



Driving the system change needed to end loss and damage from climate change

Annexes

Acknowledgements

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Annex I: Ending ecological overshoot

For each of the nine planetary boundaries we unpack the extent of the remaining safe operating space or overshoot based upon the indicators of overshoot set out by the Doughnut of Social and Planetary Boundaries. We then provide additional context to illuminate the implications and suggest what is needed to end or avoid overshoot.

Climate Change

The overshoot

Atmospheric carbon dioxide (CO₂) concentration has reached 416 parts per million —an overshoot of 94 percent beyond safe operating space.¹ The amount of energy coming into the Earth atmosphere vs what is leaving (radiative forcing) is now 2.8 Watt per square metre (W m⁻²) —an overshoot of 183 percent.²

Further context

Earth's average temperature is approaching 1.5°C above pre-industrial levels.³ Current national climate plans put the world on track to 2.3-2.5°C of warming by 2100.⁴ The Intergovernmental Panel on Climate Change (IPCC) tells us that loss and damage from climate change will escalate with every increment of warming.⁵ Greenhouse gas emissions occur across all sectors,⁶ but fossil fuel extraction, production and combustion are responsible for 73 percent of emissions.⁷

How to end it

Reductions to annual emissions of 55 percent compared with 2019 levels are needed by 2035 to keep us on track with the 1.5°C goal of the Paris Agreement.⁸ This necessitates a rapid, systemic, just transition in all sectors —including a fair, fast, full, and funded phase out of fossil fuels. For this to happen, at least 4.725 trillion USD in new and additional, high quality climate finance needs to flow from the Global North to the Global South.⁹

A shift to renewable energy generation (e.g. wind, solar, hydro) and existing low-carbon technologies (e.g. energy efficient buildings, transportation) will substantially reduce emissions.^{10,11} Planned economic contraction in the Global North via degrowth policies^{12,13} will enable an equitable transition in the Global South by freeing up the remaining global carbon budget.¹⁴

However, limiting warming to 1.5°C will not guarantee a return to a safe operating space.¹⁵ Even a temporary temperature spike risks permanent loss and damage (e.g. loss of coral reefs)¹⁶, crossing irreversible climate tipping points, and changes which may take centuries to

reverse (e.g. sea level rise).¹⁷ Therefore, limiting warming to 1.5°C should be regarded as minimum, with regenerative economic systems that prevent overshoot from reoccurring the true goal.¹⁸

Biosphere Integrity (Biodiversity Loss)

The overshoot

The rate of species extinctions per million species per year is now 100 —an overshoot of 900 percent.¹⁹ The portion of the Earth's plant growth appropriated for human use through harvesting, land clearing, and altered ecosystem productivity has reached 10 percent of 17 billion tonnes of carbon per year —an overshoot of 204 percent.²⁰

Further context

One million of the world's estimated 8 million species of plants and animals are threatened with extinction.²¹ Contributing factors include the significant alteration of 75 percent of the Earth's land by human actions²² and human activities impacting 66 percent ocean area.²³ An estimated 7 trillion USD flows to activities that increase biodiversity loss each year,²⁴ yet in 2023, finance for ecosystem protection only reached 220 billion USD²⁵ —despite projected needs ranging from 571²⁶ to 700 billion²⁷ USD each year. Biodiversity loss creates severe global risks to systems including water, food, and climate, by destroying essential ecosystem services like pollination, water purification, and climate regulation.²⁸

How to end it

44 percent of Earth's land surface will need to be devoted to safeguarding biodiversity without displacing the 1.8 billion people living on these lands.²⁹ This will require returning land to Indigenous Peoples, protecting land rights,³⁰ ensuring that Indigenous Peoples and local communities lead decision making,^{31,32} and properly resourcing stewardship and kinship based practices³³ that support high levels of biodiversity.³⁴

Transition to a planetary health diet³⁵ will reduce the amount of land required for the production of red meat and products used in ultra-processed foods (e.g. palm oil), freeing up land for the restoration of ecosystems and regenerative agriculture³⁶ (see box 1 for more information on the planetary health diet). Assigning rights to more-than-humans —including ecosystems hosting high levels of biodiversity—³⁷ and criminalising ecocide will offer legal protection.³⁸

Box 1. What is the planetary health diet

Transition to a planetary health diet³⁹ can help to address ecological overshoot of planetary boundaries including climate change, biosphere integrity, land-system change, atmospheric aerosol loading, biogeochemical flows, freshwater change, and social shortfalls including food and health.

Rather than telling people what to eat, the planetary health diet — which is rich in fruit, vegetables, nuts, legumes, and whole grains— offers a high degree of flexibility, with many traditional cuisines (e.g. Mediterranean, South and East Asia, Africa, and Latin America) already aligned with its principles.⁴⁰ To implement the planetary health diet, the production of red meat will need to be reduced by approximately 33 percent while increasing the production of fruit, vegetables, and nuts by around 60 percent.⁴¹ These changes could be achieved through a variety of policies, including taxes or caps on high-emission meat production, subsidies and incentives for plant-based agriculture, investment in supply chains for diverse crops, and public procurement standards that prioritise healthy, sustainable foods.⁴²

This transformation requires an estimated investment of up to 500 billion USD annually.⁴³ Yet the benefits, which reflect avoided health-care spending because of healthier diets, reduced loss and damage from climate change, and lower environmental degradation far outway the costs at approximately 5 to 10 trillion USD.⁴⁴

Land-System Change

The overshoot

The area of Earth's land covered by forests was at least 64 million square kilometres (Mkm²) it is now only 38 Mkm² —an overshoot of 61 percent.⁴⁵

Further context

Agricultural expansion causes nearly 90 percent of global deforestation.⁴⁶ Deforestation exacerbates climate change, desertification, soil erosion, and biodiversity loss. It also impacts the livelihoods, health, and wellbeing of those who depend on forests and increases the risk of the spread of zoonotic disease.⁴⁷ The world has reduced annual deforestation from approximately 17.6 million hectares in the 1990s to 10.9 million hectares per year between 2015 and 2025.⁴⁸ However, current rates of deforestation remain 63 percent higher than required to meet the global goal of halting and reversing forest loss by 2030.⁴⁹

How to end it

There is significant overlap in the changes required to end overshoot in biosphere Integrity and land-system change including returning forests to the stewardship of Indigenous Peoples^{50 51} and transitioning to a planetary health diet to reduce agricultural drivers of deforestation and free up land for reforestation.^{52,53} A notable addition is the regulation of supply chains to eliminate illegally sourced commodities (e.g. timber and gold) derived from unlawful agriculture, mining, and logging,⁵⁴ which drive deforestation.⁵⁵

Biogeochemical Flows (Nitrogen and Phosphorus)

The overshoot

The amount of phosphorus applied to land as fertiliser, has reached 23 million tonnes (Mt) per year —an overshoot of 273 percent.⁵⁶ The amount of nitrogen applied to land as fertiliser has reached 193 Mt per year —an overshoot of 212 percent.⁵⁷

Further context

An estimated 48 to 50 percent of the world's population currently depends on crops grown with synthetic fertilisers that contain high levels of nutrients like nitrogen, phosphorus, and potassium to meet their daily nutritional needs.⁵⁸ High levels of nutrients cause water pollution, lead to the death of marine life through algal and other blooms, increase soil acidity, and contribute to greenhouse gas emissions.⁵⁹

How to end it

Shifting to a planetary health diet will significantly reduce reliance on livestock, which requires large amounts of nutrient-intensive feed.⁶⁰ A circular economy approach to fertiliser can recover and recycle nutrients from food and agricultural waste, livestock manure, wastewater and human waste.⁶¹ Regenerative farming can rebuild soil health allowing a reduction or elimination of synthetic fertilisers.⁶²

Indigenous and traditional practices such as crop rotation (e.g. planting nitrogen-fixing legumes), intercropping (e.g. planting complimentary crops like the Three Sisters⁶³), and no-till farming, will help to keep nutrients in the soil naturally.⁶⁴ Regulating agricultural runoff, restoring wetlands⁶⁵ that act as natural nutrient filters,⁶⁶ and upgrading wastewater treatment facilities to prevent nutrient leakage will further reduce overshoot.⁶⁷

Freshwater Change

The overshoot

The proportion of land where humans have disturbed fresh surface water and groundwater sources such as lakes, rivers, and aquifers (e.g. by damming, draining, polluting, or over extracting) is now 18.2 percent—an overshoot of 78 percent.⁶⁸ The proportion of land area where the amount of water available to plants in the deeper layers of the soil is lower than what they need is now 19.3 percent—an overshoot of 74 percent.⁶⁹

Further context

Agriculture accounts for roughly 70 percent of global freshwater withdrawals from lakes, rivers, and aquifers.⁷⁰ Freshwater change is driving drought, loss of biodiversity, desertification, and widespread water insecurity.⁷¹

How to end it

Adopting the planetary health diet, will reduce water-intensive animal farming (e.g. beef and lamb) and prioritise crops with lower water footprints (e.g. sorghum and adzuki bean). Indigenous and traditional practices to conserve water,⁷² the use of precision irrigation,⁷³ and naturally drought-resistant crops (e.g. tepary beans and millet) can further reduce water use.⁷⁴

The protection and restoration of deep-rooted forest ecosystems will help to ensure the generation of rainfall, maintain internal moisture cycles, and recharge aquifers.⁷⁵ Protecting and restoring marshes, peatlands, and floodplains, will further increase the stability of water cycles.⁷⁶ This can be achieved via the changes previously identified in the context of ending overshoot in biosphere Integrity and land-system change.

A circular water economy that reduces leaks, recycles waste water, and harvests rain water will reduce urban water use.⁷⁷ Regulating water use through fair share allocations⁷⁸ and caps on corporate and agricultural users will limit water use in high-consumption sectors such as textile production, AI and data.⁷⁹

Ocean Acidification

The overshoot

The average saturation state of aragonite (Qarag) at the ocean surface reduced to 2.80 Qarag in 2022 was 6 percent below the planetary boundary.⁸⁰ It has since surpassed safe operating space.⁸¹

Further context

Ocean acidity has increased by approximately 30 percent.⁸² Ocean acidification is driven primarily by the ocean absorbing excess CO₂ from the atmosphere as a result of climate change.⁸³ Ocean acidification reduces the amount of carbonate ions like aragonite in sea water making it harder for marine animals such as shellfish and corals to build shells and skeletons.^{84,85} This is leading to biodiversity loss, food insecurity, and the loss of protective natural barriers such as reefs.⁸⁶

How to end it

Addressing climate change through the transformations previously identified is the primary way to return ocean acidification to safe operating space.⁸⁷ Cultivating and restoring mangroves,⁸⁸ kelp, eelgrass, and other marine vegetation will also help to absorb CO₂ and buffer acidity locally.⁸⁹ At the same time, reducing localised pollution, including by minimising land-based nutrient runoff from fertilisers and sewage, will help to prevent coastal zones from experiencing worsened, localised acidification, and hypoxic events.⁹⁰

Atmospheric Aerosol Loading

The overshoot

The threshold for surpassing the planetary boundary on atmospheric aerosol loading is set at a difference of 0.1 of Aerosol Optical Depth (AOD) between Earth's hemispheres — a measure of the amount of sunlight reaching the Earth surface. It is now 0.08 AOD.⁹¹ Although this is one of only two planetary boundaries that has not been surpassed it is regularly surpassed at the regional level (e.g. in Asia and Africa).⁹²

Further context

Aerosols such as sulfur dioxide, black carbon, and organic aerosols are released by burning fossil fuels, crop residues, and traditional biomass fuels (e.g. wood and animal waste).⁹³ Power generation, manufacturing, and transportation are the main sources.⁹⁴ Aerosols influence Earth's climate, weather, and air quality, with some aerosols cooling the planet by reflecting sunlight (e.g. sulfur dioxide), and others trapping heat and disturbing rainfall patterns (e.g. black carbon).⁹⁵ High aerosol concentrations have significant health impacts, including respiratory and cardiovascular diseases, and increased mortality.⁹⁶ Air pollution caused by the burning of fossil fuels alone is responsible for between 5⁹⁷ and 8⁹⁸ million deaths a year.

How to avoid future overshoot and end local overshoot

Regulating agricultural burning and a fast, fair, full, and funded phase out of fossil fuels will significantly reduce aerosols with immediate health benefits.⁹⁹ Transition to a planetary health diet will dramatically reduce organic aerosols such as particulate matter created from reactions with gaseous ammonia.^{100,101} While cutting methane emissions from agriculture, fossil fuels production, and landfill waste offers one of the fastest ways to reduce aerosols.¹⁰²

Although reducing aerosols will bring immediate benefits, it will reveal more of the warming caused by greenhouse gases by removing the cooling effect of aerosols like sulfur dioxide.^{103 104} However, this can be counteracted by rapidly cutting emissions of greenhouse gases that have short atmospheric half-lives such as methane.¹⁰⁵

Stratospheric Ozone Depletion

The overshoot

The maximum allowable decrease in the concentration of ozone in the stratosphere to avoid surpassing the planetary boundary is 275.5 dobson units (DU) — it is now 283.4 DU.¹⁰⁶ This is one of only two planetary boundaries that has not been surpassed.¹⁰⁷

Further context

Human made chemicals such as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and halons deplete ozone from the earth's atmosphere.¹⁰⁸ This damages the Earth's protective layer that shields humans and more-than-humans from harmful levels of ultraviolet radiation from the sun.¹⁰⁹

How to avoid future overshoot

The stratospheric ozone layer is recovering due to the near-total phase-out of ozone-depleting substances (ODS)¹¹⁰ under the Montreal Protocol.¹¹¹ Hydrofluorocarbons (HFCs), were introduced by chemical companies as non-ODS alternatives. Yet HFCs are also potent greenhouse gases that are expected to make up 7 to 19 percent of global emissions by 2050.¹¹² The full implementation of the Kigali Amendment to the Montreal Protocol can address the challenges of HFC and help to avoid up to 0.5°C of warming by 2100.¹¹³ However, continued monitoring of new variables that can cause ozone depletion is required to ensure that recovery is not reversed.¹¹⁴ This includes such things as nitrous oxide (N₂O), wildfire emissions, and debris release from space travel.¹¹⁵

Novel Entities (Chemical Pollution)

The overshoot

The production of hazardous chemicals should be limited to 60 million tonnes per year (Mt) to remain within safe operating space, it is currently 1,964 Mt a year—an overshoot of 3,174 percent.¹¹⁶

Further context

Novel entities are now found in every part of the planet. They include human-made chemicals (e.g. pesticides), naturally occurring chemicals that are mobilised by humans (e.g. asbestos and fossil fuels), human-made particles (e.g. micro plastics), and human-modified life forms (e.g. genetically modified organisms).¹¹⁷ Little is understood about the long term effects of novel entities¹¹⁸ and once released they are hard or impossible to remove meaning their effects can last for centuries.¹¹⁹ However, hazardous chemicals are known to have significant health¹²⁰ and ecological impacts.¹²¹ In 2019 alone, 2 million lives and 53 million disability-adjusted life years were lost from exposure to just a handful of chemicals.¹²²

How to end it:

Reduced consumption—with the Global North taking the lead— will decrease chemical production and release.¹²³ A circular economy will incentivise chemical reductions through the pro-active engineering of products to use fewer, safer, and easily separable chemicals.¹²⁴ It will also reduce waste through recycling, reuse, redistribution, and a sharing economy,¹²⁵ while increasing the traceability of the chemical contents of products and materials.¹²⁶

Setting global caps,¹²⁷ strengthening existing international treaties (e.g. the [Basel Convention](#) and [Global Framework on Chemicals](#)), adopting new treaties (e.g. [Plastics Treaty](#)), and enhancing national and regional efforts, will help to accelerate the phase out of novel entities.¹²⁸ Taking a precautionary approach to chemical management (i.e. assuming they are harmful until proven otherwise) will further prevent the use and release of hazardous chemicals.¹²⁹ Increasing understanding of the risks posed by novel entities will be critical to underpin these efforts.¹³⁰ Establishing and enforcing conflict of interest policies will also be required to stop the capture of policy regimes by corporate actors producing chemicals.¹³¹



Annex II: Ending social shortfalls

For each of the 12 essential dimensions set out in the social foundation of the Doughnut of Social and Planetary Boundaries we unpack the extent of the social shortfall, provide additional context to illuminate the implications and suggest what is needed to end the social shortfall.

Food

The social shortfall

10 percent of the global population is undernourished.¹³² 29 percent of the global population face moderate to severe food insecurity.¹³³

Further context

The main drivers of global food insecurity are conflict, economic shocks, inequality, and climate change. These interconnected crises disrupt food production, destroy local markets, and stop households from accessing or affording the nutritious food they need.¹³⁴

How to end it

If it were to respect planetary boundaries our current food system could only feed 3.4 billion people.¹³⁵ However, as many as 10.2 billion people can be fed within the safe operating space of the planetary boundaries by adopting a planetary health diet.^{136,137} The planetary health diet will also protect against economic shocks by stabilising food supply chains through diversified production and by reducing dependence on volatile livestock feed and chemical inputs.¹³⁸ Although the planetary health diet will help to prevent resource scarcity conflicts, peace building that promotes equitable resource management and shared livelihoods will be required to address root causes and drivers of conflict.¹³⁹

Health

The social shortfall

42 percent of the global population live in countries with an under-5 mortality rate exceeding 25 per 1,000 live births.¹⁴⁰ 28 percent of the global population live in countries without high coverage of essential health services.¹⁴¹

Further context

The breach of the planetary boundaries is directly leading to health impacts including respiratory and cardiovascular diseases, increased vulnerability to infectious disease, and

nutritional impacts.¹⁴² At the same time social shortfalls are undermining the social determinants for good health such as education, housing, income, and environment.¹⁴³

How to end it

Addressing the ecological overshoots that cause health impacts will significantly reduce illness and morality globally while reducing pressure on healthcare systems.¹⁴⁴ Phasing out fossil fuels and addressing novel entities will save millions of lives by avoiding respiratory and other illnesses.¹⁴⁵ Tackling undernutrition, micronutrient deficiencies, and overnutrition across all life stages through a transition to the planetary health diet will improve the health and wellbeing of billions more.¹⁴⁶ Taxation on sectors that impact health (e.g. fossil fuels, plastics, and ultra processed foods) will generate financial resources that can support these efforts.¹⁴⁷

Ensuring that essential health services are free at the point of care will remove financial barriers, prevent households from being pushed into poverty, and ensure that access to care is based on clinical need rather than wealth.¹⁴⁸ Establishing local, community-based care initiatives that prioritise preventative medicine and early diagnosis, supporting mutual care networks that allow people to connect,¹⁴⁹ and leveraging emerging technologies such as AI¹⁵⁰ will help to close geographic gaps in care and further reduce pressure on the health system.¹⁵¹ Decoupling profit and health innovation will ensure that health research and development addresses pressing public health needs (e.g. neglected tropical diseases) rather than pursue profit.^{152,153}

Matching supply to demand, decarbonisation, ending dependence on unsustainable and hazardous materials (e.g plastics), and shifting the culture of health care towards resource stewardship will help the health sector to operate within the planetary boundaries.¹⁵⁴

Education

The social shortfall

16 percent of the global adult population (aged 15+ years) are illiterate.¹⁵⁵ 37 percent of the global young adult population (aged 21–23 years) have not completed upper secondary education.¹⁵⁶

Further context

Barriers to accessing education include poverty, conflict and instability, gender discrimination, a poor quality of education, and a lack of facilities, teachers, and educational materials.¹⁵⁷ Overshoot of the planetary boundaries is further disrupting access to education by damaging infrastructure, displacing communities, triggering health crises, and by depleting economic resources that fund schools.¹⁵⁸

How to end it

Abolishing fees for education (primary through to university),¹⁵⁹ properly resource teacher training and educational materials, leveraging digital learning technologies, and targeting resources directly to marginalised and crisis-affected children will significantly increase access.¹⁶⁰ The effective implementation of the Comprehensive School Safety Framework (CSSF) will increase the resilience of education infrastructure.¹⁶¹ Digital tools such as the Learning Passport will provide continuous education for displaced, refugee, and crisis-affected children.¹⁶² Reducing domestic burdens, care duties, and the social pressures that cause child marriage,¹⁶³ will reduce barriers to education for girls.¹⁶⁴ Cancellation of debt related to education will reduce intergenerational barriers to education.¹⁶⁵

Income and work

The social shortfall

73 percent of the global population live below the societal poverty line (half their country's median household income or at least 15 USD a day).¹⁶⁶ 21 percent of young people (aged 15–24 years) globally are not in employment, education, or training.¹⁶⁷

Further context

The top 10 percent of the global population earn more than the remaining 90 percent.¹⁶⁸ Financial profits made from investments, property, and wealth are growing faster than the total output and wages of the overall economy.¹⁶⁹ Asset inflation disproportionately enriches individuals who already own capital¹⁷⁰—the top 1 percent alone hold more wealth than the bottom 90 percent combined.¹⁷¹ Regressive tax systems place a heavier financial burden on poor households.¹⁷² Automation and artificial intelligence risk further exacerbate inequality by increasing the flow of money to business and machine owners and by replacing routine low-to-middle-wage jobs with technology.¹⁷³

Two-thirds of young people not in employment, education or training are women.¹⁷⁴ Drivers include declining entry-level job opportunities, a sharp rise in mental health, limited formal job opportunities in low income Global South, and increased conflict.¹⁷⁵

How to end it

Reaching the safe and just space for income and work requires rejecting the growth imperative of GDP and designing economies that are distributive and regenerative by nature. Progressive taxation on wealth, assets, land ownership, and inheritance, can stop intergenerational wealth transfer from perpetuating wealth concentration and redistribute funds to social safety nets.¹⁷⁶ Ensuring public and shared ownership of services, land, and assets will ensure that benefits, power, and opportunities are shared equitably.¹⁷⁷

Recognising the true value of care will help to close the gender gap by compensating carers, —the majority of whom are women— for their work.¹⁷⁸ Universal access to social protection that guarantees a basic income will ensure a minimum standard of living, —and when combined with progressive taxation— help to shift wealth downwards.¹⁷⁹ Increasing the collective bargaining power of workers and upholding workers rights will protect living wages, job security, and safe working conditions.¹⁸⁰

Water

The social shortfall

37 percent of the global population lack access to safely managed drinking water.¹⁸¹ 42 percent of the global population lack access to safely managed sanitation.¹⁸²

Further context

Ecological overshoot is limiting access to safe drinking water and sanitation as climate change, pollution and over exploitation for agricultural and industrial use create water scarcity.¹⁸³ This is further compounded by conflict damage to water infrastructure,¹⁸⁴ a lack of resources to establish and maintain efficient systems,¹⁸⁵ and high costs of purchasing water.¹⁸⁶ Millions of people still practice open defecation which further increases water scarcity and health risks.¹⁸⁷ Women and girls are disproportionately affected.¹⁸⁸

How to end it

As highlighted in Annex I, ecological overshoot can be addressed by transforming food systems, land use, a circular water economy, and regulation of water consumption through a fair-shares approach.

Guaranteeing access will require expanding efficient publicly owned circular water and sanitation systems to all households. This should entail the free allocation of a basic quota of water to each household, one that is sufficient to meet the needs of all residents.¹⁸⁹ Regulation of publicly owned water systems will ensure an equitably allocated stable supply of water during times of scarcity.¹⁹⁰ In remote locations, community managed, renewable energy based circular water and sanitation systems will ensure access.¹⁹¹

Energy

The social shortfall

8 percent of the global population lack access to electricity.¹⁹² 27 percent of the global population lack access to clean fuels and technologies for cooking, heating and lighting.¹⁹³

Further context

A lack of access to electricity is denying basic health care, cutting off evening education, and is forcing reliance on polluting technologies and fuels for cooking.¹⁹⁴ In 2021, a lack of access to clean fuels was responsible for 3.1 million premature deaths.¹⁹⁵

How to end it

A just transition to renewable energy generation will enhance access to energy and clean cooking technologies.¹⁹⁶ Through distributed renewable energy (a combination of mini-grid and off-grid solar systems), energy for health care, education and other essential services can be assured, even in remote communities.¹⁹⁷ Treating energy as a public utility will see infrastructure costs and connection fees borne by the State¹⁹⁸ and the allocation of a free basic quota of electricity to each household that is sufficient to meet the needs of all residents.¹⁹⁹

Connectivity

The social shortfall

53 percent of the urban population lack convenient access to public transport.²⁰⁰ 37 percent of the global population lack access to the internet.²⁰¹

Further context

A lack of public transport and internet access limits access to basic services and opportunities, creating barriers to education and nutrition, worsening health and mental health care, and deepening poverty.^{202,203} Rural and low-income communities suffer the most from this digital and physical divide.^{204,205}

How to end it

Distributed renewable energy and digital literacy training will help to bridge the global digital divide.²⁰⁶ Formally recognising internet access and mobile phone data as a public utility and human right,²⁰⁷ and providing a free basic monthly package to individuals and households²⁰⁸ will ensure access to

education,²⁰⁹ healthcare,²¹⁰ and mutual care networks.²¹¹ Ensuring this service is delivered by a public provider that is independent from the government and employs the highest levels of data security will rule out any form of state censorship.²¹²

Free or very low cost, clean, safe, reliable, high frequency renewable energy based public transit will increase equal access to jobs, education, services and other opportunities.²¹³

Shared mobility services (e.g. e-scooters and small electric cars) can serve communities where larger transport networks are not possible.²¹⁴ Reduction of vehicle travel in the Global North will ensure that public transport can be distributed equitably across the world.²¹⁵ Implementing the 15 minute city model, where daily needs—such as work, food, health, education, and leisure—are reachable within a 15-minute walk or bicycle ride from home will help to reduce vehicle travel globally.²¹⁶

Housing

The social shortfall

32 percent of the urban population live in slums or informal settlements.²¹⁷

Further context

People living in slums and informal settlements are exposed to high rates of disease, severe mental stress, restricted access to public services, and increased vulnerability to disasters.²¹⁸ While a lack of formal address, the inability to save, and extortionate costs for basic utilities, prevent access to social protection and compound intergeneration poverty.²¹⁹

How to end it

Reaching the safe and just space for housing will require upholding the human right to adequate housing²²⁰ and redefining homes as social goods rather than market commodities.²²¹

Sharing existing housing stock fairly, by limiting the number of homes that can be owned by corporate landlords and taxing unoccupied homes, will significantly increase the availability of housing stock.²²² Expanding publicly controlled affordable social housing, capping rents, and incentivising housing cooperatives (e.g. via the Mietshäuser Syndikat model²²³) will further decrease barriers to adequate housing.²²⁴

Formalising slums and other types of informal settlements (e.g. refugee settlements) —where safe to do so— will help to turn makeshift communities into safe, legal, community owned, and governed neighborhoods by granting land rights, ensuring access to clean water and energy, and lowering disaster risks.²²⁵ Reducing the size of homes, increasing shared spaces and amenities,²²⁶ and utilising Indigenous, traditional, and emergent technologies (e.g. 3D printing) to self build homes that coexist in symbiosis with ecosystems will ensure that new housing respects the planetary boundaries.²²⁷

Equality

The social shortfall

There is a 35 percent global shortfall in gender equality (as measured by the Gender Inequality Index).²²⁸ Racial inequality persists (note that this is not tracked by any global indicator at present).²²⁹

Further context

Gender inequality harms women by limiting their access to education, fair pay, and decision making and leadership roles. It creates heavy burdens of unpaid work, increases risks of violence, and worsens poverty, hunger, and health across all stages of life.²³⁰

Discriminatory systems lock marginalised groups into cycles of disadvantage across housing, education, health, wealth, employment, and justice. This leads to impacts that span generations by denying the accumulation of wealth, lowering life expectancies, increasing vulnerability to environmental and economic shocks.²³¹

How to end it

Ending gender inequality requires dismantling the patriarchy. This necessitates unlearning socially constructed gender roles,²³² harmful norms and stereotypes.²³³ Guaranteeing women equal rights to land, credit, financial services, and property ownership.²³⁴ Removing legal restrictions that limit bodily autonomy, reproductive rights, or legal personhood. Strengthening protection laws and community support systems to end harassment and abuse.²³⁵ Recognising the true value of domestic and care work and redistributing it more fairly, and allocating free childcare to all.

Ending racial inequality will require decolonisation of the systems and institutions that perpetuate racism and discrimination. This will require coordinated, systemic change across multiple sectors including housing, healthcare, and education.²³⁶ Enforcing existing antidiscrimination laws and putting in place new laws that prevent discrimination such as voter suppression. Ensuring equal opportunities through diversity, equity and inclusion. As well as educating about colonisation, slavery, White supremacy, and other forms of historical and ongoing harm, and delivering remedy and reparations.²³⁷

Social cohesion

The social shortfall

24 percent of the global population state they are without someone to count on in times of trouble.²³⁸ 72 percent of the global population live in countries where the richest 10 percent of the population earns at least twice as much as the poorest 40 percent combined.²³⁹

Further context

1 in 6 people worldwide are affected by loneliness leading to significant impacts on health and well-being,²⁴⁰ costing billions in lost productivity and health care.²⁴¹ Social isolation and loneliness can be caused by poor health, living alone, low income, lack of education, inadequate community infrastructure, and digital technologies (e.g. social media).²⁴²

Inequality weakens social cohesion by eroding interpersonal trust and increasing social distance across economic lines.²⁴³ It also lowers public confidence in shared institutions as a result of regular citizens feeling the system is rigged against them.²⁴⁴ For example, when they are informed that billionaires are 4 thousand times more likely to hold political office than ordinary people).²⁴⁵

Communities with high levels of social cohesion tend to be safer, healthier and more resilient.²⁴⁶ A lack of social cohesion undermines the social fabric of society by leading to less interpersonal trust; more polarisation, alienation, xenophobia, and boosted support for populist or extremist movements; and reduced political participation.²⁴⁷

How to end it

Ending social isolation and loneliness will involve in person and digital interventions²⁴⁸ including social skills training, community and support groups, befriending, and cognitive behavioural therapy.²⁴⁹ While ensuring universal access to —free at the point of service— health, mental health, and elder care, will mean that support is available whenever it is needed. Creating more age-friendly communities by improving access to transportation and information and communication technologies will also help reduce social isolation and loneliness for older persons.²⁵⁰ Laws and policies that address marginalisation and discrimination will help to foster greater social connection by dismantling systems, frameworks, and institutions that perpetuate exclusion of vulnerable populations.²⁵¹ Additionally reducing working days/hours will help to increase the prevalence of mutual-care networks and social cohesion through such things as skill and equipment sharing and community-led initiatives.²⁵²

Ending inequality within countries requires utilising progressive taxation on wealth, property, inheritance, and high-income to prevent disproportionate intergenerational wealth accumulation and redistribute resources to fund robust social safety nets.^{253,254,255} Ensuring access to high quality public services for free —including healthcare and education— will help to further prevent generational poverty by leveling the playing field.²⁵⁶ Strengthening the rights of workers, the promotion and strengthening of collective bargaining, will ensure fairer wage distribution and living wages.²⁵⁷ The implementation of a universal basic income will provide further income security.²⁵⁸ While removing structural, legal, and social barriers based on race, gender, disability, or socioeconomic status will help to ensure equal opportunity and promote social mobility (e.g. by enacting and enforcing laws that guarantee equal opportunity and fair treatment in education and employment).²⁵⁹

Political voice

The social shortfall

71 percent of the global population live in countries governed by an autocratic regime.²⁶⁰

Further context

Autocracies now outnumber democracies at 92 autocracies to 87 democracies.²⁶¹ Research from 2025 suggests that as much as 74 percent of the world's population now live in countries governed by an autocratic regime.²⁶² Human rights and civil liberties are declining globally.²⁶³ Freedom of expression has been the worst-affected aspect —worsening in 44 countries over the last decade.²⁶⁴ The U.S has seen the most rapid dismantling of democracy in modern history, with a 24 percent decline in liberal democracy during the first year of the second Trump presidency.²⁶⁵ The rise of authoritarianism, centralisation of power amongst extractive multilateral corporations and oligarchs, and the shrinking of civic space²⁶⁶ all pose a significant challenge to ending ecological overshoot and addressing social short falls.

How to end it

Reaching the safe and just space for political voice will require rebuilding and strengthening democratic institutions, protecting free and fair elections, building broad coalitions of opposition, and stopping the consolidation of power by extractive multilateral corporations and oligarchs.

Protecting the rule of law, maintaining independent oversight and a clear separation of powers will strengthen democratic institutions. Enforcing strong anti corruption measures, and media freedom, will help to ensure checks and balances on executive power.²⁶⁷ Defending elections by ensuring election systems are free from interference will stop the marginalisation of minority voices and creation of

manufactured majorities²⁶⁸ (useful tools may include proportional representation²⁶⁹ and fusion voting).²⁷⁰ Creating guardrails that ensure voters and candidates abide by the outcomes of every election will help to foster public confidence in the fact that elections are free, fair, and secure.²⁷¹

Building a broad coalition of actors including unions, community organisations, social movements, and small businesses will increase pressure to uphold human rights and transparency.²⁷² Increasing digital literacy will help to counter misinformation.²⁷³

Peace and justice

The social shortfall

75 percent of the global population state that they perceive widespread corruption in government and business.²⁷⁴ 20 percent of the global population live in countries with a homicide rate of 5 or more per 100,000.²⁷⁵

Further context

Corruption wastes public funds, weakens democracy, and worsens inequality and public health. It diverts money from essential public services and infrastructure, reduces trust in public institutions, and increases centralisation of power and wealth.²⁷⁶

Nearly 40 percent of global homicides are connected to crime —mainly organised crime and gang-related violence.²⁷⁷ Climate change, demographic shifts, rapid urbanisation, and resource scarcity are increasingly intersecting with the risk of violence.²⁷⁸ High murder rates are a direct result of the systematic inequality imposed by colonialism and racial capitalism.²⁷⁹ They are not individual moral failures, but symptoms of enduring historical oppression and social exclusion.²⁸⁰ They point to failed institutions, economic distress, a lack of access to opportunities, justice and rights, and high levels of community trauma.

How to end it

Reaching the safe and just space for peace and justice will require enforcing strong anti corruption measures, addressing the root causes and drivers of homicide and decolonising the criminal justice system.

Strong anti-corruption measures involve implementing beneficial ownership registers to track hidden money flows, public disclosure of budgets and contracts, and high legal penalties for violation.²⁸¹ They also require conflict-of-interest disclosures, the protection of whistleblowers, and freedom of the press.²⁸² Their enforcement will help to rebuild trust in public institutions, stop the misappropriation of funds and the centralisation of wealth and power.

Dismantling systemic inequalities rooted in historical and ongoing coloniality, and delivering reparation and remedy to communities, will help to reduce violent crime by strengthening social safety nets and creating equal access to opportunities.²⁸³ Decolonisation will move the justice systems away from penal systems that replicate colonial control and mass incarceration of marginalised groups toward community-led restorative justice practices.^{284,285} This will restore power to affected groups, reduce repeat offences through accountability and healing, reduce community trauma, build social resilience, and equip communities to resolve conflicts safely.²⁸⁶

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