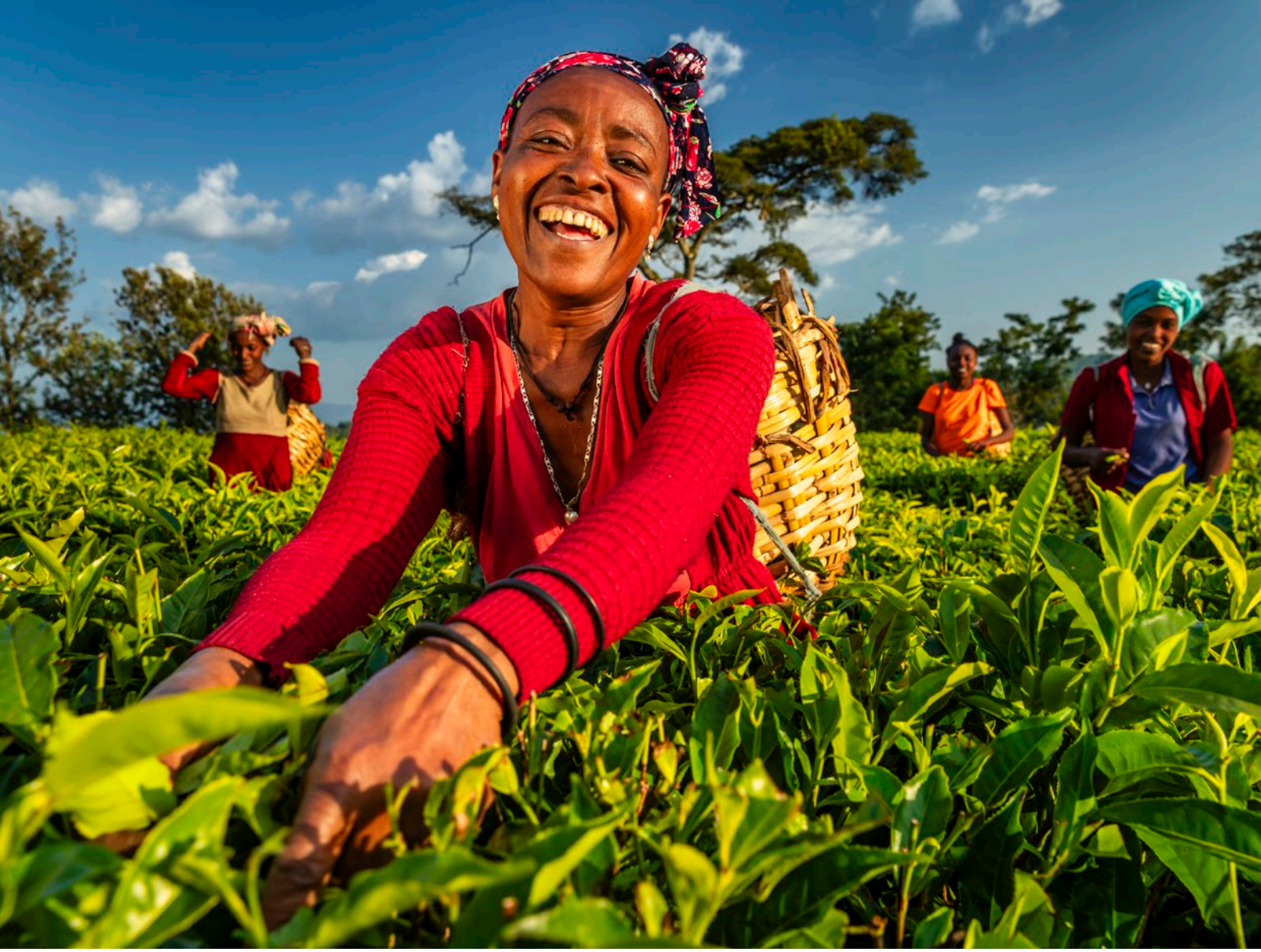


Driving the system change needed to end loss and damage from climate change

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Cover image: Women harvesting tea leaves on a plantation in central Ethiopia © hadynyah / iStock

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Contents

Acronyms and Abbreviations 5

0. Executive Summary 6

1. Introduction 9

1.1 What is the problem? 10

1.2 What are the origins of the problem? 12

1.3 How unequal exchange plays out 14

1.4 Introducing the solution: systems change 15

1.4.1 What is systems change? 15

1.4.2 How do we see systems change? 16

1.4.3 What is the relationship between preventing, reducing and addressing loss and damage and system change? 16

2. What needs to change? 18

2.1 Ending and Preventing Ecological Overshoot 18

2.2 Addressing Social Shortfalls 21

2.3 Core transformations 26

2.3.1 Ending the growth imperative moving beyond GDP 26

2.3.2 Alternative Indicators to GDP 26

2.3.3 Indigenous values 27

2.3.4 Growth-critical economic thinking 27

2.3.5 Differentiated responsibilities 28

2.3.6 Degrowth in the Global North and a flourishing Global South has benefits for all 29

2.3.7 Transitioning Away from Growth 29

2.4 Working less and valuing care 30

2.4.1 Reducing working time 30

2.4.2 Valuing care 30

2.5 Ending the hegemony of Global North Science, knowledge and expertise and decolonising learning and information exchange 31

2.6 From dominance to stewardship and kinship 31

2.7 Expanding who has rights, rights for more than humans 33

2.8 Rethinking reparations 34

2.9 Thinking seven generations ahead 36

3. How can we drive change? 37

3.1 Positive tipping points 37

3.2 The 3.5 percent rule 37

3.3 Litigation and operationalising Advisory Opinions on Climate Change 39

3.4 A collective vision for the future 40

3.5 Not just a seat at the table —burn the table down 41

3.6 Embracing plurilateralism 41

4. Next steps for driving systems change 42

General recommendations 42

Recommendations for policy, political and narrative influencers in the Global North 43

Recommendations for policy, political and narrative influencers in the Global South 44

Recommendations for civil society 44

Endnotes 45

Acronyms and Abbreviations

AO	Advisory Opinion
CBDR-RC	Common but differentiated responsibilities and respective capabilities
FPIC	Free, Prior, and Informed Consent
GDP	Gross Domestic Product
ICJ	International Court of Justice
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
L&DC	Loss and Damage Collaboration
OECD	Organisation for Economic Co-operation and Development
UN	United Nations
UN Debt Convention	United Nations Framework Convention on Sovereign Debt
UNFCCC	United Nations Framework Convention on Climate Change
US	United States of America
USD	United States Dollars
WTO	World Trade Organization

Executive Summary

What is the problem?

Human activities have pushed our Earth beyond its safe operating space. Seven of nine planetary boundaries have now been exceeded.[1] At the same time, 35 percent of the global population face social shortfalls in areas such as food, water, housing, work, peace, and political voice.[2,3] The richest 20 percent of countries —home to just 15 percent of the global population— contribute more than 40 percent of annual ecological overshoot.[4] Whereas, the poorest 40 percent of countries —home to 42 percent of the global population— experience more than 60 percent of social shortfalls.[5] Ecological overshoot and social shortfalls were created through particular configurations of imperialism, colonialism, racism, and capitalism over the last few centuries.[6,7,8,9] Unequal exchange between the Global North and Global South is perpetuated by unfair trade,[10] debt,[11,12] and tax[13] rules. Inequality is growing[14] and democracy[15,16,17] is shrinking as wealth[18] and power is concentrated among authoritarian leaders,[19,20] extractive multinational corporations and oligarchs (i.e. ultra-wealthy and politically powerful people).[21]

What is the solution?

Systems change is needed to end ecological overshoot of the planetary boundaries while addressing social shortfalls. This requires transformation that addresses the root causes and drivers of ecological overshoot and social shortfalls, and democratising power throughout systems. Key transformations must include:

- **Moving beyond economic growth:** "Green growth" is not possible.[22,23] We must focus on reducing consumption while shifting to regenerative and distributive economic activity within and between nations.[24,25] Indigenous concepts suggest relationality[26,27] and reciprocity[28] as core values that should underpin all economic activities. Emerging growth-critical economic frameworks include degrowth[29] and Doughnut Economics.[30]
- **Working less and recognising the true value of care:** Reducing working time is necessary to decouple work from growth,[31] reduce consumption,[32,33] and free up time for people to live healthier,[34] more sustainable lives.[35] Recognising the true value of care will help address gender inequality.[36]
- **Ending the hegemony of Global North science, knowledge, and expertise:** Ending epistemological violence[37] against Indigenous and other knowledge holders is critical to ensure that leadership, knowledges, wisdom, and experiences that can end ecological overshoot and social shortfalls are not marginalised at the very moment they are needed most.[38,39,40]

- **Restoring our reciprocal relationship with more-than-humans:** Global North models of conservation have failed to prevent ecological overshoot while displacing Indigenous Peoples who have safeguarded biodiversity for millennia.[41] We must(re-)turn to stewardship and kinship to restore our reciprocal relationship with more-than-humans (e.g. animals, plants, fungi, forests, glaciers, rivers, the atmosphere)[42,43,44] recognise that human and more-than-human wellbeing are inseparable,[45,46] and reject the idea that humans have dominion over so called "nature".[47]
- **Reconsidering reparations:** We need to think of reparations differently,[48] not as a punishment, but as an acknowledgement of shared responsibility, and as an opportunity to dismantle systems that benefit just a handful of people.[49] Reparatory justice can reallocate resources and capabilities to build just and equitable systems that can end ecological overshoot and address social shortfalls for all.[50]
- **Thinking seven generations ahead:** Indigenous principles such as the Haudenosaunee Peoples' Seventh Generation value and the principle of intergenerational equity[51] urge current generations to live in a manner that future generations can still meet their needs, enjoy human rights, and thrive.[52,53] This suggests that no decision should be taken without first considering how it might affect the ecologically safety and social justice of future generations.

Positive tipping points, non-violent mass mobilisation of 3.5 percent of the population, and achieving a collective vision for the future, can all play important roles in driving systems change.

- **Positive tipping points:** By identifying, triggering and accelerating social tipping points in human societies, positive tipping points[54] can interact to form self-reinforcing cascades of change[55] to bring us closer to systems change. Only 20-25 percent[56] of a population is typically required to reach a positive tipping point.[57]
- **The 3.5 percent rule:** Non-violent protests are twice as likely to succeed as armed conflict, with those engaging a threshold of 3.5 percent of the population having almost never failed to bring about change.[58,59,60,61,62] Most successes have been achieved with less than 3.5 percent of the population participating.[63] Large-scale participation is usually only a surface-level indication of the full scale of public support.[64]
- **A collective vision for the future:** Decolonisation,[65] critical consciousness,[66] appreciating the agency that individuals possess to bring about change,[67,68,69] and citizens' assemblies,[70] can help create a shared vision for tangible alternative futures that are habitable, just, and equitable.[71] A collective vision can drive systems change by enabling people to appreciate what life under a new system might feel like.[72]
- **Coalitions of the willing:** Groups of willing States, regions, cities, unions, companies, and individuals can move faster than multilateralism, test practical solutions, and drive positive tipping points, creating a "race to the top".[73]

What are our key recommendations?

- The burden of systems change must be borne equitably, in line with historic responsibility, self-determination, Free Prior Informed Consent (FPIC), and the principles of common but differentiated responsibilities and respective capabilities (CBDR-RC), the polluter pays, do no harm, and intergenerational equity.

- The Global North must organise a planned shrinkage of its material economy to free up ecological space for the Global South to meet the needs of its citizens.[74] Degrowth and Doughnut Economics can help achieve this.
- It is not viable for the Global South to follow Northern development paths without increasing ecological overshoot and social shortfalls. The Global South should resist growth-based capitalist development models without compromising on the right to development.[75]
- Abolishing debt-based currency[76] and shareholder primacy,[77] caps on resource use,[78] and banning advertising[79,80] and behavioural economic models that encourage consumerism[81] can all help economies move beyond growth.
- The (re-)turn to stewardship and kinship must be supported by returning land to Indigenous Peoples, granting rights to more-than-humans,[82] and recognising ecocide as a serious crime.[83]
- The Global North should not regard degrowth nor reparations as a punishment.[84] There are significant benefits to Global North citizens from these actions across health,[85] security,[86] and international cooperation.[87]
- As a minimum first step towards reparatory justice, the Global North must agree to make the global economy fundamentally fairer for the Global South[88], including by reforming trade frameworks through the lens of ecological limits and distributive justice,[89] and agreeing to fit for purpose UN Debt Convention and UN Tax Convention.[90]
- Education[91,92] and political systems must centre intergenerational thinking to ensure decision making considers the ecological safety and social justice space of future generations.[93]
- Systems change requires a prolonged campaign of strategic non-violent mass mobilisation. This necessitates breaking down systems change into manageable chunks, having a clear set of demands for each reform, coordinating mobilisation globally, ensuring the sustainability of mobilisation,[94] and maintaining the wellbeing of participants.[95]

1

Introduction

Things did change

Noa awoke to the smell of morning flowers. The dawn chorus louder each passing year. The morning dew heavy. Overnight oats grown in the valley. Jam from last year's raspberries. Every drop of water used to wash the dishes put to use. Solar cells at 70 percent. Enough for the mornings emails and to charge the rotavator. The neighbour needs it. Reforesting work takes place in the burn scar today. Before starting a moment of silence for the trees that were lost in last year's fire. Still too hot. But frosts returning to the hills.

30 years since Noa went to protests. Somehow confident that if enough people joined the marches, the unions, a local care network —things could change. Things did change.

Since then, land entrusted to the care of Noa's ancestors has returned to the stewardship of the community. Everything needed to live well, a school, a health center, the town hall —all within 15 minutes walk. Internet, water, electricity, now free. Homes owned by the community —not the banks. People happier, healthier, ready to give back to nature, their elders, and future generations.

In a previous brief, we laid out our five-year vision for responding to loss and damage caused by climate change under the United Nations Framework Convention on Climate Change (UNFCCC). In a subsequent paper we presented a "mosaic of solutions" that can meet the Loss and Damage needs of the Global South while building long term resilience and advancing sustainable development. In the latter, we concluded that systems change will be needed for all humans, ecosystems, and species to thrive, not just survive, in the midst of climate change and other planetary challenges.

In this paper, we consider what systems change entails and what opportunities there are to advance it. To do so, we take the Doughnut of Social and Planetary Boundaries[96] as an analytical framework to guide our inquiry into how to end ecological overshoot of the planetary boundaries while addressing social shortfalls, such as a lack of access to healthcare, food, and education.[97]

Although critical assessment of the Doughnut has identified some limitations to the framework,[98,99,100,101] we find it to be a useful tool that provides a concise visual illustration and quantification of progress towards ending ecological overshoot and addressing social

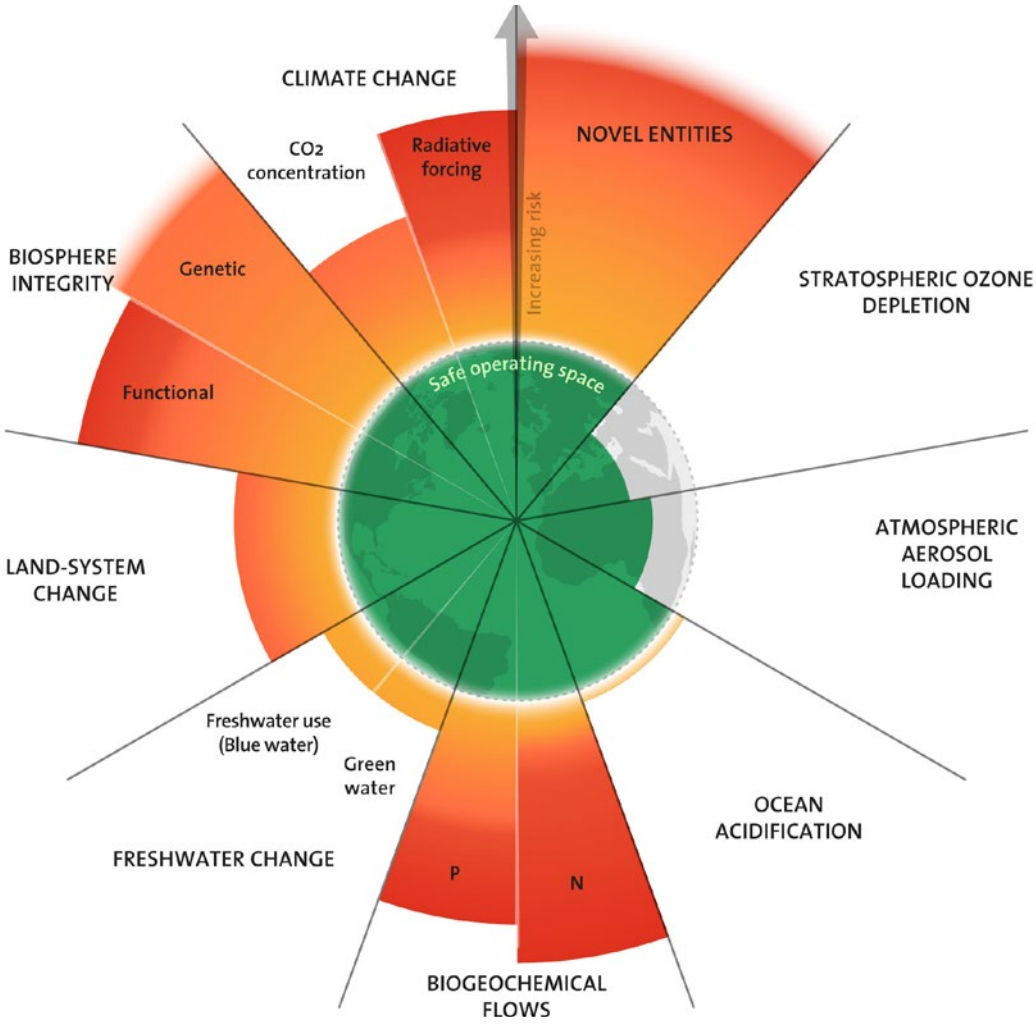
shortfalls.[102] However, we wish to strongly recognise the importance of raising questions about who gets to set planetary boundaries, whose interests they serve, and how the task of ending ecological overshoot and addressing social shortfalls will be shared.[103] We do so acknowledging the historic and ongoing marginalisation of Global South voices in international negotiations[104,105] and how uneven responsibilities and vulnerabilities continue to challenge the fairness and effectiveness of global governance.[106,107] In light of this, our use of the Doughnut framework is firmly tied to equity and justice and the centering of Global South and Indigenous perspectives.[108]

By acknowledging that loss and damage is one of the many symptoms of ecological overshoot that will further exacerbate social shortfalls, we aim to increase understanding of the need for strategic coordinated change across all systems. We also hope that this paper can serve to stimulate an important discussion within Loss and Damage negotiations under the UNFCCC regarding the structural inequalities that prevent outcomes that can lead to real transformation.

1.1 What is the problem?

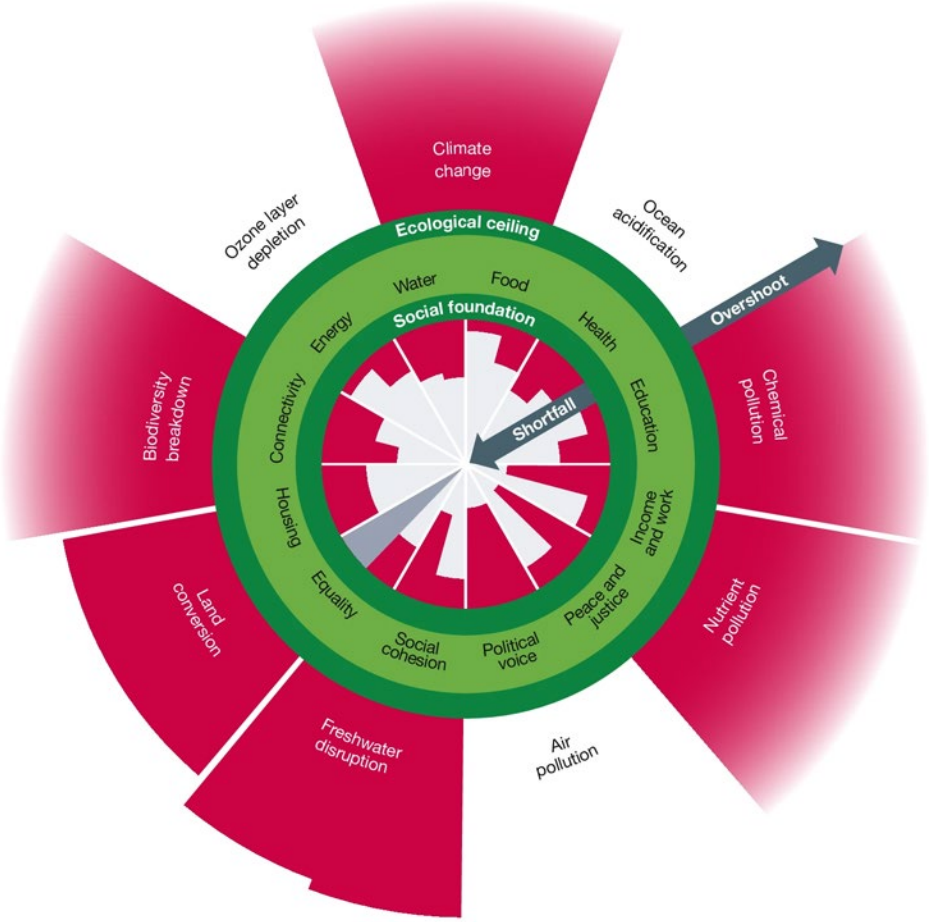
Human activities have pushed our Earth beyond its safe operating space. Seven of nine planetary boundaries have now been exceeded[109] and all seven show worsening trends.[110] Only two boundaries remain in the safe zone.[111] See figure 1 on the next page.

Figure 1: The 2025 update to the Planetary boundaries.[112]



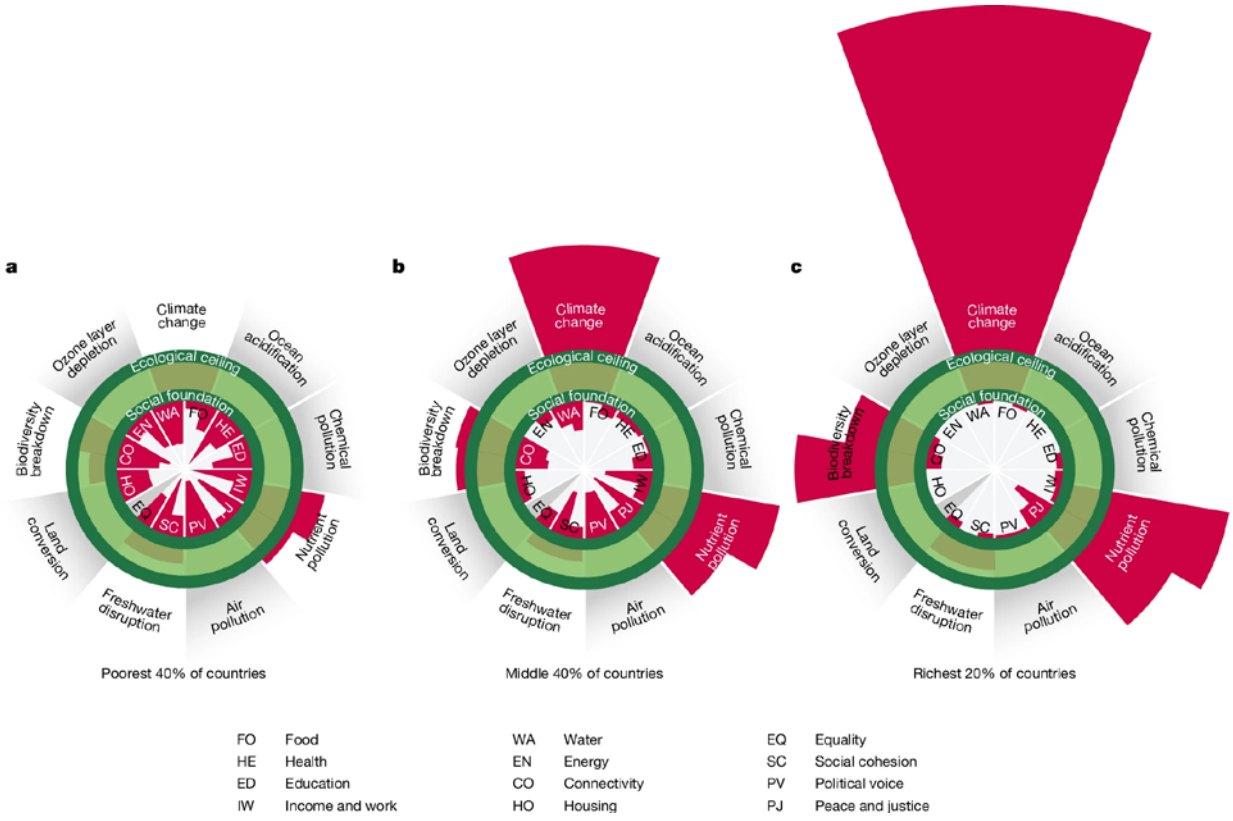
At the same time, the basic needs of billions of people are not being met, with as much as 35 percent of the global population facing social shortfalls in areas such as food, water, housing, work, peace, and political voice.[113,114] See figure 2 below.

Figure 2: Current global status of shortfall and overshoot in the Doughnut of social and planetary boundaries.[115]



Responsibility for overshooting the planetary boundaries and the populations affected by the harshest, most immediate, impacts of both overshoot and social shortfalls are not evenly distributed.[116,117,118] The richest 20 percent of countries —home to just 15 percent of the global population— contribute more than 40 percent of annual ecological overshoot.[119] Whereas, the poorest 40 percent of countries —home to 42 percent of the global population— experience more than 60 percent of social shortfalls.[120] See figure 3 on the next page.

Figure 3: Status of shortfall and overshoot in a disaggregated Doughnut framework for three country clusters.[121]



1.2 What are the origins of the problem?

Ecological overshoot and social shortfalls were not inevitable. They were created through particular configurations of imperialism, colonialism, racism, and capitalism over the last few centuries[122,123,124,125]

Capitalism emerged in Western Europe roughly 500 years ago.[126] In the 14th and 15th centuries, following the plague, peasant uprisings and labor shortages had weakened feudalism. Elites reacted by enclosing common land and stripping peasants of self-sufficiency to force them into low-wage labor.[127] Capitalism then expanded as European colonisers destroyed self-sufficient industries in the Global South and forcibly re-organised production to serve consumption and accumulation in Europe.[128,129] This mass appropriation of labor and resources enabled the Industrial Revolution in Europe.[130] It also spread the distorted Christian concept of human dominion over the more-than-human world, framing the latter as a passive resource to be managed, subdued, and controlled.[131] This concept was used to justify the subordination of Indigenous Peoples[132] through dispossession, the devaluing of Indigenous ways of being and knowing, and the replacement of Indigenous ecological stewardship with intensive European plantation and property models.[133,134,135,136]

As European empires expanded into the Americas and Africa, elites formulated racial hierarchies to divide working classes and legally justify the economic exploitation and enslavement of non-Europeans.[137] The invention of racism led to the misappropriation of medicine, anthropology, and early statistics to create pseudoscientific rationales asserting white biological and intellectual superiority.[138] As a foundational pillar of capitalism, the kidnapping and forced displacement of Africans under the Transatlantic Slave Trade[139] formed a coerced labor force to produce cash crops such as sugar, tobacco, and cotton. This gave rise to the modern banking, credit, and insurance systems,[140] and a massive

accumulation of wealth in European capitals and the newly independent United States of America (U.S).[141]

Consequently, colonialism intensified patriarchal relations —including control over women's bodies and exploitation of their labour—[142,143,144] and affected the lived experience of the racialised body by politically, psychologically, and physically alienating people who were not White.[145,146] It also asserted a philosophical separation of humans from more-than-humans,[147,148] the mind from the body, and reason from emotion.[149]

In the middle of the 20th century, anti-colonial movements across the Global South overthrew colonisers and immediately set about reorganising production around local needs and national development.[150] During this time many Global South governments introduced progressive policies (e.g. land reform and nationalisation) to rebuild economic sovereignty[151] that delivered rapid development and social improvements.[152] However, these efforts were suppressed —often through military force— as former colonisers removed independent governments to install compliant regimes that would keep cheap resources flowing to the Global North.[153]

Following the Bretton Woods Conference in 1944, the concept of Gross Domestic Product (GDP) became the primary tool for measuring national economies.[154] The need to perpetually grow national and global economies has since dominated macroeconomics. As a result, GDP has emerged as a primary driver of ecological overshoot and social shortfall,[155] despite warnings that unchecked growth would result in sudden and uncontrollable decline in both population and industrial capacity.[156]

Since the 1980s, the Global North has imposed structural adjustment programmes across the Global South under the guise of exporting neoliberalism —the promotion of free markets, privatisation, and deregulation.[157] Promoted by the Bretton Woods Institutions (the International Monetary Fund (IMF) and World Bank) and others such as the World Trade Organisation (WTO)[158], these programmes forced Global South countries to privatise industries and public services and cut spending, devalue their currencies, and roll back progressive reforms, in exchange for emergency loans.[159] This reduced the cost of Global South labour and resources and re-organised production around exports to the Global North by trapping the Global South at the bottom of global commodity chains.[160] In this way the imperial arrangement between Global North and South was restored without the need for occupation.[161]

As a result, the Global South has been forced into a vicious cycle of borrowing to service external debt, while being prevented from protecting domestic industries and adequately taxing international corporations operating in their countries.[162] This has increased poverty and food insecurity while making public services more expensive and less accessible.[163] It has also enabled the Global North to externalise its disproportionate ecological overshoot by using the Global South as a manufacturing hub, carbon sink, and waste dump[164], thereby taxing the Global South with further ecological and social burdens.[165,166,167]

At the same time, neoliberalism has significantly impacted the quality of life of the average citizen of the Global North. Through privatisation, deregulation, regressive taxation policies, and the weakening of trade unions, wealth and economic power has been transferred upward to an increasingly influential elite made up of extractive multinational corporations and oligarchs.[168,169] This has resulted in a reduction in social protection, a decline in the quality of public services, and increasingly exploitative labour conditions.[170,171]

Deregulation has also brought about a form of hyperconsumption that celebrates excess, impatience, and overindulgence,[172] that is perpetuated by media, advertising, and influencer culture.[173] Advances in technology and the normalisation of data-collection following 9/11[174] have given rise to surveillance capitalism and the commodification of personal data for profit generation, political manipulation,

and behavioural influence.[175] This has expanded market logic into areas traditionally shielded from commerce, such as healthcare, education, and social welfare.[176] As a result, average citizens can feel locked into systems of hyperconsumption that are outside of their direct control.[177]

With the emergence of authoritarian neoliberalism,[178] States are increasingly using police and military power, the militarisation of borders,[179,180] welfare cuts, and the insulation of economic decisions from democratic control to protect the economic interests of extractive multinational corporations and oligarchs by force.[181] This involves attacking and capturing democratic institutions, exploiting electoral reform to undermine the representation of minority groups,[182] and silencing critics including unions, activists,[183] academic institutions, and media organisations.[184,185] While around the world large private security forces now protect the interest of extractive multinational corporations and oligarchs at sites of production and distribution, and mineral and fossil fuel extraction.[186]

At the same time, violations of the UN Charter in Gaza and Ukraine,[187] campaigns against the International Criminal Court (ICC)[188,189], and week international responses to genocide and other atrocities[190] are putting significant pressure on the rule of international law. The legitimacy of international policy regimes is further undermined by the influence of multilateral corporations such as fossil fuel and agriculture companies.[191,192] Consequently, shrinking multilateralism is stalling and/or prohibiting the establishment of international treaties and undermining the implementation of existing agreements that could help end ecological overshoot and social shortfalls.[193]

1.3 How unequal exchange plays out

The following four examples help illustrate the scale of this ongoing unequal exchange.

1. Wealth is becoming more concentrated, inequality is growing

More than 800 million people on Earth live in extreme poverty while[194] 2.1 billion lack safely managed drinking water, 3.4 billion lack safe sanitation, and 1.7 billion still lack basic hygiene.[195]

The number of billionaires has reached 3,000.[196] The richest 0.001 percent of the global population now own three times more wealth than the bottom half of the population combined.[197]

2. The Global North and wealthy continue to consume more than their fair share

High income countries in the Global North were responsible for 76 percent of excess resource use between 1970 and 2017.[198] China was responsible for 15 percent of resource use and the rest of the Global South was responsible for just 8 percent.[199]

Globally, the top 10 percent of consumers are responsible for environmental damages totaling between 1.7 and 5.7 trillion USD per year.[200] Consumers in the Global North remain the most responsible with consumers in the U.S. coming out on top with an average per person responsibility for environmental damages ranging from 19 to 63 thousand USD per year.[201]

3. The Global North and wealthy emmit, the Global South and poor suffer climate loss and damage

The Global North is responsible for roughly 92 percent of the CO_2 emissions that have contributed to overshoot.[202] The Global South —which is responsible for only 8 percent of excess CO_2 emissions— is experiencing loss and damage that could have cost as much as 937 billion in 2025 alone[203] and is expected to suffer loss and damage in the trillions of USD a year by the 2050s.[204,205,206]

The richest 10 percent account for 77 percent of greenhouse gas emissions associated with private capital ownership (e.g. investments in companies and property). The poorest half of the global population accounts for only 3 percent.[207] Of the poorest 1.1 billion people, 80 percent live in regions that are exposed to extreme heat, flooding, and other climate hazards.[208]

4. The system is still rigged

The Global North extracts labour and resources from the Global South worth over 10 trillion USD a year.[209] Between 1990 to 2015 drain from the Global South totalled 242 trillion USD.[210]

The Global North earned more than 1.4 trillion USD in loan repayments from the Global South in 2023 alone.[211] As of 2025, approximately 3.4 billion people live in Global South countries that spend more on debt servicing than on healthcare or education.[212]

Tax-related illicit financial flows —including tax evasion and avoidance— are costing countries around the world an estimated 492 billion USD.[213] The Global South is disproportionately affected.[214,215,216,217] In 2023, tax losses in 25 of the poorest Global South countries were 47 billion USD —equivalent to 49 percent of their public health budgets.[218]

1.4 Introducing the solution: systems change

1.4.1 What is systems change?

The unequal systems that have led to ecological overshoot and social shortfall are deeply interconnected. Incremental change in one area will not address the root causes and drivers of the ecological overshoot and social shortfalls that we face. Systems change is therefore required (See box 1 for a brief introduction to systems).

However, there is no universally accepted definition of systems change or how it would unfold in practice.[219,220,221] There is also no shared understanding of what distinguishes change that is transformational from change that is not.[222] This risks the concept being co-opted to describe any type of change, making it difficult to distinguish between business-as-usual actions and truly transformational systems change.[223] It also risks systems change being wielded as a system of oppression, something which researchers warn has happened with traditional development models[224,225,226] and transformational climate change adaptation.[227]

Box 1. What is a system?

A system is made up of interdependent elements that are connected through a web of relationships.[228] These elements can include more-than-humans (e.g. the atmosphere, water, plants, animals, fungi), human things (e.g. buildings, cars, cities) and social, political, economic, and cultural institutions (e.g. education, democracy, law, capitalism). Together, the elements of a system interact to produce a whole that is greater than the sum of its parts,[229] like a coral reef or a city.[230]

Systems exist at different scales, from the micro (e.g. a bacteria), to the meso (e.g. a community), and the macro (e.g. the global economy). A system can also be nested within another. For example a single bee hive that produces honey is part of the global food system which includes everything from how food is grown to how it is bought, prepared, eaten, and disposed of.[231]

Within systems feedback loops can occur when a system's output returns as future input driving change or stability. Positive feedback loops amplify change and drive exponential growth or acceleration (e.g. global warming caused by greenhouse gas emissions). Negative feedback loops counteract change to maintain equilibrium, and stability (e.g. plants absorb carbon dioxide and reduce global warming).[232]

Systems also interact with each other. For example, the carbon cycle involves all of the Earth's four major spheres. When plants died (Biosphere), over time they became coal (Geosphere), which was burnt by humans to produce energy and released as carbon dioxide, leading to global warming (Atmosphere), and ocean acidification (Hydrosphere).

1.4.2 How do we see systems change?

We see systems change as taking actions that lead to the formation of new systems that behave radically differently to what we have now. This requires identifying and addressing the root causes and drivers of ecological overshoot and social shortfalls, and democratising power throughout systems. Only in this way can we ensure that the needs of all humans and more-than-humans[233] can be met without surpassing the planetary boundaries.

In regards to transformation, we do not consider incremental changes (e.g. making a car more fuel efficient) to be transformational. Although, we do recognise that incremental changes can help to create enabling environments for future transformations and/or come together to lock in a transition to a new system.[234] Instead, we consider changes to be transformational only when they address the root causes and drivers of ecological overshoots and social shortfalls in a manner that guarantees non-repetition of the violation of human and more-than-human rights, access to justice, and remedy and reparation.[235]

Furthermore, we wish to stress that the burden of systems change must be borne equitably in line with historic responsibility, self-determination, Free Prior Informed Consent (FPIC), and the principles of common but differentiated responsibilities and respective capabilities (CBDR-RC), the polluter pays, do no harm, and intergenerational equity.

1.4.3 What is the relationship between preventing, reducing and addressing loss and damage and system change?

Although responding to loss and damage caused by climate change presents an important opportunity to scrutinise and address the root causes of vulnerability,[236] systems change necessitates confronting a much broader range of harms including colonialism and racial capitalism.[237]

Intersectionalist perspectives also insist that climate violence is inseparable from colonial violence, including military, technological, environmental, and extractive violence.[238] In light of this, the narrow framing of climate harm afforded by the term “loss and damage” can be considered inadequate for discourses on systems change.[239] Therefore, in this paper we consider the transformation, repair, reparation, and justice required to guarantee that harm does not happen again.[240] —not just those caused by climate change.

2

What needs to change?

Addressing the root causes and drivers of ecological overshoot and social shortfalls requires transforming both how we interact with systems and how we think about them. While democratising power throughout systems requires centring Indigenous Peoples, local communities, and other marginalised groups —along with their knowledges, wisdoms, priorities, and needs— in bottom-up local-to-global decision making.

Table 1 and 2 unpack the transformations needed to end ecological overshoot and address social shortfalls across the nine planetary boundaries and 12 essential dimensions set out in the social foundation of the Doughnut of Social and Planetary Boundaries. See Annex I and Annex II for a more detailed unpacking.

In the following sections we explore a number of the core transformations needed to bring about these changes. This includes consideration of the need to: end dependence on economic growth; work less and value care more; end the hegemony of Global North Science, knowledge and expertise; restore our reciprocal relationship with more-than-humans; expand rights to more-than-humans; rethink reparations; and think seven generations into the future.

2.1 Ending and Preventing Ecological Overshoot

Ecological overshoot has many repercussions. Fortunately, there are ways that overshoot can be addressed, and —where boundaries have not yet been crossed— prevented. Table 1 includes a non-exhaustive list of both impacts and solutions.

Table 1: Ending and Preventing Ecological Overshoot

Planetary Boundary	What's the problem?	How do we fix it?
Climate Change	Earth's average temperature is approaching 1.5°C above pre-industrial levels.[241] Current national climate plans put the world on track to 2.3-2.5°C of warming by 2100.[242] Fossil fuel extraction, production, and combustion are responsible for 73 percent of emissions.[243]	Reductions to annual emissions of 55 percent, compared with 2019 levels by 2035, will keep us on track with the 1.5°C goal of the Paris Agreement.[244] This requires a rapid and systemic, just transition in all sectors —including a fair, fast, full, and funded phase out of fossil fuels. Transitioning to a planetary health diet will significantly reduce emissions from food systems.[245]

Planetary Boundary	What's the problem?	How do we fix it?
Biosphere Integrity (Biodiversity Loss)	One million of the world's estimated 8 million species of plants and animals are threatened with extinction.[246] An estimated 7 trillion USD flows to activities that increase biodiversity loss each year.[247] Biodiversity loss creates severe global risks to systems including water, food, and climate, by destroying essential ecosystem services (e.g. pollination).[248]	44 percent of Earth's land surface must be devoted to safeguarding biodiversity without displacing the 1.8 billion people living on these lands.[249] This will require transitioning to a planetary health diet to reduce the amount of land needed for agriculture,[250] returning land to Indigenous stewardship,[251] protecting land rights,[252,253,254] assigning rights to more-than-humans,[255] and criminalising ecocide.[256]
Land-System Change	The area of Earth's land covered by forests was at least 64 million square kilometres (Mkm^2) it is now only 38 Mkm^2.[257] Agricultural expansion causes nearly 90 percent of global deforestation.[258] 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.[259]	Returning forests to the stewardship of Indigenous Peoples[260,261] and transitioning to a planetary health diet will reduce agricultural drivers of deforestation and free up land for reforestation.[262,263] Regulation of supply chains to eliminate illegally sourced commodities derived from unlawful agriculture, mining, and logging,[264] will further reduce deforestation.[265]
Biogeochemical Flows (Nitrogen and Phosphorus)	An estimated 48 to 50 percent of the world's population currently depends on crops grown with synthetic fertilisers that contain high levels of nitrogen and phosphorus.[266] High levels of nutrients cause water pollution, kill marine life, increase soil acidity, and contribute to greenhouse gas emissions.[267]	Shifting to a planetary health diet will significantly reduce reliance on synthetic fertilisers.[268] Adopting regenerative farming guided by Indigenous and traditional knowledge holders [269] will help to keep nutrients in the soil.[270] A circular economy approach to fertiliser will recycle nutrients.[271,272] Regulating agricultural runoff, restoring wetlands[273] that act as natural nutrient filters,[274] and upgrading wastewater treatment facilities will further reduce overshoot.[275]

Planetary Boundary	What's the problem?	How do we fix it?
Freshwater Change	Freshwater change is driving drought, loss of biodiversity, desertification, and widespread water insecurity.[276] Agriculture accounts for roughly 70 percent of global freshwater withdrawals from lakes, rivers, and aquifers.[277]	Adopting the planetary health diet, will reduce water-intensive animal farming and prioritise crops with lower water footprints.[278] Indigenous and traditional water conserving practices,[279] and precision irrigation[280] will further reduce water use. The protection and restoration of forests, marshes, peatlands, and floodplains will ensure the generation of rainfall, maintain internal moisture cycles, and recharge aquifers.[281,282] A circular water economy will reduce urban water use.[283] Regulation[284] will limit water use in high-consumption sectors (e.g. AI and data).[285]
Ocean Acidification	Ocean acidity has increased by approximately 30 percent[286] as a result of climate change.[287] This is making it harder for marine animals, such as shellfish and corals, to build shells and skeletons,[288,289] leading to biodiversity loss, food insecurity, and the loss of protective natural barriers such as coral reefs.[290]	Addressing climate change is the primary way to return ocean acidification to safe operating space.[291] Cultivating and restoring mangroves,[292] kelp, eelgrass, and other marine vegetation will also help to absorb CO_2 and buffer acidity locally.[293] Reducing nutrient runoff will prevent localised acidification and hypoxic events.[294]
Atmospheric Aerosol Loading	Aerosols such as sulfur dioxide and black carbon are released by burning fossil fuels, crop residues, and traditional biomass fuels (e.g. wood).[295] Power generation, manufacturing, and transportation are the main sources.[296] Aerosols influence Earth's climate, weather, and air quality (e.g. by trapping heat and disturbing rainfall patterns).[297] High aerosol concentrations have significant health impacts (e.g. respiratory disease).[298] Air pollution from burning fossil fuels is responsible for between 5[299] and 8[300] million deaths a year.	Regulating agricultural burning and phasing out of fossil fuels will significantly reduce aerosols with immediate health benefits.[301] Transitioning to a planetary health diet will dramatically decrease organic aerosols such as gaseous ammonia.[302,303] Cutting methane emissions from agriculture, fossil fuel production, and landfill waste offer one of the fastest ways to reduce aerosols.[304]

Planetary Boundary	What's the problem?	How do we fix it?
Stratospheric Ozone Depletion	Human made chemicals such as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and halons, deplete ozone from Earth's atmosphere.[305] This damages the Earth's protective layer that shields humans and more-than-humans from harmful levels of ultraviolet radiation from the sun.[306]	The ozone layer is recovering due to the near-total phase-out of CFCs and HCFCs[307] under the Montreal Protocol.[308] Hydrofluorocarbons (HFCs) were introduced as alternatives but are potent greenhouse gases.[309] The full implementation of the Kigali Amendment to the Montreal Protocol can address the challenges of HFC's.[310] Continued monitoring of new variables that can cause ozone depletion (e.g. nitrous oxide) is required to prevent overshoot from happening again.[311,312]
Novel Entities (Chemical Pollution)	Novel entities are now found in every part of the planet. They include pesticides, asbestos, fossil fuels, micro plastics, and genetically modified organisms.[313] Hazardous chemicals are known to have significant health[314] and ecological impacts.[315] The production of hazardous chemicals is currently 1,964 million tonnes (Mt) a year.[316]	The production of hazardous chemicals must be limited to 60 Mt per year. This will require reduced consumption,[317] a circular economy that recycles, reuses and shares products,[318,319] and taking a precautionary approach to hazardous chemicals.[320] Setting global caps,[321] strengthening existing international treaties (e.g. the Basel Convention), and adopting new treaties (e.g. a Plastics Treaty) will help to accelerate the phase out.[322]

2.2 Addressing Social Shortfalls

Social shortfalls are affecting people across the globe, but are disproportionately affecting people in the Global South. Fortunately, there are ways that they can be addressed. Table 2 includes a non-exhaustive list of both impacts and solutions.

Table 2: **Addressing Social Shortfalls**

Social Shortfall	What's the problem?	How do we fix it?
Food	10 percent of the global population is undernourished,[323] 29 percent face moderate to severe food insecurity.[324] Conflict, economic shocks, inequality, and climate change are the main drivers of food insecurity.[325] Our current food system could only feed 3.4 billion people if it were to respect planetary boundaries.[326]	Adopting a planetary health diet can feed 10.2 billion without surpassing planetary boundaries.[327,328] This will protect against economic shocks by stabilising food supply chains through diversified production and reduced dependence on volatile livestock feed and chemical inputs.[329] Peace building that promotes equitable resource management and shared livelihoods will help address root causes and drivers of conflict.[330]
Health	42 percent of the global population live in countries with an under-5 mortality rate exceeding 25 per 1,000 live births.[331] 28 percent live in countries without high coverage of essential health services.[332] The breach of the planetary boundaries is directly leading to health impacts.[333] Social shortfalls are undermining the social determinants for good health (e.g. education, housing, and environment).[334]	Addressing ecological overshoots that cause health impacts and transition to the planetary health diet will improve the health and wellbeing of billions of people,[335] thereby reducing pressure on healthcare systems.[336] Ensuring that essential health services are free at the point of care,[337] and establishing local, community-based care initiatives that prioritise preventative medicine and early diagnosis, will help to close geographic gaps in care.[338]
Education	16 percent of the global adult population (aged 15+ years) are illiterate.[339] 37 percent of the global young adult population (aged 21–23 years) have not completed upper secondary education.[340] Barriers to education include poverty, conflict and instability, displacement, damaged or inadequate infrastructure, and gender discrimination.[341,342]	Abolishing fees for education[343] properly resourcing schools, digital learning tools,[344] and targeting resources directly to marginalised and crisis-affected children will significantly increase access.[345] Effective implementation of the Comprehensive School Safety Framework will increase the resilience of education infrastructure.[346] Reducing domestic burdens, care duties, and the social pressures that cause child marriage,[347] will reduce barriers to education for girls.[348]

Social Shortfall	What's the problem?	How do we fix it?
Income and work	73 percent of the global population live below the societal poverty line.[349] 21 percent of young people (aged 15–24 years) globally are not in employment, education or training[350] —two-thirds are women.[351] The top 10 percent of the global population earn more than the remaining 90 percent.[352]	Progressive taxation on wealth, assets, land ownership, and inheritance, will stop disproportionate intergenerational wealth concentration and redistribute funds to social safety nets.[353] Ensuring public and shared ownership of services, land, and assets will ensure benefits, power, and opportunities are shared equitably.[354] Recognising the true value of care will help to close the gender gap by compensating women for unpaid care work.[355] Universal access to social protection that guarantees a basic income will ensure a minimum standard of living and shift wealth downwards.[356] Increasing the collective bargaining power of workers and upholding workers rights will protect living wages, job security, and safe working conditions.[357]
Water	37 percent of the global population lack access to safely managed drinking water.[358] 42 percent lack access to safely managed sanitation.[359] Climate change, pollution, and over exploitation for agricultural and industrial use is causing water scarcity.[360] Conflict damage to water infrastructure,[361] a lack of resources to establish and maintain efficient systems,[362] and high costs of purchasing water further restrict access.[363]	Transforming food systems, land use, introducing a circular water economy, and regulating water consumption through a fair-shares approach will reduce water security caused by ecological overshoot. Expanding efficient publicly owned, renewable energy based, circular water and sanitation systems to all households with a free allocation of a basic quota of water will guarantee access.[364]
Energy	8 percent of the global population lack access to electricity.[365] 27 percent lack access to clean fuels and technologies for cooking, heating and lighting.[366] A lack of access to electricity denies basic health care, disrupts education, and forces reliance on polluting fuels for cooking.[367] In 2021, unsafe fuels were responsible for 3.1 million premature deaths.[368]	A just transition to distributed renewable energy generation will enhance access to energy and clean cooking technologies (e.g. via mini-grid and off-grid solar systems).[369,370] Treating energy as a public utility will see infrastructure costs and connection fees borne by the State[371] and the allocation of a free basic quota of electricity to each household.[372]

Social Shortfall	What's the problem?	How do we fix it?
Connectivity	53 percent of the urban population lack convenient access to public transport.[373] 37 percent of the global population lack access to the internet.[374] This limits access to basic services and opportunities, creating barriers to education,[375] and nutrition, thereby worsening health outcomes,[376] and deepening poverty.[377,378] Rural and low-income communities suffer the most from this digital and physical divide.[379] [380]	Formally recognising internet access and mobile phone data as a public utility and human right,[381] and providing a free basic monthly package to individuals, and households[382] will ensure access. Free or very low cost, clean, safe, reliable, high frequency renewable energy based public transit, and shared mobility services (e.g. e-scooters), will increase equal access to mobility.[383,384] Implementing the 15 minute city model will help to reduce the need for vehicle travel globally.[385]
Housing	32 percent of the urban population live in slums or informal settlements.[386] This exposes them to high rates of disease, severe mental stress, restricted access to public services, and increased vulnerability to disasters.[387] A lack of formal address, the inability to save, and extortionate costs for basic utilities, prevent access to social protection and compound generation poverty.[388]	Homes must be redefined as social goods rather than market commodities.[389,390] Sharing existing housing stock fairly,[391] expanding publicly controlled affordable social housing, capping rents, and incentivising housing cooperatives will significantly decrease barriers to adequate housing.[392] Formalising slums and informal settlements will help turn them into safe, legal, community owned and governed neighborhoods.[393] Reducing the size of homes, increasing shared spaces and amenities,[394] and utilising Indigenous, traditional and emergent technologies to self build homes that coexist in symbiosis with ecosystems will ensure new housing respects the planetary boundaries.[395]

Social Shortfall	What's the problem?	How do we fix it?
Equality	There is a 35 percent global shortfall in gender equality.[396] Gender inequality harms women by limiting their access to education, fair pay, healthcare, and decision making and leadership roles.[397] Racial inequality persists but is not measured globally.[398] Discriminatory systems lock marginalised groups into generational cycles of disadvantage across housing, education, health, wealth, employment, and justice.[399]	Ending gender inequality requires dismantling the patriarchy. This will involve unlearning socially constructed gender roles,[400] guaranteeing women equal rights and bodily autonomy, strengthening protection laws and community support systems,[401] recognising the true value of domestic and care work, and allocating free childcare to all. Ending racial inequality will require decolonising systems and institutions that perpetuate racism and discrimination across multiple sectors including housing, healthcare, and education.[402]
Social cohesion	24 percent of the global population state they are without someone to count on in times of trouble.[403] 72 percent live in countries where the richest 10 percent of the population earns at least twice as much as the poorest 40 percent combined.[404] 1 in 6 people worldwide are affected by loneliness leading to significant impacts on health and well-being,[405] costing billions in lost productivity and health care.[406] Inequality weakens social cohesion by eroding interpersonal trust, increasing social distance across economic lines,[407] and lowering public confidence in shared institutions.[408]	Ending social isolation and loneliness will involve in person and digital interventions;[409] universal access to free health, mental health, and elder care; creating more age-friendly communities;[410] increasing the prevalence of mutual-care networks;[411] and dismantling systems that perpetuate exclusion of vulnerable populations.[412] Ending inequality within countries requires utilising progressive taxation on wealth to redistribute resources to social safety nets,[413,414,415] and ensuring access to high quality public services for free to prevent generational poverty.[416]
Political voice	Autocracies now outnumber democracies.[417] 74 percent of the global population live in countries governed by an autocratic regime.[418] Human rights and civil liberties are declining globally.[419] Freedom of expression has been the worst-affected aspect.[420]	Reaching the safe and just space for political voice will require rebuilding and strengthening democratic institutions; enforcing strong anti-corruption measures and media freedom,[421] protecting free and fair elections;[422] building broad coalitions of opposition,[423] and increasing digital literacy to counter misinformation.[424]

Social Shortfall	What's the problem?	How do we fix it?
Peace and justice	75 percent of the global population state that they perceive widespread corruption in government and business.[425] 20 percent live in countries with a homicide rate of 5 or more per 100 thousand.[426] Corruption weakens democracy, worsens inequality, diverts money from essential public services, and reduces trust in public institutions.[427] High murder rates are a symptom of enduring historical oppression and social exclusion.[428,429] They point to failed institutions, economic distress, a lack of access to opportunities, justice and rights, and high levels of community trauma.	Ending corruption will require enforcing strong anti corruption measures. This will involve implementing beneficial ownership registers to track hidden money flows; public disclosure of budgets and contracts; conflict-of-interest disclosures; protection of whistleblowers; freedom of the press;[430] and high legal penalties for violation.[431] Dismantling systems that perpetuate inequality in marginalised communities and delivering reparation and remedy will help to reduce violent crime by strengthening social safety nets and creating equal access to opportunities.[432] 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.[433]

2.3 Core transformations

2.3.1 Ending the growth imperative moving beyond GDP

The Doughnut framework makes clear that no country is currently meeting the needs of its people without surpassing planetary boundaries.[434] Not only does this confirm that the labels of developed and developing are outdated,[435,436] it underscores that the economic pathways taken by so-called "developed countries" are un-viable.[437]

Ending the dogma of endless growth is necessary to return to the safe and just operating space of the nine planetary boundaries.[438,439] While many policy makers and institutions, including the World Bank, Organisation for Economic Co-operation and Development (OECD) and United Nations Environment Programme (UNEP) have argued for a "green growth" that de-couples GDP from the use of resources — such a thing is not possible.[440,441]

This is because empirical evidence has shown that GDP cannot continue to go up while resource use or emissions go down.[442] Instead, we must end dependence on economic growth all together and focus on reducing consumption while shifting to regenerative and distributive economic activity within and between nations.[443,444]

2.3.2 Alternative Indicators to GDP

A number of alternative indicators of progress have been proposed as replacements for GDP that offer better insights into social and environmental well-being. Examples include the Genuine Progress

Indicator, the OECD's Better Life Index, and UNDP's Human Development Index. The indicators build on research in the fields of Happiness and Wellbeing Economics and reports such as the Global Flourishing Study and the World Happiness Report. While these indicators may prove useful to track progress towards ending ecological overshoot and addressing social shortfalls, they are no substitute for ending the growth imperative.[445]

2.3.3 Indigenous values

Indigenous concepts such as Sumak Kawsay, kaitiakitanga, ubuntu and Ecological swaraj have long suggested relationality and reciprocity as core values that should underpin all economic activities (Table 3 unpacks these four concepts). Relationality is the understanding that humans and more-than-humans are deeply connected.[446,447] Instead of treating so-called "nature" as a resource to exploit, relationality suggests that we are all part of a shared web of mutual care, identity, and responsibility.[448] [449] Similarly, reciprocity suggests that our relationship with more-than-humans is one of mutual care and responsibility that requires humans reciprocate for the gifts that more-than-humans bestow upon us.[450]

Table 3: Sumak Kawsay, kaitiakitanga, ubuntu, and Ecological swaraj

Sumak Kawsay	Kaitiakitanga	Ubuntu	Ecological swaraj
Sumak Kawsay meaning "good living" in the Kichwa language is an Indigenous principle from the Andean and Amazon regions promoting living in harmony with more-than-humans to achieve wellbeing for all. It has become prominent in Latin America in recent years, featuring in the Ecuadorean and Bolivian constitutions since 2008 and 2009 respectively.[451] [452]	Kaitiakitanga is a Māori concept that means guardianship, stewardship, and the protection of the natural environment, people, and resources. It frames humanity's connection to the Earth not as ownership, but as a deep obligation to care for the world for future generations.[453]	Ubuntu is an Indigenous African philosophy rooted in Bantu languages that is sometimes translated as "I am because we are." Ubuntu's core values are relationality, collective responsibility, communal accountability, social justice, recognition, and reciprocity.[454] Ubuntu provides an Indigenous framework for understanding life systems, biodiversity, and human health, as well as a decolonial framework.[455,456]	Ecological swaraj, also known as Radical Ecological Democracy (RED), is a political and economic worldview rooted in Mahatma Gandhi's concept of self-rule (swaraj). It combines local autonomy and direct democracy with a deep responsibility to protect ecological limits and the rights of all species.[457,458]

2.3.4 Growth-critical economic thinking

Emerging growth-critical economic frameworks —including degrowth and Doughnut Economics— mirror and reflect these Indigenous values and therefore hold significant potential to help us return to an ecologically safe and socially just operating space.[459]

Degrowth proposes a radical redistribution of power, wealth, and resources, a reduction in the material size of the global economy, and a shift in common values towards care, solidarity, and autonomy.[460] It prioritises social and ecological well-being with the aim of transforming societies to ensure environmental justice and a good life for all within planetary boundaries.[461]

Degrowth can contribute to decolonisation efforts by helping to address the Global North's ecological and climate debts to the Global South, and the legacies of unequal exchange.[462] Yet, it also applies to the Global South in the sense that it is not viable to follow Northern development paths without increasing overshoot, thereby suggesting that the Global South should resist growth-based capitalist development models.[463]

However, challenges related to degrowth include ensuring that degrowth is not used as a form of neocolonial agenda setting to deprive the Global South of development pathways taken by the Global North.[464] It may also be necessary to address the short term impacts that degrowth in the Global North might bring to livelihoods in export dependent economies in the Global South.[465]

The Foundational Economy is a complementary evolving approach to socio-economic development which focuses on the provision of everyday universal basic needs such as food, housing, and health services within the planetary boundaries.[466] It offers a practical blueprint for society to identify the essential sectors that must be protected, funded, and democratised as consumption scales down.[467]

Doughnut Economics seeks to balance the goal of meeting the needs of all people with respecting the ecological limits of the planet.[468] The Doughnut of Social and Planetary Boundaries is a core concept of Doughnut Economics offering a visual monitor of progress to achieve this goal. Seven ways of thinking are set out by the Doughnut to bring about the regenerative and distributive dynamics needed to achieve this goal.[469] They promote:

1. A shift from endless GDP growth to thriving within the Doughnut;
2. Recognition that the economy is embedded within, and dependent upon, society and the living world;
3. Collaboration and reciprocity;
4. Embracing feedback loops, adapting to change, and managing complexity;
5. Addressing systemic inequalities by designing economies to be distributive by nature;
6. Shifting to regenerative and circular systems; and
7. Focusing on an economy that allows humanity to thrive, regardless of whether it is growing, shrinking, or in steady-state.

Although these ways of thinking suggest that degrowth and decolonial approaches are part of the Doughnut model,[470] some critics suggest that the Doughnut does not go far enough to address structural inequalities created by colonialism, racism, and capitalism.[471] Others suggest the Global South will need to adopt an equitable approach to the Doughnut, whereby a period of just growth enables sustainable development prior to reducing ecological overshoot.[472]

2.3.5 Differentiated responsibilities

With countries in the Global South facing the urgent challenge of meeting the most basic needs of their citizens, countries in the Global North must create conceptual space for Southern Peoples and communities to determine what they consider to be a good life, while ensuring that growth alternatives work hand-in-hand with efforts to decolonise.[473] This must include guaranteeing that the Global South

has the opportunity to pioneer different economic pathways[474] that are free from Global North influence,[475] and upholding the South's right to development.[476]

To free up the ecological space needed by the Global South to undertake equitable transformation, Global North countries must organise a planned shrinkage of their material economies.[477] De-growth and Doughnut Economics have clear applications in this regard, and must be leveraged to drastically and urgently reduce Northern ecological overshoot.

2.3.6 Degrowth in the Global North and a flourishing Global South has benefits for all

The transition to degrowth and circular economies in the Global North need not be punitive. Instead Global North countries should see it as an opportunity to improve the quality of life of their citizens by reducing consumption while shifting to regenerative and distributive economic activity.[478]

By addressing their disproportionate ecological overshoot, Global North countries would not only enjoy the benefits of their own transitions to healthier, happier, and more sustainable societies, but also enjoy co-benefits as Global South countries transition. This would include a reduction in adverse impacts as ecological overshoots, such as climate change, are brought under control. It would also enhance global security, including by reducing conflict related forced migration and supply chain disruption, as social shortfalls that are the root causes of conflict are addressed.[479] It would also lead to a decrease in the risk of pandemics[480] and other biological hazards (e.g. malaria) as global disease prevention is strengthened.[481]

Additionally, it would see the Global North benefit from the sharing of innovative solutions pioneered by Global South countries that would help to further decrease ecological overshoot and social shortfall in the Global North.[482] Lastly, it would also enable the Global North to increasingly benefit from the South-North international cooperation when facing disasters and/or social challenges.

2.3.7 Transitioning Away from Growth

The transition away from growth can be accelerated by abolishing debt-based currency, ending shareholder primacy, implementing caps on resources, and by banning advertising and behavioural economic models that encourage consumerism.

Debt-based currency: Abolishing debt-based currency and implementing a new money system completely free of intrinsic debt (i.e. money that is created by lending or debt creation) is needed to de-link the global economy from debt, thereby helping to end the need for growth.[483] This could be achieved by stopping commercial banks from creating money and lending it into existence and instead setting up democratic, accountable, and transparent State agencies to create money and then spend it into existence.[484] The Chicago Plan Revisited, which was put forward by the IMF in 2012 after the 2008 financial crash,[485] outlines how this can be accomplished.[486]

Shareholder primacy: Ending the business norm of the need to maximise shareholder returns will ensure that corporations can take action to reduce their contributions to ecological overshoot and social shortfalls. Current norms mean that leaders of corporations feel strongly obliged to maximise shareholder returns.[487,488,489] This leads to decision making that prioritises profit over operating in a way that continues to ecological overshoot and exacerbates social shortfalls. For example, CEOs may be reluctant to take decisions such as increasing wages or utilising more expensive circular materials that could result in decreased shareholder returns.[490]

Caps and bans: As the world transitions to regenerative and distributive economic activity, caps on the use of resources administered by international treaties and national legislation can help to limit extraction.[491] Banning inbuilt obsolescence (i.e. products designed to stop working to force consumers to buy new ones) and products with severe environmental impact (e.g. bottled water)[492] will help to curtail obsolescence driven consumption[493] and direct resources towards essential needs.

Banning advertising in public spaces[494,495] and behavioural economics models that encourage consumerism (e.g. nudge theory, Habit Loop, artificial scarcity, and dark patterns[496])[497] while increasing taxes on luxury products, will play an important role in reducing hyperconsumption. Encouraging examples already exist. More than 57 municipalities in 10 countries have taken steps against fossil advertising in their public space and Spain, France, the UK and Australia have either adopted laws to ban fossil fuel adverts or are discussing doing so.[498]

To be equitable and avoid harm, these caps and bans must be co-designed with communities and small businesses.[499] Throughout the transition, they should be coupled with the promotion of messaging on reducing consumption.

2.4 Working less and valuing care

Reducing consumption in the Global North and globally will require decreasing economic activity at the same time as making sure that everyone has meaningful work.[500] While just transition concepts have rightly focused on ensuring that workers in highly polluting industries are not adversely affected by climate and environmental action (e.g. coal miners and oil workers),[501,502,503] a truly just transition must also reduce working time,[504,505,506] and recognise the true value of care.[507,508]

2.4.1 Reducing working time

Reducing working time is necessary to decouple work from growth[509] and decrease our structural dependency on GDP growth as a means to create meaningful work.[510] Studies have shown that reducing working time without a loss of salary or forced flexible working has significant benefits for well-being, mental health, and productivity,[511] particularly by lowering stress and increasing time for sleep,[512] and exercise.[513] It has also been shown to increase job and life satisfaction,[514,515] and time with family.[516]

Reducing working hours will also decrease emissions and overshoot related to commuting and the consumption that comes with a workcentred society.[517] A 25 percent reduction in working time could lead to emission reductions of 20 percent,[518] and a 30.2 percent reduction in ecological footprint.[519] Working-time reductions will also help to redistribute work more evenly in a post-growth society where fewer working hours are needed.[520]

Proposals for reducing work time include the four-day week[521] and the 32-hour model, with many feminist scholars advocating[522] for shortening the working day rather than the week to help re-balance care burdens between men and women[523] in heteronormative households, for example, by freeing up time for men to take on more of the daily care activities.

While some fear that increasing free time will encourage people to consume more (e.g. by freeing up time for weekend getaways involving short haul flights), studies have shown that giving people more time encourages them to live more sustainable lives.[524] This is because, with more time, people are better able to grow and cook their own food; repair broken goods instead of buying new ones; and walk, cycle or use public transport instead of driving.[525] It also frees up time for them to contribute to community responses to ecological overshoot, mutual care networks, skill and equipment sharing, and increase political participation —all of which can have positive impacts on democracy and social wellbeing.[526]

2.4.2 Valuing care

Recognising the true value of care is a crucial component of transitioning to a post-growth society. Given a monetary value, unpaid care work would exceed 40 percent of GDP in some countries.[527] If this work were compensated, it would represent 9 percent of global GDP —equivalent to 11 trillion USD.[528]

Globally, women shoulder more than three quarters of unpaid domestic and care work,[529] an inequitable distribution that is one of the root causes of gender inequality.[530] This work involves caring for children, the sick, and elderly, cleaning, cooking, collecting water, fetching firewood, and subsistence farming. This burden is the main barrier to women's full participation in the economy and politics, their access to decision making positions, and the realisation of many of their human rights.[531]

By recognising the true value of care, distributing care more fairly within the household, and reducing the total number of hours spent on unpaid care through access to robust gender-responsive public services (e.g. child care), women will face significantly less discrimination.[532]

2.5 Ending the hegemony of Global North Science, knowledge and expertise and decolonising learning and information exchange

Across the world the Indigenous and traditional cultural practices of sufficiency, care, commoning, sustainability, reciprocity, and multi-species justice continue to be erased.[533]

Ending the hegemony of Global North science, knowledge, and expertise and epistemological violence[534] against Indigenous and other knowledge holders is critical to decolonise learning and information exchange.[535] It is also needed to ensure that solutions, knowledges, and experiences that can end ecological overshoot and social shortfalls are not omitted at the very moment they are needed most.[536,537,538]

The exclusion and de-valuing of Indigenous Knowledges, Science, wisdom and ways of being and knowing as well as local and traditional knowledge and ecological wisdom will only increase ecological overshoot and social shortfalls.[539] Instead, they must be drawn upon to address overshoot and social shorts falls by changing, enriching, complementing, and challenging Global North science; and by reinforcing the need to reevaluate our systems of knowledge production, dissemination, and absorption.[540,541,542,543] This does not mean discarding Global North science, knowledge and experience, but instead creating space for more forms of knowledge to emerge.[544]

To halt this epistemological violence, epistemic justice (i.e. fairness in how people are treated as knowers), and resistance must prevail.[545] This will involve meaningful integrating Indigenous and other forms of knowledge into science (e.g. IPCC reports)[546,547] and healthcare (e.g. two-eyed seeing that embraces the strengths of both Indigenous and Northern science[548]). It calls for ensuring that Indigenous Peoples and communities own and manage their own knowledge, research and data (e.g. through Indigenous data sovereignty).[549] It will also require recognising and respecting Indigenous justice systems,[550] and ending extractive research and exchange.[551] By taking a pluriversal approach[552] (i.e. including many different systems of knowledge and ways of being) we can deconstruct the dominant Northern ideologies that promote technocratic, top-down, and extractive models of green colonialism which perpetuate epistemic injustice, and the projection of economic side effects onto marginalised groups.[553]

2.6 From dominance to stewardship and kinship

The perpetuation of a human centered world view originating in the Global North that justifies the domination of more-than-humans is one of the root causes of ecological overshoot.[554,555,556] Despite efforts to protect "nature", Global North models of conservation have failed to prevent ecological overshoot while displacing Indigenous Peoples who have safeguarded biodiversity for millennia.[557] We must therefore, (re-)turn to stewardship and kinship to restore our reciprocal relationship with more-than-humans to end ecological overshoot and as part of our efforts to address social shortfalls.[558,559,560] This will involve taking responsibility for the well-being of both human and more-than-human communities and treating more-than-humans as extended family members and living ancestors rather than as resources.[561] Table 4 unpacks what stewardship and kinship entail.

Table 4: Stewardship and kinship

Stewardship	Kinship
Stewardship emphasises care and responsibility for the well-being of both human and more-than-human communities.[562] Examples of stewardship include protecting more-than-humans from resource extraction, removing waste, restoring biodiversity, selective harvesting,[563] and traditional fire management.[564]	Kinship goes a step further than stewardship, recognising that humans are not separate from the more-than-human world but part of an interconnected community of relationships. It emphasises belonging, reciprocity, and mutual flourishing.[565] Examples of kinship include treating more-than-humans as extended family members and living ancestors rather than as resources,[566,567] recognising the agency of more-than-humans,[568] and stewardship responsibilities that extend across generations.[569]

The false dichotomy that humans are in some way separate from more-than-humans,[570,571] and that "nature" is somewhere where people are not, ignores the reality that human and more-than-human wellbeing are inseparable.[572,573] Through stewardship and kinship, we can re-define interactions between humans and more-than-humans as a relationship, where humanity is responsible for reciprocating for the "gifts"—rather than commodities— that more-than-humans bestow upon us.[574] See box 2 for one example of reciprocity.

Box 2. Honorable Harvest

The Honorable Harvest practiced by many Indigenous Peoples in North America. It sets out guidance on how to harvest resources from more-than-humans in a manner that is respectful and sustainable.[575] The key principles are:

- **Ask permission:** Wait for a sign of abundance before taking, seek consent from the plant or animal, and abide by the answer.
- **Never take the first or the last:** Show self-restraint to protect the survival and continuation of the species.
- **Take only what you need:** Take only what you need, never take more than half, and leave plenty for others to harvest.
- **Harvest in a way that minimises harm:** Harvest in a manner that does not destroy the surrounding habitat.
- **Use everything:** Respect the gift by wasting nothing of what was taken.
- **Give thanks and reciprocate:** Leave a gift —such as spreading seeds, weeding, or offering gratitude— to help replenish what was taken.

Indigenous Knowledge and Science and the relational practices that they employ must guide this transition.[576,577,578] Their leadership and practices —such as the Milpa Model,[579] the Three Sisters,[580] and controlled burning[581]— can inform regenerative farming, the transition to regenerative and distributive

economic activity, and increase resilience to ecological overshoot. At the same time, equitable access to the benefits of "nature"[582] and the creation of more free time will allow average citizens to take up stewardship, thereby increasing their appreciation of our shared independence with more-than-human beings.[583,584,585]

Preventing land from being taken out of, and returning land to, Indigenous stewardship and kinship will help to address ecological overshoot and social shortfalls related to biodiversity, equality, and housing.[586] Returning land to Indigenous Peoples will also help to remedy and repair historical injustices and trauma caused by colonialism and racial capitalism[587] by supporting sovereignty and self-determination, restoring inherent rights, healing, and the reclaiming of place- based and ancestral knowledge, and biocultural relations.[588] It will also help restore ancestral food systems, rebuild local economies, and foster physical and mental well-being.[589,590]

Emerging practices to give land back to Indigenous Peoples include private landowners, nonprofits, and local governments voluntarily returning land.[591] The establishment of community land trusts, shared stewardship and/or ownership of public lands.[592] The payment of voluntary land taxes[593] (i.e. systems where non-Indigenous people pay "rent" or cultural taxes) as well as legal action to enforce the implementation of treaties and reclaim stolen land.[594] Land tenure reform also provides an opportunity to change the legal rules and rights for owning, using, and managing land to ensure equitable access and prevent future dispossession.[595,596,597]

2.7 Expanding who has rights, rights for more than humans

In addition to stewardship and kinship, expanding rights to more-than-humans[598] is critical to enhance their legal protection. The notion of more-than-human rights builds on the older discourse of rights of nature, providing a clarifying alternative in the legal context that the rights of more-than-humans are not separate from human rights.[599] It does so by rooting human rights within a wider array of biotic, ecosystemic, and biospheric rights, and by creating a feedback loop between developments in more-than-human jurisprudence (the science, theory, or philosophy of law) and human jurisprudence.[600]

Legal cases, local rules, and laws, as well as other legal instruments arguing for or detailing the rights of more-than-humans have increased in recent years.[601] Examples include the inclusion of the rights of nature by Ecuador in its 2008 constitution[602] and other ongoing national initiatives in Panama, Chile, Pakistan, and Switzerland, as well as the granting of rights to bodies of water (e.g. rivers, lakes and lagoons), forests, and mountains.[603] While advances in the recognition of more-than-human rights are important, equal focus must be placed on ensuring and measuring implementation of rights.[604] Box 3 illustrates how the rights of nature have been implemented in Ecuador.

Box 3. Implementing the rights of nature in Ecuador

In 2021, Ecuador's Constitutional Court revoked mining permits in the Los Cedros cloud forest and banned extractive activities within the confines of the forest reserve, ruling that these activities violated the rights of nature outlined in Ecuador's 2008 constitution.[605] Known as the Los Cedros Ruling, the case was brought by biologist Andrea Terán Valdez against the Llurimagua mining concession. The plaintiff argued that mining activities threatened several endemic frog species particually the Longnose Harlequin Frog and the Confusing Rocket Frog as well as more than three dozen other species including birds, monkeys, and the spectacled bear.[606] As a result of the ruling, mining operations have ceased in Los Cedros and no mining infrastructure remains.[607] This has set an important precedent and demonstrates that the enforcement of the rights of more than humans can be effective tools to protect ecosystems.

The proposal to criminalise "ecoside" as a serious crime aims to create enforceable accountability for the most severe harms to more-than-human.[608] This would create personal criminal liability for the key decision makers behind actions that contribute to ecological overshoot, thereby helping to operationalise more-than-human rights.[609]

Proponents aim to add ecocide as a fifth crime —alongside genocide, crimes against humanity, war crimes and the crime of aggression— to the Rome Statute of the International Criminal Court.[610] A core group of Pacific states have already formally requested this amendment[611] and a number of other States have expressed support.[612] At the national and regional levels, 15 countries already have formal legal provisions to penalise ecocide, and more than 20 countries have introduced or advanced ecocide bills in their parliaments. [613]

2.8 Rethinking reparations

Under international human rights law, victims of systemic human rights violations have a right to a remedy.[614] Reparations address these harms through compensation, restitution, rehabilitation, satisfaction, and guarantees of non-recurrence.[615]

The right to remedy extends to a vast array of harms that have contributed to ecological overshoot and social shortfalls. These include, colonisation,[616] the Transatlantic Slave Trade,[617] the dispossession of Indigenous Peoples,[618] harms caused by extraction,[619] loss and damage from climate change,[620,621] and atmospheric appropriation.[622]

Despite the incommensurate nature of many harms, economic quantifications suggest that hundreds of trillions are owed in reparations to victims of historic harms. The perpetrators of the Transatlantic Slave Trade owe between 100 and 131 trillion USD to affected countries and/or the decdents of the enslaved.[623] High emitting countries owe 192 trillion USD for atmospheric appropriation,[624] and will owe hundreds of trillions more for loss and damage by the end of this century.[625] These are staggering figures that vastly exceed the annual GDP of perpetrator countries,[626] the value of responsible corporations,[627] and the wealth of individuals with disproportionate responsibility.[628]

Calls for reparations are growing.[629] The United Nations General Assembly (UNGA) has adopted a historic resolution declaring the Transatlantic Slave Trade as the "gravest crime against humanity" that calls for reparations as a concrete step to remedy historical wrongs.[630] The African Union, the CARICOM Reparations Commission and other representatives of the colonised and brutalised are increasingly calling upon their (former) oppressors to address historic and ongoing harms.[631] Efforts to cement recognition of historic harms in international law highlights their structural relations to the present and challenges the traditional doctrine of non-retroactivity (i.e. new laws only apply to future actions, not the past). This is helping to carry international conversations forward and advance new norms.[632,633] It may also provide critical entry points for the integration of remedy and reparation into mechanisms such as the UN Tax and Debt conventions and/or the establishment of dedicated mechanisms.[634]

Yet, despite growing calls for reparations, there is also a backlash against them.[635,636,637,638] Wielded as a punitive measure to fuel nationalism by populist leaders in the Global North, reparations are being weaponised[639] in the name of protecting hard working tax payers, "fairness" and "colorblindness". [640] As a result, the solidarity between people in the Global South and Global North, and between different groups within the Global North (e.g. migrants and other members of the working class), is being undermined.[641]

Therefore, we need to think of reparations differently, not as a punishment, but as an acknowledgement of shared responsibility and as an opportunity to dismantle systems that benefit just a handful of people.[642] As a future-oriented project, reparatory justice can serve as a tool for reallocating resources and capabilities to build just and equitable systems that can end ecological overshoot and address

social shortfalls.[643] By rebuilding the global political and economic systems created by colonialism, slavery, and extraction, reparations will benefit all.[644,645] For example, tax justice —one of a number of structural changes that could form the basis of reparative justice initiatives— can end trillions of dollars of illicit financial flows every year[646] and redirect them to addressing ecological overshoot and social shortfalls globally.[647]

As a minimum first step, the Global North must agree to make the global economy fundamentally fairer for the Global South.[648] This will involve democratising the governance of the World Bank, IMF and WTO, putting an end to structural adjustment conditions on finance, and agreeing to fit for purpose UN Debt and UN Tax Conventions.[649] Box 4 unpacks what is required in greater detail.

Box 4. What does fair tax, trade, and debt look like and how can it help to end ecological overshoot and address social shortfalls?

Making the international tax, trade, and debt systems fair, and canceling debt, will play a critical role in delivering reparatory justice, ending ecological overshoot and addressing social shortfalls.

Tax

Progressive taxes can help to reduce consumption, redistribute wealth, disincentivise harmful economic activities, and raise vital funds to enable transformation.[650] Negotiations are ongoing to establish a UN Tax Convention that could reclaim trillions of dollars in tax and ensure all countries have an equal voice in shaping international tax rules.[651] To be fit for purpose, the UN Tax Convention must reallocate international taxing rights, combating illicit financial flows and tax abuse, and put in place an effective global minimum corporate tax and progressive global taxes on wealth and fossil fuels.[652] [653] It must also provide the rules for countries to put in place domestic environmental and taxes,[654] while ensuring that money raised through taxation contributes to reaching a safe and just operating space.

Debt

Transforming how debt is governed to prevent and resolve debt crises[655] and the canceling debt will be critical components of facilitating reparatory justice,[656] and ensuring that Global South countries have the financial resources they need to advance systems change equitably. Civil society and supporting governments aim to introduce the debt convention to the UN General Assembly by 2027. A fit for purpose UN Debt Convention will prevent debt crises from occurring and facilitate debt cancellation through a Multilateral Sovereign Debt Resolution Mechanism,[657] establish a global debt registry, and upgrade the United Nations Conference on Trade and Development's (UNCTAD) Principles on Promoting Responsible Sovereign Lending and Borrowing.[658]

Trade

Reform of trade frameworks through the lens of ecological limits and distributive justice[659] will play a crucial role in ending unequal exchange between countries, regulating trade of products and materials that contribute to overshoot, and addressing the ecological footprint of supply chains.[660] Abolishing or reforming the WTO could remove rules that come into conflict with ending environmental overshoot and social shortfalls and stop the Global North's unfair exploitation of the labour and resources of the Global South.[661] It would also allow new rules to be put in place that promote localised circular economies and degrowth.[662] While abolishing the Investor-State Dispute Settlement mechanism will ensure that all States can take action to address ecological overshoot without the fear of being sued by overshooting corporations.[663]

However, changing how we think about reparations in the Global North, should not be confused with rescinding obligations under international law. Despite co-benefits, remedy and reparations are first and foremost to address harms. Therefore, re-considering reparations must be accompanied by both an unwavering commitment to fulfil international obligations, and a shift in narrative from "aid" to justice and from "charity" to reparation.[664] This will require commitments to educate about and discuss historic harms such as colonialism and the slave trade, as well as their current day manifestations.[665,666]

In light of the sheer scale of reparations due, there may be a limit to the financial compensation that can be paid.[667] However, there are many other forms of reparation that the Global North may be asked to fulfil by survivors of harm. These include returning land, a universal basic income, and the cancellation of debt.

2.9 Thinking seven generations ahead

The principle of intergenerational equity recognises that current generations must use Earth's resources in a manner that future generations can still meet their needs, enjoy human rights, and thrive.[668] It calls for every generation to receive the Earth as a caretaker and hold it in common with past and future generations.[669] Long held Indigenous principles, such as the Haudenosaunee Peoples Seventh Generation value, urges current generations to live and work for the benefit of the seventh generation into the future.[670] The practices of stewardship and kinship extend these concepts to consider the future wellbeing of more-than-humans.[671] This suggests that no decision should be taken without first considering how it might affect the ecological safety and social justice of future generations.

Rather than education systems that perpetuate the behaviour that cause ecological overshoot and social shortfalls,[672,673] centring intergenerational thinking will require education systems that equip young people to drive systems change. This will be achieved through the transfer of knowledges and skills, including systems and future thinking, historical consciousness, critical thinking, and stewardship and kinship.[674,675] The decolonisation of education and the removal of colonial biases through the integration of global histories (i.e. not just Global North histories), and diverse knowledge systems will be crucial in this regard.[676,677]

Intergenerational thinking will also require policy makers at all levels to stop favoring short-term fixes aligned with election cycles over the long term benefits of addressing ecological overshoot and social shortfall.[678] At the same time, it will be necessary to push back on emerging narratives from the Global North —and extractive multinational corporations and oligarchs globally— that seek to colonise the future by reserving a central role in future societies for capitalism and business that have significant responsibility for ecological overshoot (e.g. fossil fuel, corporations), and the leaders and individuals that protect them. [679] This includes paying particular attention to techno determinist narratives[680] that center the use of unproven technological fixes (e.g. geo engineering, carbon capture storage, and the colonisation of other worlds) as solutions to ecological overshoot.[681]

3

How can we drive change?

While there are many different perspectives on how to bring about systems change, research suggests that positive tipping points; mobilisation of 3.5 percent of the population; achieving a collective vision for the future; and coalitions of the willing can all play important roles. In this section we unpack each of these potential tools and consider how they may be leveraged strategically.

3.1 Positive tipping points

The concept of positive tipping points builds on the understanding that incremental changes can help to create enabling environments for future transformations and/or come together to lock in a transition to a new system.[682] By identifying, triggering and accelerating social tipping points in human societies, positive tipping points can interact to form self-reinforcing cascades of change[683] that can bring us closer to systems change. Critically, positive tipping points do not require all of society to tip to the new alternative. In fact, only a 20-25 percent[684] of a population is typically required to reach a situation where everybody else is compelled to follow.[685]

Positive tipping points are already happening. Examples include Norway, where progressive policies[686] have made electric vehicles cheaper than petrol cars, resulting in 98.4 percent of new passenger cars registered in April 2026 being electric vehicles.[687] Norway's uptake of electric vehicles has been made possible by a number of enabling conditions including the country's wealth. As one of the richest countries in the world —largely due to its oil and gas reserves— Norway has grown a sovereign wealth fund of more than 2 trillion USD.[688] This financial reserve enables the country to accelerate investments in big infrastructure projects, such as electric vehicle charging, and offer large financial incentives without worrying too much about lost revenue.[689] Furthermore, with 88 percent of energy coming from hydroelectricity[690] Norway has the second most electrified energy system in the world, putting the country in the perfect economic position to switch to electric vehicles.[691]

This example clearly illustrates the role of means of implementation, and why the Global North must meet its legal obligations to cooperate to ensure that the Global South can trigger and accelerate positive tipping points. It also demonstrates the risk that positive tipping points could contribute to moral licensing through selective enforcement and/or mandates, and the risk of moral hazards (e.g. although Norway is rapidly transitioning to electric vehicles the country is continuing to expand its fossil fuel extraction).[692,693]

3.2 The 3.5 percent rule

Research indicates that non-violent protests are twice as likely to succeed as armed conflict, with those engaging a threshold of 3.5 percent of the population having almost never failed

to bring about change.[694,695,696,697,698] The 323 violent and nonviolent campaigns studied[699,700] suggested that non-violent protest had been more likely to create change due to a number of factors:[701]

- They were able to recruit more participants than violent protests due to moral, physical, informational, and commitment barriers being lower;
- They were able to draw on a wider range of individuals and groups, thereby disrupting a greater number of sectors;
- They allowed campaigners to operate more openly, as planning and mobilisation could be organised publicly;
- People in positions of power were more likely to either negotiate with, and/or defect to, non-violent campaigns;
- The nature of non-violent protest could undermine the narratives used by those in power to justify repression of protest action and could cause the violent crushing of resistance to backfire; and
- They had the potential to win over security forces, including when family and community members were participating.

The involvement of 3.5 percent of a population in a peak event (e.g. a march or picket) during a non-violent protest campaign would lead to change by: [702,703,704]

- Creating major economic, political and social disruption, and incurring costs for those in power that can be coercive;
- Demonstrating broad public sympathy and helping to build further public support; and
- Causing the defection of people in power through the perception that the non-violent campaign is reaching a critical mass.

This tendency —"the 3.5 percent rule"— also acknowledges that large-scale participation is usually only a surface-level indication of the full scale of public support which far exceeds the number of people who are in the street.[705] However, researchers caution that simply aiming to mobilise 3.5 percent of a population is no guarantee for change and should not be taken as a prescriptive goal.[706] This is because other factors, including momentum, organisation, strategic leadership, and the sustainability of non-violent campaigns, are likely as important as large-scale participation.[707] Researchers also note that most successes have been achieved with less than 3.5 percent of the population participating,[708] and there is no guarantee that changes gained will not be reversed in some form at a later date.[709]

Furthermore, the global turn toward authoritarianism has meant that the success rates of both non-violent and violent mass movements have declined in recent years[710] —although non-violent mobilisation still remains more successful.[711] While researchers studying hyperpolitics[712] caution that digital outrage (e.g. angry viral social media posts) and fleeting mass protests without long term strategies are replacing the traditional organised collective action that have delivered success in the past.[713] In the case of the latter, recommendations to course correct include shifting political focus away from digital spectacle (e.g. online campaigns) back toward concrete long-term goals,[714] and re-creating the organisational structures that were hollowed out by neoliberalism (e.g. local clubs, unions, and voluntary associations).[715]

Yet, despite these challenges, it is clear that the 3.5 percent rule has an application for advancing systems change if certain limitations are taken into account. We therefore highlight the following for further consideration:

- It is necessary to break down systems change into manageable chunks — each reform will need a clear and coordinated set of demands to mobilise around;
- Some reforms may be more likely to be achieved through non-violent mass mobilisation than others (e.g. taxing the 1 percent), due to easily understood personal benefits (e.g. more money for public services);
- Non-violent mass mobilisation and tipping points can interact to form self-reinforcing cascades of change (e.g. mass mobilisation to achieve a 4 day working week could advance political support for de-growth); and
- The scale of reform required to achieve systems change necessitates a prolonged campaign; this suggests non-violent mass mobilisation may need to happen in waves, across regions and scales, to enable movements to sustain activities and maintain wellbeing.[716]

3.3 Litigation and operationalising Advisory Opinions on Climate Change

Litigation is a useful tool to bring both private and public institutions to court for poor efforts to mitigate ecological overshoot,[717] while the operationalisation of advisory opinions (AO) from the world's highest courts can drive transformation at the international and national level.[718]

Climate change litigation —an emerging body of environmental law— has grown exponentially since the adoption of the Paris Agreement.[719] More than 3,600 cases have been filed across 62 countries[720] and States obligations to act on climate change are increasingly being affirmed as a matter of legal duty.[721]

Courts are hearing polluter pays cases (seeking damages from companies) and corporate framework cases (seeking to develop standards preventing companies from continuing with high-emitting activities), and climate-washing cases (challenging inaccurate or misleading narratives about transitions).[722] Human rights-based arguments have proven fruitful as a way for the public to influence policy change and hold governments accountable.[723] Urgenda Foundation v. State of the Netherlands (2019) became the first tort climate case successfully brought against a government on the grounds of human rights violations. Under KlimaSeniorinnen v. Switzerland (2024), the European Court of Human Rights ruled that Switzerland's weak climate targets violated the human rights of elderly women.[724]

The AOs of three apex courts —the International Tribunal on the Law of the Sea (ITLOS), the Inter-American Court of Human Rights' (IACHR) and International Court of Justice (ICJ)— have affirmed the legal obligations of States in regards to climate change.[725] The forthcoming advisory opinion from the African Court on Human and Peoples' Rights is expected to do the same.[726] Together these AO have the power to advance a decolonial vision of the rule of law, one that will help to end ecological overshoot and social shortfalls.[727]

Since their delivery, the AOs have been taken up as sources of law across litigation, multilateralism, norm development, and domestic governance.[728] For example the ICJ AO has been relied upon by the European Court of Human Rights, and domestic courts, including in Costa Rica,[729] France,[730] the Netherlands,[731] Brazil,[732] and Canada.[733] The ICJ AO has also been used to strengthen legal arguments,[734] as in the loss and damage claim brought by the Pari Islanders against Holcim in Switzerland.[735] At the international level, the ICJAO is already shaping multilateral processes, including in relation to the Human Rights Council (HRC), the UN Ocean Conference, and the work[736] of the International Law Commission.[737]

3.4 A collective vision for the future

To drive systems change, it is crucial to cultivate a shared vision for alternative futures that are habitable, just, and equitable.[738] This means creating a cohesive story about the future we aspire to. A story that is compelling enough to inspire sustained long term mobilisation of non-violent campaigns and the endurance of any adjustments (e.g. a shift to the seasonal availability of foods) or temporary hardships during the transition (e.g. loadshedding). This vision will also play a central role in informing strategic planning of non-violent mobilisation, identifying and triggering positive tipping points, as well as messaging on reducing consumption and the shift to a post-growth economy.

Research suggests that a vision that evokes lived experiences and makes the desired future feel tangible (i.e. real, touchable, and with a physical form) will help to align people with a shared vision for the future.[739] This is because by allowing people to experience what life under a new system might feel like —rather than just talking about or visualising the future in an abstract way— they are better able to understand and support the systems changes needed to achieve the vision.[740] For example, by allowing people to experience the four day week for a trial period, they are able to feel the personal benefits, such as more time with family, that systems change would bring. The creation of mutual care networks, alternative economic systems (e.g. local circular economies), and political groups, alongside introductions to Indigenous leadership, Knowledges, and wisdom, will all play an important role in exposing people to what a habitable, just, and equitable future would feel like.[741] At the same time, the development of personas representing different groups of stakeholders can help to ensure that the vision reflects intersectional experiences.[742]

Democratic innovations that enable deliberative democracy such as citizens' assemblies and permanent deliberative councils, can engage a broad range of stakeholders through sortition at the local, national, regional, and global level.[743] This will advance a collective vision that is inclusive of a wide range of views.[744] This process will not only deliver recommendations for decision makers on how to achieve the vision, but will also help to build the bridges between groups of stakeholders with diverse political views.[745,746]

Ultimately, achieving a truly collective vision will require the decolonisation[747] of both future thinking practices and the future itself. This necessitates ensuring that historically marginalised perspectives, voices, epistemologies, and alternate ways of understanding the world are able to shape the vision in a meaningful way. It will also require employing future thinking methodologies that draw on practices that are more attuned to the visions of the historically marginalised in combination with those closely associated with systems thinking such as scenario planning (a strategic method that plans for multiple plausible futures).[748,749] For example, critical fabulation (a method that combines historical archive data with critical theory and imaginative storytelling to tell the stories of people whose lives were erased or silenced by dominant historical records))[750] and worlding (a generative process of world making) could be employed.[751]

A key aspect of this work will be helping people recognise and transform oppressive social structures through the development of a critical consciousness[752] —one that enables people to analyse their reality and then act to change it.[753] This will entail appreciating that freedom from oppressive systems begins within the mind, self-love, and the rejection of the falsehood that the needs, priorities, knowledges, and leadership of some people is worth less than others.[754] It will also require appreciating the agency that individuals possess to bring about change by altering personal values, beliefs, intentions,[755] and identifying inner purpose and future potential;[756]and how this can lead to positive tipping points.[757] Those with privilege will need to unlearn cultural biases, reject assumptions about what they think the marginalised need or want, and become ready to listen to, and learn from, those who have been historically marginalised[758] —including the more-than-human world.

Lastly, lessons from 3.5 percent rule, suggest that a collective vision for the future will emerge as part of sustained efforts to bring about systems change rather than result from a proscribed level of participation. Therefore, having a vision in place should not be a prerequisite for taking action.

3.5 Not just a seat at the table —burn the table down

The democratisation of power throughout systems will not just involve creating a seat at the table for Indigenous Peoples, local communities, and other marginalised groups, it means burning the table down and building something much better.[759] This is not just a prerequisite for more effective transformation,[760] but will itself drive systems change by placing the priorities, needs, knowledges, wisdom, and world views of these groups at the center of decision making.[761]

This will require decolonising all international decision making bodies to recognise the self-determination of Indigenous Peoples and enshrine negotiating and veto power equal to nation States.[762] It will also require operationalising FPIC (Free Prior Informed Consent) by mandating States, corporations, and all other actors to secure FPIC before approving any form of activities.[763] At the same time decision making must be devolved down to the lowest level possible to ensure that local and context specific knowledge, and experience drive decision making.[764] Governance frameworks must be expanded to recognise the agency of more-than-humans and their rights. This could entail giving legal personhood[765] or designating human advocates[766] to entities such as rivers in local and national governance and to entities such as the atmosphere at the international level.

3.6 Embracing plurilateralism

As countries turn to protectionism and resource competition rather than international cooperation and shared, but differentiated responsibilities, multilateralism is shrinking.[767] Taking the long view highlights the very real risk that the Global North —and extractive multinational corporations and oligarchs globally— will increasingly solidify their efforts to protect their own wealth and power while leaving the Global South —and vulnerable populations everywhere— to face the impacts of ecological overshoot unassisted. This fortress world scenario could see the Global North respond to intensifying ecological overshoot and social shortfall with extreme militarisation of borders and migration policies, gated-community security, hoarding resources, and hyper protectionism.[768,769,770]

However, by framing fragmentation and isolationism as an opportunity to build new orders and alliances, our current geopolitical situation could be the starting point for systems change. By embracing plurilateralism,[771] coalitions of the willing made up of smaller groups of countries can step to identify and trigger social tipping points in where global treaties are failing. For example, even in the absence of the U.S and China, a committed coalition of States —such as those that convened at the Conference on Transitioning Away from Fossil Fuels in Santa Marta, Colombia, in April 2026[772]— could tip society towards a just transition away from fossil fuels. The establishment of regional coalitions of countries willing to reform regional and bilateral trade treaties to rein in ecological overshoot also presents an opportunity to trigger positive tipping points.[773]

In fact, multiple examples of plurilateral action already exist, including the Climate Club, Bridgetown Initiative, the Climate and Clean Air Coalition a coalition of countries taking steps to cut black carbon, the North Sea Power Hub, and the Electrify Now initiative. These coalitions can move faster, test practical solutions, and build momentum, creating a "race to the top"[774] on ending ecological overshoot and social shortfall.[775]

4

Next steps for driving systems change

It's clear that systems change is needed to end ecological overshoot and address social shortfalls. This requires transformation that addresses the root causes and drivers and democratising power throughout systems.

In this final section we lay out the next steps to advance systems change. Below is a set of general recommendations followed by specific actions tailored for policy, political, and narrative influencers in the Global North and Global South, and global civil society actors.

General recommendations

- The burden of systems change must be borne equitably, in line with historic responsibility, self-determination, FPIC, and the principles of CBDR-RC, polluter pays, do no harm, and intergenerational equity.
- In order to achieve systems change, we must transition from an economy based on growth to regenerative and distributive economic activity. This shift must be driven by abolishing debt-based currency and shareholder primacy, reducing working time, recognising the true value of care, caps on resource use, and banning advertising and behavioural economic models that encourage consumerism. Alternative economic models include degrowth and Doughnut Economics.
- The hegemony of Global North science, knowledge, and expertise and epistemological violence against Indigenous and other knowledge holders must end. These knowledges have solutions that are critical to ending ecological overshoot and social shortfalls.
- Systems change is not possible without a (re-)turn to stewardship and kinship to restore our reciprocal relationship with more-than-humans, recognise our interdependence, and reject the idea that humans have dominion over so called "nature". This (re-)return must be accompanied by returning land to Indigenous stewardship, granting rights to more-than-humans, and adopting ecocide as a serious crime.
- Reparations are an opportunity to dismantle systems that benefit just a handful of people, not a punishment. Reparatory justice can serve as a tool for reallocating resources and capabilities to build just and equitable systems that can end ecological overshoot and address social shortfalls for all.
- No decision should be taken without first considering how it might affect the ecologically safety and social justice of future generations. Education and political systems must center intergenerational thinking.

- By identifying, triggering and accelerating social tipping points in human societies, positive tipping points can interact to form self-reinforcing cascades of change that bring us closer to systems change.
- Non-violent protests are twice as likely to succeed as armed conflict, with those engaging a threshold of 3.5 percent of the population having almost never failed to bring about change.
- Decolonisation, critical consciousness, appreciating the agency that individuals possess to bring about change, and citizens' assemblies, can help to create a shared vision for tangible alternative futures that will help to drive systems change.
- Coalitions of the willing can move faster than multilateralism, test practical solutions, and drive positive tipping points creating a "race to the top". Our current geopolitical situation suggests that we should embrace plurilateralism as a way to advance systems change.
- Targeted regulation of individual pollutants (e.g. methane) and activities that make significant contributions to ecological overshoot and social shortfalls will have near term benefits and could lead to positive tipping points but are no substitute for addressing root causes and drivers.
- Litigation is a useful tool to bring both private and public institutions to court for poor efforts to mitigate ecological overshoot and to deliver reparations for violations of human rights. The operationalisation of AO from the world's highest courts can drive transformation at the national and international level.
- Taxation can play a critical role in ending environmental overshoot and addressing social shortfalls by helping to reduce consumption, redistribute wealth, disincentivise harmful economic activities, and raise vital funds to enable transformation.
- Debt cancellation is a critical component of facilitating reparatory justice.
- Reform of trade frameworks through the lens of ecological limits and distributive justice will play a crucial role in ending unequal exchange between countries, regulating trade of products and materials that contribute to overshoot, and addressing the ecological footprint of supply chains.
- Transition to a planetary health diet 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.

Recommendations for policy, political and narrative influencers in the Global North

- The Global North must organise a planned shrinkage of its material economy to free up ecological space for the Global South to meet the needs of its citizens. Degrowth and Doughnut Economics can help achieve this.
- The Global North should not regard degrowth nor reparations as a punishment. There are significant benefits to Global North citizens from these actions across health, security, and international cooperation.
- As a minimum first step towards reparatory justice, the Global North must agree to make the global economy fundamentally fairer for the Global South including by reforming trade frameworks through the lens of ecological limits and distributive justice, agreeing to fit for purpose UN Debt and UN Tax Conventions.

Recommendations for policy, political and narrative influencers in the Global South

- It is not viable for the Global South to follow Northern development paths without increasing overshoot. The Global South should resist growth-based capitalist development models without compromising on the right to development.

Recommendations for civil society

- Systems change requires a prolonged campaign of strategic non-violent mass mobilisation. These efforts need to break down systems change into manageable chunks, have a clear set of demands, be coordinated and sustainable, and maintain the wellbeing of participants.
- Campaign actions must shift political focus away from digital campaigns back toward concrete long-term goals, and re-creating the organisational structures that were hollowed out by neoliberalism.



Things did change, for all

The forest never silent now. Never the loneliness of Noa's youth. Always a community to lift you up. The dread, the worry, the sleepless nights thinking about a future not safe to bring children into —gone. The prospect of record breaking temperatures, rainfall, wind speeds, death and destruction now diminishing. Azuki beans, swiss chard, and eggs for dinner. Noa's garden no longer a pastime, but a contribution to community sustenance. Can't be late, tonight is the concert. Not one but two family members in the band. The bus on time. Always. The world that could have been a lingering reminder to be grateful. Comfort in the knowledge that everyone —not just Noa, not just his neighbour, or his neighbours neighbour— has the things they need, the people they hold dear close and in good health.

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