

OUR COLLECTIVE FUTURE- IS BIOCIDES, ECOCIDES, ECO- ANXIETY, SOLASTALGIA THE NEW PLANETARY NORMAL?

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As early as 1962 Rachel Carson's work *Silent Spring* warned of the detrimental impacts of human practices like pesticide use on the natural world leading to "biocides" with the ripple effect going beyond solely targeting pests. Climate change is on everyone's lips. Over the last century it has gained currency as a term from Ramachandra Guha's '*livelihood environmentalism*' to the '*full-stomach environmentalism*' of the affluent world with dangerous impacts that leaves no one untouched.

In the South American rain forest, there is a tribe called the Desana, who see the world as a fixed quantity of energy that flows between all creatures. Every birth must therefore engender a death, and every death bring forth another birth. This way, the energy of the world remains complete. When they hunt for food, the Desana know that the animals they kill will leave a hole in the spiritual well. But that hole will be filled, they believe, by the souls of the Desana hunters when they die. Were there no men dying, there would be no birds or fish being born. Where have we tipped the balance beyond repair?

Today we are on the brink of self-inflicted annihilation.

The 8000 page Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report (AR6; March 20th, 2023), compiled over 8 years synthesises the findings of 234 scientists on the physical science of climate change, 270 scientists on impacts, adaptation and vulnerability to climate change, and 278 scientists on climate change mitigation. The AR6 details the grim impacts of devastation by rising greenhouse gas (GHG) emissions around the world; the destruction of homes; the loss of livelihoods; fragmentation of communities and increasingly dangerous and irreversible risks if we fail to change course radically. The IPCC's Sixth Assessment report, published in 2021, found that human emissions of heat-trapping gases have already warmed the climate by nearly 2 degrees Fahrenheit (1.1 degrees Celsius) since 1850-1900.

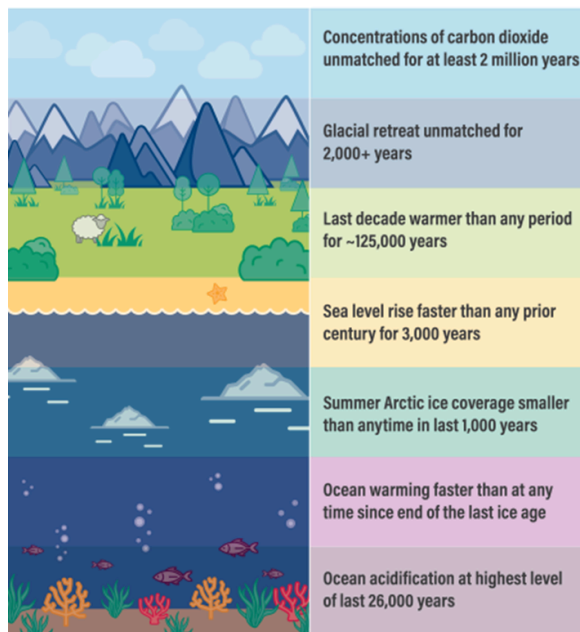
As per World Meteorological Organization (WMO 2023) Asia remained the world's most disaster-hit region reporting highest casualties and economic losses from weather, climate and water-related hazards compounded by floods, storms and severe heatwave impacts.



Europe is the fastest warming continent of the world. Year 2022 was marked by extreme heat, drought and wildfires. Sea surface temperatures around Europe reached new highs, accompanied by marine heatwaves taking a major human, economic and environmental toll. The State of the Global Climate 2023 report from the World Meteorological Organization (WMO) lists ‘a deafening cacophony of broken records’-record levels of GHG or greenhouse gas emission levels, surface temperatures, ocean heat and acidification, sea level rise, Antarctic Sea ice cover and glacier retreat. Year 2023 was the warmest with the global average near-surface temperature at 1.45 °Celsius (with a margin of uncertainty of ± 0.12 °C) above the pre-industrial baseline. The past nine years, 2015 to 2023, were also the warmest on record. According to new Swiss Institute research by mid-century, the world stands to lose around 10% of total economic value from climate change. That is a real scenario if temperature increases stay on the current trajectory, and both the Paris Agreement and 2050 net-zero emissions targets are not met.

The Climate Economics Index stresses how climate risks will impact 48 countries representing 90% of the world economy and ranks their overall climate resilience. It shows that all countries will be affected, but some are more vulnerable than others with low resilience to withstand climate shocks. Hence the most vulnerable face new protection risks as their displacement continued in 2023 since protection is coming at an increasingly higher cost. On average, African countries are losing 2–5 percent of Gross Domestic Product (GDP) and many are diverting up to 9 percent of their budgets responding to climate extremes.

Evidence of global warming already underway



Source: IPCC AR6

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In sub-Saharan Africa, the cost of adaptation is estimated to be between US\$ 30-50 billion annually over the next decade, or 2-3 percent of the region's Gross Domestic Product, says the WMO State of the Climate in Africa 2023 report.

IS PLANET EARTH ALL DOOM & GLOOM

Post COVID-19 new phenomena like Eco anxiety, Solastalgia, Eco-cide, Bio-cide are emerging fears triggered by the frequent climate events. The American Psychology Association (APA) describes eco-anxiety as “the chronic fear of environmental cataclysm that comes from observing the seemingly irrevocable impact of climate change and the associated concern for one’s future and that of next generations”. As resources shrink and climate impacts get internalized psychological consequences of varying seriousness are visible in a growing number of people.

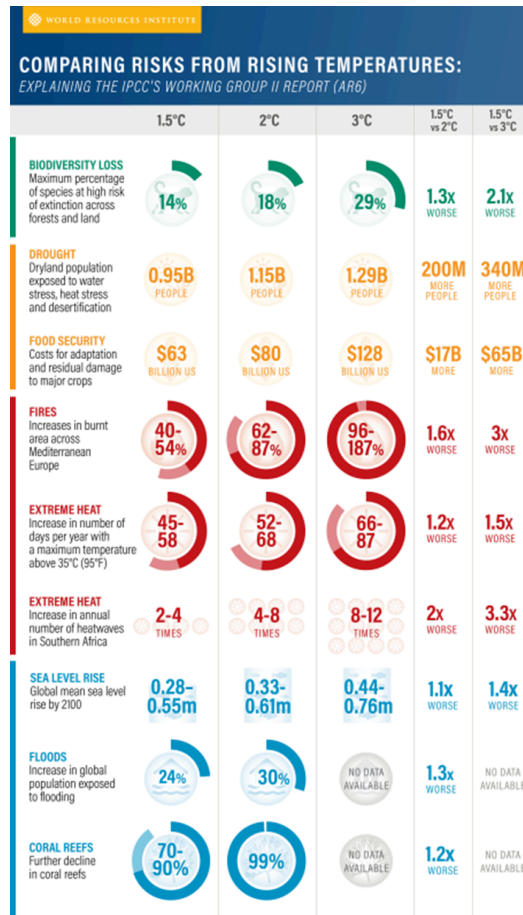
Eco-anxiety is not considered a disease yet. But increasing episodes of climate emergency are leading to psychological disorders more prevalent among people who are more aware about the protection of the environment. Perhaps ignorance can be short lived bliss. The symptoms range from slight cases of anxiety, stress, sleep disturbances, nervousness, to more serious sensation of suffocation or even depression. Among the latter group, it is quite common for people to express a strong sense of guilt about the situation of the planet, which can be aggravated, among those who have children, when thinking about their future.

Despite being a new concept Eco-anxiety is closely linked to other phenomena called solastalgia. Lancet journal already included it in 2015 as a term related to the impact of climate change on human well-being. This term Solastalgia was coined by the Australian philosopher Glenn Albrecht and is not a disease but a set of psychological disorders that occur in a native population following destructive changes in their territory, whether as a result of human activities or the climate. Solastalgia therefore affects people who have already suffered the consequences of a natural disaster and this what differentiates it from eco-anxiety.

AIR POLLUTION accounted for 8.1 million deaths globally in 2021, becoming the second leading risk factor for fatalities (2024, State of Global Air report). Pollutants like outdoor fine particulate matter (PM2.5), which comes from burning fossil fuels, caused more than 90 per cent of global air pollution deaths and were responsible for global poor health outcomes.

Methane is the 2nd largest greenhouse gas (GHG) trigger and is tracked by IMEO launched at the Group of Twenty (G20) meeting in 2021. Under the GMP (global methane pledge), more than 150 countries have committed to collectively reducing their methane emissions by 30 per cent across all sectors by 2030. Methane Alert and Response System (MARS), launched at COP27 (2022), has issued alerts to those responsible on 127 plumes.

Nearly 114 oil and gas companies covering 37% of production joined UNEP's measurement, reporting and verification programme (OGMP 2.0) with September 2023 deadline to identify opportunities of methane mitigation.



THE TEN KEY FINDINGS OF IPCC AR6, 2023, ARE:**1. Human-induced global warming of 1.1 degrees C has spurred unprecedented changes to the Earth's climate.**

With even 1.1 degrees C (2 degrees F) of global temperature rise irreversible changes to the climate system like rising sea levels to more extreme weather events to rapidly disappearing sea ice are now occurring in every region of the world.

Additional warming of every 0.5 degree C (0.9 degrees F) global temperature rise will exacerbate the frequency and severity of heat extremes, heavy rainfall events and regional droughts. Similarly, heatwaves that, on average, arose once every 10 years in a climate with little human influence will likely occur 4.1 times more frequently with 1.5 degrees C (2.7 degrees F) of warming, 5.6 times with 2 degrees C (3.6 degrees F) and 9.4 times with 4 degrees C (7.2 degrees F). The intensity of these heatwaves will also increase by 1.9 degrees C (3.4 degrees F), 2.6 degrees C (4.7 degrees F) and 5.1 degrees C (9.2 degrees F) respectively.

The probability increases of reaching dangerous tipping points in the climate system. Once crossed, it can trigger self-amplifying feedback or RUNAWAY HEATING such as thawing permafrost or massive forest dieback. Simultaneously if warming reaches between 2 degrees C (3.6 degrees F) and 3 degrees C (5.4 degrees F) the West Antarctic and Greenland ice sheets could melt almost completely and irreversibly over many thousands of years, causing sea levels to rise by several meters.

2. Even now Climate impacts on people and ecosystems are more widespread and severe than expected, escalating future risks with every fraction of warming causing *“an atlas of human suffering and a damning indictment of failed climate leadership”* (United Nations Secretary-General António Guterres). Nearly half the global population currently grapples with severe water scarcity for at least one month per year. Higher temperatures are causing spread of vector-borne diseases like malaria, West Nile virus and Lyme disease. Improvements in agricultural productivity in middle and low latitudes have slowed and crop productivity growth shrunk by 33% in Africa since 1961. Since 2008, extreme floods and storms have forced over 20 million people from their homes every year.

While every fraction of a degree of warming will intensify these threats even limiting global temperature rise to 1.5 degree C is not safe for all. At this level of warming, for example, 950 million people across the world's drylands will experience water stress, heat stress and desertification, and 24% of global population will face flooding.

3. Adaptation measures can effectively build resilience, but more finance is needed to scale solutions.

Climate policies in at least 170 countries now consider adaptation, but in many nations, these efforts have yet to progress from planning to implementation. Measures to build resilience are still largely small-scale, reactive and incremental, with most focusing on immediate impacts or near-term risks.

This disparity between today's levels of adaptation and those required persists in large part due to limited finance. According to the IPCC, developing countries alone will need \$127 billion per year by 2030 and \$295 billion per year by 2050 to adapt to climate change. But funds for adaptation reached just \$23 billion to \$46 billion from 2017 to 2018, accounting for only 4% to 8% of tracked climate finance. Yet with sufficient support, proven and readily available ecosystem-based adaptation solutions can build resilience to climate risks and simultaneously deliver broader sustainable development benefits merging what were hitherto considered conflicting goals. Meaningful collaboration with Indigenous Peoples and local communities is critical and such traditional best practices are increasingly being harvested as Climate concerns grow.

4. Some irreversible climate impacts - losses and damages.

Globally highly vulnerable people and ecosystems are already struggling to adapt to climate change impacts. For some “soft limits” mean effective adaptation measures exist, but economic, political and social obstacles constrain implementation, such as lack of technical support or inadequate funding that does not reach the needy communities. But people and ecosystems already facing/ approaching “hard” limits to adaptation, where climate impacts from 1.1 degrees C (2 degrees F) of global warming have no existing adaptation strategies have to face losses and damages e.g. Coastal communities in the tropics (Indonesia) where entire coral reef systems have deteriorated to a point that can no longer support their livelihoods and food security. Rising sea levels have forced low-lying neighborhoods to move to higher ground and abandon cultural sites. Fortunately, at COP27 countries agreed to establish dedicated funding arrangements for mitigating loss and damage.

5. Global GHG emissions peak before 2025 in 1.5 degrees C

The IPCC finds that there is a more than 50% chance that global temperature rise will reach or surpass 1.5 degrees C (2.7 degrees F) between 2021 and 2040 across studied scenarios. In fact in a high-emissions pathway the world may hit this threshold sooner between 2018 and 2037! Global temperature rise in such a carbon-intensive scenario could also increase to 3.3 degrees C to 5.7 degrees C (5.9 degrees F to 10.3 degrees F) by 2100. The last time global temperatures exceeded 2.5 degrees C (4.5 degrees F) above pre-industrial levels was more than 3 million years ago. To survive deep GHG emissions reduction modelling needs emissions to peak immediately and before 2025 at the latest. They then should drop rapidly, declining 43% by 2030 and 60% by 2035, relative to 2019 levels. Though the annual growth rate of GHG emissions slowed from an average of 2.1% per year between 2000 and 2009 to 1.3% per year between 2010 and 2019 this is grossly inadequate. GHG emissions have climbed steadily over the past decade, reaching 59 gigatonnes of carbon dioxide equivalent (GtCO_{2e}) in 2019 — approximately 12% higher than in 2010 and 54% greater than in 1990.

Even if countries achieved their climate pledges (nationally determined contributions or NDCs), GHG emissions would reduce by just 7% from 2019 levels by 2030, in contrast to the 43% associated with limiting temperature rise to 1.5 degrees C (2.7 degrees F). Some countries have submitted new or enhanced NDCs since the IPCC's cut-off date, but these commitments collectively still fall short of closing this emissions gap.

Ecosystem-based adaptation can protect lives and livelihoods



Source: Global Commission on Adaptation 2019.

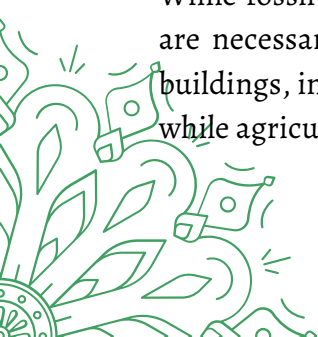


6. Ban burning fossil fuels.

Carbon dioxide emissions from existing and planned fossil fuels put 1.5 degrees C target out of reach. The need of the hour is to retire existing fossil fuel infrastructure, cancel new projects, retrofit fossil-fueled power plants with carbon capture and storage (CCS) technologies and scale up renewable energy sources like solar and wind that are progressively more affordable than fossil fuels in many regions. In pathways that limit warming to 1.5 degrees C (2.7 degrees F) global use of coal should fall by 95% by 2050, oil decline by about 60% and gas by about 45% using abatement technologies like CCS. Although coal-fired power plants are starting to be retired across Europe (England closed its last plant few days ago) and the United States, some multilateral development banks continue to invest in new coal capacity risking stranding assets worth trillions of dollars as the globe shifts its power source.

7. Urgent, systemwide transformations to secure a net-zero, climate-resilient future.

While fossil fuels are the number one source of GHG emissions, deep emission cuts are necessary across all of society to combat the climate crisis. Power generation, buildings, industry, and transport are responsible for close to 80 % of global emissions while agriculture, forestry and other land uses account for the remainder.



Spatial and urban planning revamp is needed that minimizes the need for travel, promotes build-out of shared, public and non-motorized transport (NMT) and rapid transit and bicycling in cities, supply of electric passenger vehicles, commercial vehicles and buses, coupled with wide-scale installation of rapid-charging infrastructure, investments in zero-carbon fuels for shipping and aviation.

Policy measures that make these changes less disruptive while enforcing them can help accelerate needed transitions e.g. subsidizing zero-carbon technologies; taxing high-emissions technologies like fossil-fueled cars (Singapore pattern); Infrastructure design — like reallocating street space for sidewalks or bike lanes — can help people transition to lower-emissions lifestyles. Fortunately, some strong synergies exist between transformational mitigation and adaptation E.g. climate-smart agriculture practices like shifting to agroforestry can improve resilience to climate impacts, while simultaneously advancing mitigation.

8. Carbon removal critical to limit global temperature rise to 1.5 degrees C.

Deep decarbonization across all systems while building resilience won't be enough to achieve global climate goals though- some quantity of carbon removal is essential by natural solutions like sequestering and storing carbon in trees and soil, as well as more nascent technologies that pull carbon dioxide directly from the air. But carbon removal needs GHG reduction. Also, reforestation effort may be neutralized by increasing wildfires caused due to heating. Or technologies like bioenergy with carbon capture and storage (BECCS) may offer a more permanent solution but also risk displacing croplands, thereby threatening food security.

9. Increasing Climate finance for both mitigation and adaptation.

Public and private finance flows for fossil fuels today far surpasses those directed toward climate mitigation and adaptation- especially in developing countries. Though this climate finance has risen more than 60% since the IPCC's Fifth Assessment Report yet the yawning gap persists that can be bridged with increase between 3 and 6 times - sixfold in Southeast Asia and developing countries in the Pacific, fivefold in Africa and fourteenfold in the Middle East-by 2030 to achieve only mitigation goals.

Developing countries will need finances of \$127 billion per year by 2030 and \$295 billion per year by 2050 for adaptation, as well as loss and damage. Current funds totaling under \$50 billion per year for both are well below estimated needs.

10. Climate change exacerbates inequity to ensure a just transition.

Households with incomes in the top 10 percent, emit upwards of 45 percent of the world's GHGs, while those families earning in the bottom 50% account for 15% at most. Yet negative climate impacts hit poorer, historically marginalized communities the hardest. Vulnerable populations total 3.3 billion to 3.6 billion people in highly vulnerable countries having global hotspots concentrated in the Arctic, Central and South America, Small Island Developing states, South Asia and much of sub-Saharan Africa.

Pervasive, conflict, existing inequalities and development challenges (e.g., poverty and limited access to basic services like clean water) only heighten sensitivity to climate hazards and limit communities' capacity to adapt. From 2010 to 2020 mortality from storms, floods and droughts was 15 times higher in countries with high vulnerability to climate change than in those with very low vulnerability.

Beyond waste - turn rubbish into resource

Municipal waste is set to rise by two thirds from 2.3 billion tonnes in 2023 to 3.8 billion tonnes by 2050. Its costs could jump from USD 252 billion in 2020 to USD 361 billion and further almost double to a staggering USD 640.3 billion per year by 2050 (including hidden costs of pollution, poor health and climate change from poor waste disposal practices) if urgent action on waste management is not launched to secure a liveable and affordable future (UN Environment Programme (UNEP) report).

"Beyond an age of waste: Turning rubbish into a resource," (UNEP Global Waste Management Outlook WMO, 2024) uses life cycle assessments to analyse global waste generation cost and management trends since 2018 forecasting global benefits/ losses by continuing business-as-usual, adopting halfway measures, or committing fully to zero waste and circular economy societies that seek to achieve 2030 Agenda. Extrapolation shows that scientific waste prevention and management could half net annual costs by 2050 to USD 270.2 billion. Pragmatic transition to a circular economy model will decouple waste generation and economic growth by adopting waste avoidance, sustainable business practices, and full waste management. This could lead to a full net gain of USD 108.5 billion per year!

The study, 'A Just World on a Safe Planet', conducted by 65 leading natural and social scientists from more than 20 countries aims to define a safe and just corridor for people and the planet. But over-consumption of finite resources by a minority of the world's population is shrinking the 'Safe and Just Space' (The Lancet Planetary Health journal). The Earth System Boundaries (ESB, 2023) seminal work underlines the safe and just "ceiling" up to which the 7.9 billion human population could meet its needs from the planet to live free of poverty people could continue to extract natural resources and pollute without destabilizing the Earth's systems and endangering humanity. 'Safe ESBs' are the levels beyond which tipping points may be triggered, making Earth unstable. In seven of eight indicators for the five domains, the ESBs have already been transgressed spanning vital sectors like climate, surface water, groundwater, natural ecosystem areas and air pollution. Nearly nine million premature deaths are linked to air and water pollution and millions of others are suffering from diseases due to rising heat and extreme weather events. In India, one billion people are living on land with diminishing yields. India is also among the hardest hit globally by water shortages. The Paris Agreement seeks to limit global warming to below 2 degrees Celsius from pre-industrial levels but, even then, 30 million people of Bangladesh will be vulnerable to the impact of sea level rise.

The rich are responsible for the present crisis is at the heart of all climate crisis discussions. Apart from the fossil fuel-powered industrial revolution of the developed nations, there are statistics on consumerism that the richest 10 per cent of the world had caused around 50% of global emissions in 2015. Of these an unequal 15 per cent of emissions were caused by the top 1 per cent of the world. On the other hand, the world's poorest 50 per cent were responsible for just 7 per cent and, ironically, they were the ones suffering the effects of the climate crisis the most (Oxfam and the Stockholm Environment Institute, 2020).

10 key solutions needed to mitigate climate change

1.  **RETIRE** coal plants
2.  **INVEST** in clean energy & efficiency
3.  **RETROFIT** and **DECARBONIZE** buildings
4.  **DECARBONIZE** cement, steel & plastics
5.  **SHIFT** to electric vehicles
6.  **INCREASE** public transport, biking and walking
7.  **DECARBONIZE** aviation and shipping
8.  **HALT** deforestation & **RESTORE** degraded lands
9.  **REDUCE** food loss and waste and **IMPROVE** agricultural practices
10.  **EAT** more plants & less meat

Source: IPCC AR6.
23/02/20

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Looking Ahead

The IPCC's AR6 warns that risks of inaction on climate are cataclysmic unless unprecedented disruptive transformation is adopted by all. Ironically, we have never had more information about the gravity of the climate emergency and its cascading impacts — or about what needs to be done to reduce intensifying risks. Limiting global temperature rise to 1.5 degrees C (2.7 degrees F) is still possible, but only if we act immediately. IPCC clarifies that the world needs to peak GHG emissions before 2025, nearly halve GHG emissions by 2030 and reach net-zero CO₂ emissions around mid-century, while also ensuring a just and equitable transition. There is a dire need to rethink economic models and technological interventions to ensure that the depleting critical natural resources are accessed, shared and managed fairly by the 2050 deadline. The stark reality is that even a basic standard of living for all by 2050 could overshoot the climate boundary of planet Earth. Pegging governments, businesses, and society to minimum needs by changing our consumption and production patterns to more circular ones that are more ecosystem-based solutions alone can promise a safe and just future. Let us look within to find ways to put our best environmental foot forward before our Yeti sized Carbon footprint spells DOOM and we fall victims to Eco-cide or solastalgia.