation one of the biggest contributors to climate change.<sup>46</sup>

Climate change is also set to increase the rate of land degradation. The IPCC has identified increased global temperatures, as well as climate-caused more irregular and intensive patterns of rainfall, to increase soil erosion.<sup>47</sup> Just as anthropogenic climate change is caused by our growing numbers and unsustainable demand for resources, so does our outsized impact upon the planet degrade and break down the natural barriers to regulate the carbon cycle, such as

the decay of the world's soils, resulting in a downwards spiral of worsening climate effects.

### No Land, No Life

Land degradation negatively impacts 3.2 billion people<sup>48</sup>, and is predominantly faced by smallholder farmers and the extremely poor, who are most vulnerable to its effects. It's estimated that 12 million hectares of land capable of producing 20 million tons of grain are lost annually due to drought and land degradation<sup>49</sup>, which contributes to the crisis of 282 million people experiencing high levels of food insecurity.<sup>50</sup>

*“For more than 3 billion people, land is core to their survival, well-being, and livelihood – it is the principal asset of the rural poor.” – UNCCD, 2023<sup>51</sup>.*

According to the UN FAO nearly half of the world's population live in households dependent upon agrifood systems.<sup>52</sup> The long-term effects of land degradation can disrupt people's livelihoods and cause food insecurity, increasing the risk of conflict, displacement, and migration.

### Consumption and Land Degradation

The IPBES (2018) assessment on land degradation states, *“Unless urgent and concerted action is taken, land degradation will worsen in the face of population growth, unprecedented consumption, an increasingly globalized economy and climate change.”<sup>53</sup>*

The report goes on to examine the complexity of the relationship between population growth, consumption, and land degradation, *“The ultimate driver of land degradation is high and rising per capita consumption, amplified by continued population growth in many parts of the world.”<sup>54</sup>*

The disparity in the resource demands of the Global North vs the Global South are well known. According to the Global Carbon Atlas, an average person in the UK emits almost four times the amount of carbon annually compared to the average Indian, and over 12 times that of the

average Nigerian.<sup>55</sup> This disparity in resource demand also mirrors the vast inequalities plaguing modern food systems, with the persistence of hunger and food insecurity in many areas of the Global South, whilst food waste and obesity present problems in the Global North.

To slow and prevent further land degradation it's vital that countries, particularly those in the Global North, act now to reduce their overconsumption of resources in order to reduce corresponding pressures placed upon land.

### Population is an “Amplifier”

The IPBES (2018) report's use of the word “amplifier” is apt when it comes to describing the impact of population growth on land degradation. Whilst population growth cannot be assigned as the sole cause of land degradation, it amplifies all the intensive pressures placed upon land, from expanding agriculture to increasing resource extraction from mining and logging.

The IPBES (2018) assessment report on land degradation, identified: “*cropland expansion, unsustainable land management practices including overgrazing by livestock, urban expansion, infrastructure development, and extractive industries as the main drivers of land degradation.*” In addition, the report noted, “*that the ultimate driver of land degradation is high and growing consumption of land-based resources, e.g., through deforestation and cropland expansion, escalated by population growth.*”<sup>56</sup>

It's been estimated to meet the rising demand of our growing population we would need to scale up food production by 70% by 2050.<sup>57</sup> Whilst technological breakthroughs may occur that improve agricultural efficiency with reduced environmental impacts, they would be limited by scale if continued population growth drives unsustainable demand, as Connor (2013) makes clear, “*it is exactly because the world now faces an inescapable requirement to increase crop production by 70% on essentially current agricultural land to adequately feed an expected population of 9.2 billion*

*by 2050 that low yielding systems [such as organic farming or agroecology] cannot contribute to the solution.*”<sup>58</sup>

We must recognise that the earth is not an infinite food basket, rather intensive, industrial agricultural practices have pushed the earth's ecological systems to a breaking point. With sustainable agricultural solutions not currently able to produce at the scale required, we must focus on reducing demand, through ending our overconsumption of resources, particularly in the Global North, and curbing global population growth.

### Women Working the Land

Women have a large presence in agri-food systems, particularly in the Global South. The agri-food sector accounts for 71% of female employment in South Asia and 66% of female employment in Sub-Saharan Africa.<sup>59</sup> Land degradation disproportionately impacts women and girls, affecting their livelihoods and food security for themselves and their families.

Despite the large presence of women in the global agricultural workforce, women comprise less than 13% of agricultural landholders. Gender inequalities persist, with women's working conditions more likely to be informal, unpaid, or poorly remunerated, with access to fewer productive resources than men. Women and girls are also more vulnerable to the social conflicts and instability that can arise from land degradation. A 2007 study by the London School of Economics, found that on average environmental disasters kill more women than men following a survey of 141 countries.<sup>60</sup>

The importance of women as land stewards cannot be underestimated, as women's role in providing for the welfare and nutritional needs of their families means they are more likely to invest in soil conservation. After a new framework for land registration was introduced in Rwanda in 2006 to increase tenure security for women, it was



found that registered landowners were over two times more likely to invest in soil conservation than unregistered owners, with women headed households 19% more likely compared to 10% of men.<sup>61</sup> If women are able to own the land they farm, then they are more likely to invest in sustainably managing that land to reap long-term benefit from it. Yet due to persisting inequalities and patriarchal norms, women and girls are often excluded from training in sustainable land management.

### **End the Taboo, End Land Degradation**

In more than 100 countries, women have limited rights in claiming and protecting land assets due to local customs, religion, or patriarchal laws and practices.<sup>62</sup> The UNCCD's focus on improving women's land tenure rights and access to educational resources on sustainable land management should be celebrated. The UNCCD rightly recognises that improving women's land tenure rights can encourage more sustainable land management and prevent further land degradation.

However, it must also be recognised that efforts to curb population growth is an effective long-term strategy to prevent and slow land degradation. As outlined above, population growth is an amplifying factor that drives land degradation, yet there persists a reluctance to address population growth as part of the solutions to land degradation. This reluctance most likely stems from an association with coercive population policies like China's one child policy that infringed upon people's rights, but this perception overshadows all the positive, ethical population policies that have been successfully introduced in other countries. Population Matter's own *Power to the People* report outlines four case studies of effective, choice-based population policies, from Thailand, Kerala, Rwanda, and Costa Rica. These countries have successfully reduced population growth through policies and programmes which improved lives and enhanced opportunities, by clearing away obstacles and giving people the choice to

have smaller families. Policies to curb population growth can also help achieve the Sustainable Development Goals, to quote the IPBES (2018) assessment report on land degradation, "*Measures to curb population growth are available and can deliver significant and lasting environmental and social benefits. These include improved access to education, family planning and gender equality.*"<sup>63</sup>

To combat land degradation in the most at-risk areas, the holistic approach offered by PHE that can address all the drivers of land degradation is needed. PHE projects can provide education on sustainable land management to local communities, reducing immediate pressures upon the land. In addition, the lowering of local fertility rates achieved through integrated family planning programs will reduce population growth, long-term reducing pressure on the land and preventing further land degradation. PHE can break the destructive cycle of land degradation, instead putting people at the heart of sustainable land stewardship.

# DESERTIFICATION

## Drylands to Deadlands

Deserts may be thought of as hot, desolate landscapes, but true deserts are rich with biodiversity, and play a critical role in the regulation of our planet's interconnected ecosystems. The desert biome contains 13 out of 15 of the world's mineral deposits.<sup>64</sup> Every year Saharan winds carry tons of phosphorous-rich dust on a trans-Atlantic journey to the Amazon basin fertilising the world's largest rainforest.

By contrast, land that has undergone the process of desertification, lacks the ecological richness of true deserts, rather it's barren, arid land, where wildlife and human populations struggle to survive. The area's most prone to desertification are drylands, areas with a scarcity of water. Drylands are found in five of the world's seven continents, constitute 41% of global land area and are home to 3 billion people.<sup>65</sup>

People have lived on drylands for thousands of years, with indigenous knowledge passed down the generations to ensure communities are adapted to live in harmony with these ecosystems. However, in recent decades, climate change alongside rapid population growth in these areas has tipped the ecological balance, placing far greater

pressure on drylands, and triggered the process of desertification.

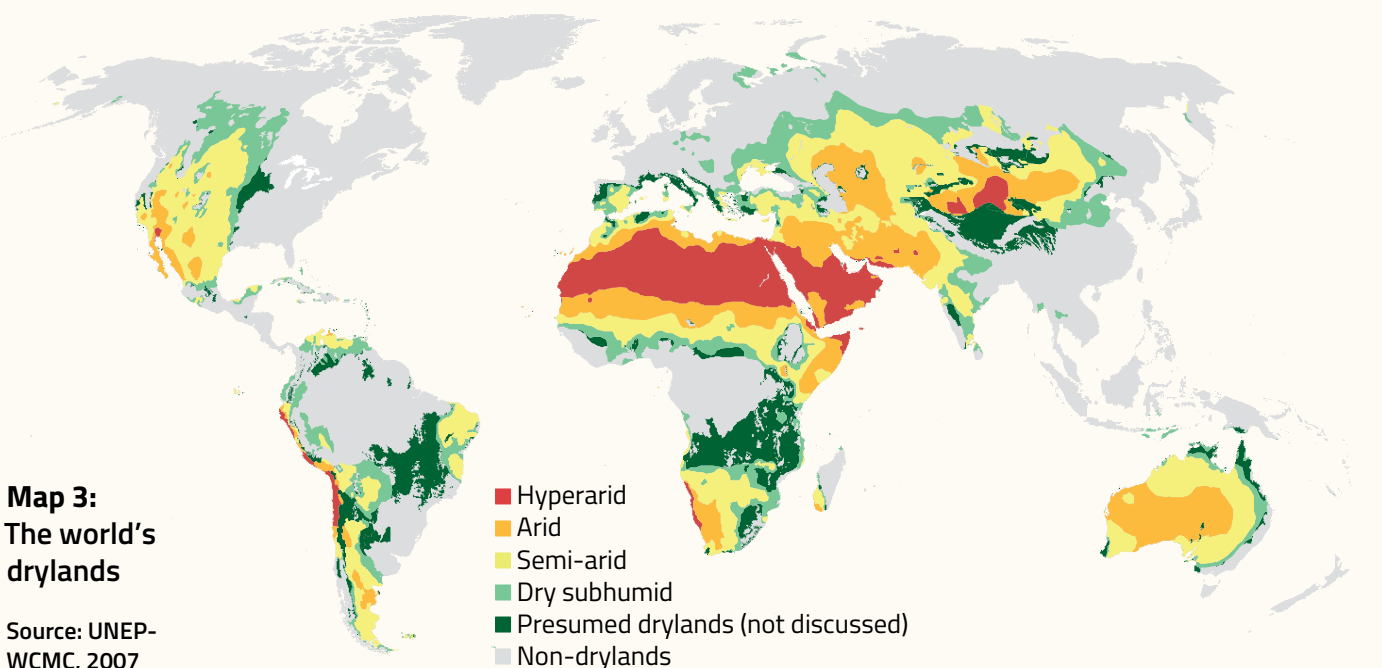
## What is desertification?

Desertification does not mean desert expansion, rather it is a term assigned to the process of land degradation that occurs on drylands. The principal difference between land degradation and desertification is a matter of geography, in that all land types can become degraded, but only drylands can undergo desertification.

The UNCCD defines desertification as, "*land degradation in arid, semi-arid and dry subhumid areas resulting from various factors, including climatic variations and human activities.*"<sup>66</sup>

Desertification hotspots are typically identified by a decline in vegetation, soil erosion, increased water scarcity, and a reduction in the land's natural resilience to events such as floods, droughts, or extreme weather events.

Desertification is a global issue, that affects both high-income and low-income countries in the Global North and the Global South. Europe is increasingly affected by desertification, where drylands cover 33.7% of northern Mediterranean



countries.<sup>67</sup> The European Environment Agency (EEA) indicated that 8% of the territory of the European Union had a ‘high sensitivity’ to desertification<sup>68</sup>, these areas at increased risk of soil erosion, loss of soil organic carbon, biodiversity loss, and landslides.

The most severe impacts of desertification will be felt in the Global South, where many low-income countries lack the same resources that can provide resilience to desertification, such as government subsidies or land restoration measures, that bodies such as the European Union can fund.

It’s estimated that 46 out of 54 African countries are vulnerable to desertification, with many already affected. In addition, desertification has currently affected 38 out of 48 countries in Asia.<sup>69</sup> When questioned by National Geographic on the issue of desertification in China, Feng Wang, associate professor at the Institute of Desertification Studies at the Chinese Academy of Forestry, was clear on the cause, “*The main problem [China faces] is an oversized population living in the drylands that surpasses the ecological carrying and restoring capacity of this area*”.<sup>70</sup>

### **Worsening Climate Impacts**

Over 20% of global plant biodiversity is located within drylands,<sup>71</sup> yet the effects of desertification will lead to continuing biodiversity loss, weakening ecosystem resilience against climate change.

Desertification will also increase the albedo effect, a measure of how reflective a surface is to light, the more reflective a surface the higher the albedo value. In the case of cleared and de-watered landscapes, characterised by drylands and desertification hotspots, the albedo value is higher, with more solar energy converted to heat, increasing local temperatures. This can have a detrimental effect as the area becomes hyper-arid, with negative health effects for the local population. The risk of sand and dust storms is also raised, reducing air quality in the local area.

### **Negative Feedback Loops**

Drylands are known as “dry” lands principally due to being regions with water scarcity. However, that does not mean they are necessarily characterized by low rainfall, some drylands in equatorial Africa receive over 1000mm of rainfall per year on average, far more than the rainfall volume in either London or Paris, 750mm and 650mm respectively.<sup>72</sup>

Instead, the hot, arid temperatures of drylands, mean they are areas with high rates of evaporation and water loss. Over millennia, dryland ecosystems have adapted to exist within this cycle of intense rainfall followed by water stress, with many plants and animals possessing the ability to conserve water during periods of scarcity.

However, more frequent, and extended periods of drought are resulting in vegetation die-off, reducing the land’s productivity until it effectively becomes “dead” soil. In turn, land that has undergone desertification, is less able to absorb or retain water, exacerbating droughts.

The ecosystems we rely upon to provide for us are intertwined in complex relationships, but as we exceed the ecological boundaries of the earth due to our unsustainable resource demand and continued population growth, we break down these delicate relationships and degrade these natural systems, in turn affecting our own quality of life.

### **The Population Factor**

People have lived in drylands for thousands of years, with dryland communities having developed remarkable resilience and innovation to adapt to live in these harsh conditions. Anthropologists have found that across the Arabian Peninsula and North Africa, informal community by-laws have successfully regulated grazing, wood collection, and cutting of wild herbs, giving the land and vegetation adequate fallow periods of time to recover, preventing land degradation.

Drylands were historically managed by nomadic pastoralists, who ranged their cattle across the available pasture in drylands. The mobile nature of these pastoralists prevented overgrazing or soil compaction by the prolonged presence of cattle, rather they gained what was needed from the land and moved on, allowing time for the land to recover.

However, in recent decades, these traditional practices have broken down, and indigenous knowledge for managing drylands is being lost. Instead, rapid population growth in dryland areas, has meant a transition to more intensive forms of agriculture to meet rising demand for food. Unsustainable agricultural practices: overgrazing, artificial fertilizer, and pesticide use, has intensified pressure upon drylands, resulting in an acceleration of desertification.

While less than 10% of drylands is undergoing desertification, the areas that have undergone desertification experienced the most rapid population growth, the population having increased from approximately 172 million in 1950 to over 630 million today.<sup>73</sup> In Morocco, areas identified as desertification hotspots were characterised by dryland plains with high population and livestock pressure. According to the IPCC (2019) report on desertification, the population in drylands is projected to increase twice as rapidly as non-dryland areas, and is predicted to reach 4 billion by 2050<sup>74</sup>, which will

drive expansion of intensive agriculture to meet rising demand for food and result in a detrimental increase in drylands undergoing desertification.

90% of dryland populations live in low-income countries, and are acutely vulnerable to the effects of desertification and climate change, as their livelihoods predominantly depend upon agriculture. Agriculture in the catch-22 of being the sector most vulnerable to desertification and climate change, and one of the main drivers of desertification. Globally, desertification costs US\$64 billion per annum, or 5% of global agricultural GDP.<sup>75</sup>

Whilst for thousands of years, traditional indigenous techniques allowed communities to live off the land in a sustainable fashion, in recent decades, rapid population growth in these areas has meant these traditional techniques have broken down, resulting in increasing areas of land undergoing desertification. The IPCC (2019) report on desertification noted, “*Traditional agroecological practices are also increasingly unable to cope with growing demand for food.*”<sup>76</sup>

### Desertification Syndrome

Desertification syndrome is a term used to describe the negative development cycle linking desertification and poverty. Wherein dryland populations apply unsustainable agricultural practices to meet demand, leading to desertification, crop failure, and food insecurity. The effects of desertification, ruining livelihoods and driving people below the poverty line, subsequently limiting the capacity of the community to invest in more sustainable forms of land management, continuing the vicious cycle of desertification.

There is an increasing concentration of poverty in dryland areas of Sub-Saharan Africa and South Asia, where 41% and 12% of the total populations respectively live in extreme poverty.<sup>77</sup> Many of these communities lack access to safe, modern contraception, resulting in higher population

**More people place  
more pressure  
on the land**



Drylands undergo desertification, trapping communities in poverty cycles

densities in these areas, increased pressure upon the land, and an accelerated rate of desertification.

### The Impact of Desertification on Women and Girls

Women, especially in low-income countries, are often over-represented in the agricultural workforce, due to it often falling to women to meet the basic nutritional needs of their families. A result of this means women are more likely than men to suffer the effects of food and economic insecurity from desertification, with their livelihoods impacted due to crop losses and declining land productivity. The vulnerability of women to desertification is compounded by the fact that many women, especially in dryland communities, lack legal ownership of the land they farm. In the Middle East and North Africa only 4% of women hold land titles.<sup>78</sup>

The UNCCD, the IPCC, and other parties combating desertification, have increasingly taken a gendered perspective when it comes to potential solutions to desertification. They recognise that if women had increased legal ownership and rights over the land they farmed, they are more likely to incorporate sustainable agriculture techniques that would reduce the rate of desertification. The IPCC (2019) report on desertification stated, *“If women had equal rights to land, it is estimated that agricultural production in the poorest regions would increase by up to 4% and malnourishment would decline by 12-17%.”*<sup>79</sup>

### Empower to Plan Against Desertification

There is a positive outlook to be shared with the UNCCD and other international bodies envisioning women at the forefront of sustainable land management. However it's important to emphasise that women will only be effective leaders of sustainable land management if they are provided with adequate resources.

One of the most valuable resources to women is time. This includes time to observe their local landscape and recognise what areas are

at risk of desertification and what areas need to be conserved. This includes time to become educated on sustainable agricultural techniques and the time to apply these techniques to the land that they manage. But this time won't be available to women if it's consumed by pregnancy, recovering from childbirth, and the long tiring hours of raising children, with even more time consumed by larger families. If a woman is in charge of her fertility, through access to safe, modern contraception, then she can choose to space her pregnancies, have a smaller family, and ultimately be in control of more of her time. With 257 million women worldwide lacking access to safe, modern contraception<sup>80</sup>, particularly in rural, impoverished communities in drylands, this represents a huge proportion of women unable to be in charge of their fertility, their time, and unable to act effectively to combat desertification.

It's been recognised that preventing desertification is strongly preferable and more cost-effective than allowing land to degrade and restoring it after, so too must we tackle desertification by addressing the underlying drivers, of which continued population growth is one. PHE projects that integrate choice-based family planning programs, alongside education on sustainable land management, can immediately reduce local population pressure on drylands and prevent further desertification. In turn this can produce a wellspring of other positive effects, such as enabling dryland communities to escape poverty by breaking the cycle of desertification syndrome.

It's been recognised that women and girls can be at the forefront of sustainable land management in drylands, combatting desertification, and so too must it be recognised that at the core of empowering women and girls is putting them in charge of their own reproductive choices.

# CONCLUSION

The International Drought Resilience Alliance (IDRA) was clear when it stated in the Global Drought Snapshot 2023, *“We need to adopt proactive measures that are to be taken by nations to curtail the spells of drought... active family planning, and curbing rapid population growth are prerequisites for societal development that respects planetary boundaries.”*<sup>81</sup>

Yet with 257 million women worldwide lacking access to safe, modern contraception, there is an urgent need to close these funding gaps.<sup>82</sup> This report has gone into greater depth to outline the exact reasons why closing these gaps in sexual and reproductive health funding, is an effective long-term preventative solution to mitigate against drought and land degradation.

To tackle complex issues such as drought and land degradation, it's important to utilise a holistic approach that can break down the vicious cycle wherein one crisis worsens the other. PHE is an effective holistic approach, that can improve access to safe, modern contraception and healthcare in remote areas, alongside educating communities on how to sustainably manage natural resources, for example conserving water during times of scarcity, and adopting sustainable agricultural techniques.

Funding PHE projects can directly contribute to the following Sustainable Development Goals: SDG 1: End poverty in all its forms everywhere; SDG 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture; SDG 3: Ensure healthy lives and promote wellbeing for all at all ages; SDG 5: Achieve gender equality and empower all women and girls; SDG 6: Ensure availability and sustainable management of water and sanitation for all and; SDG 10: Reduce inequality within and among countries.

Whilst population growth remains the elephant in the room in many international development circles, there has been widespread support for PHE by the East African Community (EAC). The EAC currently has some of the world's highest rates of population growth with the most acute environmental effects, including drought and land degradation.

The East Africa region (EAC Partner States and Ethiopia) agreed to adopt the PHE approach as a strategy for sustainable development. The East African Integrated Population, Health and Environment (PHE) Strategic Plan 2016-2021 was clear when it stated, *“Changes in the region are linked to a number of interrelated problems such as: rapid population growth, ill-health, poverty, land degradation, declining agricultural productivity and water quality which must be addressed concurrently using integrated solutions as contained in the Population Health Environment (PHE) approach.”*<sup>83</sup>

Uganda especially has been a strong proponent for PHE, with the introduction of its National Population, Health, and Environment Network in 2021, which emphasised the importance of integrated family planning programs. Population Matter's own Change Champion, Dr Gladys Kalema-Zikusoa, is a founder of a Ugandan PHE organisation, Conservation Through Public Health, which promotes family planning alongside gorilla conservation.<sup>84</sup> Though none of the EAC countries have yet adopted PHE as part of their drought and land degradation strategies, this report outlines that PHE projects are also an effective long-term solution to these crises.

Population Matters currently has an active campaign directed at the UK government to support PHE projects, under its commitments to the Kunming-Montreal Global Biodiversity Framework and international aid.

Humanity is dependent upon our environment, in turn environmental conditions are shaped and degraded by our outsized impact. The previous sections of this report have described the devastation of drought, land degradation, desertification, and the harm they inflict causing food and water insecurity, with the most detrimental impacts faced by women and girls. These interconnected crises are the results of the

environmental toll that high population growth and our overconsumption of resources have placed upon the planet. If we are to prevent the world from heading into a dried-up future, with ever more frequent droughts, and the degradation of biodiverse ecosystems into barren landscapes, then we must act now, to curb population growth and reduce our overconsumption, particularly in the Global North.

## RECOMMENDATIONS

**Governments must commit to the achievement of the Sustainable Development Goals. In particular, that requires the necessary level of financial support from the wealthiest nations, as well as their commitment to addressing unsustainable consumption within their own borders.**

**Where evidence indicates negative population impacts domestically, governments should identify and implement the PHE model into their National Biodiversity Strategy and Action Plans. In addition, governments should integrate the PHE model into their National Drought and Land Degradation strategies.**

**Conservation organisations and funders should recognise and support action which reduces population growth where evidence indicates it would be beneficial by incorporating the PHE model.**



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# ABOUT POPULATION MATTERS

Population Matters is a UK-based charity which campaigns to achieve a sustainable human population, to protect the natural world and improve people's lives. We promote positive, practical, ethical solutions – encouraging smaller families, inspiring people to


consume sustainably, and helping us all to live within our planet's natural limits. We believe everyone should have the freedom and ability to choose a smaller family. We support human rights, women's empowerment and global justice.




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Population Matters  
The Chandlery, 50 Westminster Bridge Road  
London SE1 7QY  
020 8123 9116  
Charity 1114109, Company 3019081



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