

Embracing Sustainability Within The Values-based Ecosystem on Climate Action

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01. Executive Summary

In today's vibrant and unsettled world, we often discuss courses of action but fail to engage the people who will listen and take action; instead, we attract many audiences to hear and then leave it at that. In this document, we aim to understand the current state of climate action and its impacts on multisectoral affairs. Accordingly, we will promote the adoption of a sustainability-based approach within our values-driven ecosystem for climate action.

We discussed in this document about sustainability common issues to address and connect with core values, climate action: from policymakers' perspective, climate action: from victim perspectives, climate action: reality matrix, multiple sectoral implications of climate from agriculture and food processing, education, energy, healthcare and life sciences, environment services, industrial and manufacturing, pharma and biotech, chemicals, real estate, financial services, transport and logistics,

mining and metals, tourism and quality of life, information and communication technology, and human capital innovation. Ultimately, we have witnessed that humans create most problems and have brutal effects through their actions. Therefore, the role of humankind is to adopt the right mindset, behaviour, and actions. In this regard, values can play a pivotal role in embracing and empowering a values-based approach in policy making and policy execution for the benefit of people, planet, and prosperity.

That means, at the edge of AI (Artificial Intelligence), we still need to rely on NI (Natural Intelligence) by admitting that AI was invented by human beings, indeed. Therefore, the last hope must be alive for the human, by the human, and for the human.

02. Sustainability: Common Issues to Address and Connect with Core Values

During this study, we have witnessed the following issues significantly:

- No coordination between the policymaking and execution.
- Policymakers are not capturing the real pulse of the problems.
- Sectoral leaders are considering their gains and benefits.
- Subject matter experts can hardly play an unbiased role.
- Lack of connecting the dots approach.
- Youth need to be well aware of current actions and policies.
- Policymakers need to consider future generations and their will while formulating policies and solutions for a sustainable future for them.
- All stakeholders' groups need to come under one roof of a prospective evaluation process.
- What is in there for us needs to be well echoed than what is in there for me.
- Collecting gains must be prioritised.
- Collective responsibility and a shared, balanced approach are essential, and initiative measures need to be considered.
- Critical issues can be addressed more effectively with a simple mindset, leading to a straightforward approach.



03. Climate Action: from Policymakers' Perspective

Climate change is a threat to human well-being and planetary health (very high confidence). There is a rapidly closing window of opportunity to secure a liveable and sustainable future for all (very high confidence). Climate resilient development integrates adaptation and mitigation to advance sustainable development for all. It is enabled by increased international cooperation, including improved access to adequate financial resources, particularly for vulnerable regions, sectors, and groups, and inclusive governance and coordinated policies (high confidence). The choices and actions implemented in this decade will have impacts now and for thousands of years (high confidence). ^[1]

The international community is at a unique moment where the recovery from COVID-19 offers the chance for a fresh commitment to-

tackle climate change and achieve net zero carbon emissions as a central element in 'building back better'. Analytical frameworks developed by contemporary economists to study this challenge provide approaches that policymakers could consider when designing policy packages to incentivise greenhouse gas (GHG) emissions reductions. ^[2]

Politico-administrative actors have predominantly expanded climate policy and raised policy ambition in recent decades. However, economic crises and weakening public support may cause the dismantling of climate policy and hamper policy ambition. Together, the contributions show that interactions between politico-administrative actors and publics, organised interests, and international organisations shape climate and anti-climate policy change. ^[3]

1. <https://www.ipcc.ch/report/ar6/syr/summary-for-policymakers/>

2. <https://royalsociety.org/-/media/policy/projects/climate-change-science-solutions/climate-science-solutions-economics.pdf>

3. <https://www.tandfonline.com/doi/full/10.1080/13876988.2024.2369640#abstract>

Policy analysis plays a crucial role in addressing climate change by providing a systematic and evidence-based approach to understanding the problem and identifying potential solutions. [4]

Malte Winkler: Climate Policy has evolved over decades, yet it continues to face significant challenges. The growing urgency to act, the need to integrate novel technologies, and balancing heterogeneous public expectations are just a few examples. Our research tries to identify potential solutions to these and other challenges by understanding the often interwoven dimensions that political action or non-action may imply. [5]

Local authorities play a key role in tackling climate change by implementing targeted adaptation and mitigation measures. The specific implementation of a mix of adaptation and mitigation strategies is the outcome of the interaction of policymakers through a political debate and their attitudes towards climate change. [6]

Unilever went on to publish its first Climate Policy Engagement Review in March 2024. This review analysed the climate-related positions and advocacy activity of each association and assessed their alignment with

Unilever's climate priorities and the broader goals of Paris-aligned climate policy. It also outlined actions to address low levels of engagement and areas of misalignment. [7]

Science has a role to play in providing evidence on both climate change and the solutions. In this paper, we look at the nature of expert advice to public policymakers and examine one approach to the synthesis of scientific evidence. We focus on a series of briefings for policymakers that summarise evidence from 12 areas of science and technology which are key to accelerating progress towards net-zero greenhouse gas emissions and resilience to climate change. [8]

Given current scientific knowledge, a plausible rationale exists for government intervention to address climate change. Nevertheless, a rationale for some kind of intervention does not indicate which kind is the most cost-effective, nor does it mean that even the most thoughtful intervention, given all the likely unintended consequences, is necessarily better than doing nothing. [9]

Researchers focus on what they need from policy and policymaking to produce climate justice. Few engage meaningfully with policy theories to describe how policymaking works. More engagement would help to set -

4. <https://www.numberanalytics.com/blog/analyzing-climate-change-policy-perspective>

5. <https://perspectives.cc/service/climate-policy-research/>

6. <https://www.sciencedirect.com/science/article/abs/pii/S0378873321000800>

7. <https://www.climateaction100.org/news/unilever-driving-progress-on-climate-policy-engagement/>

8. <https://royalsocietypublishing.org/doi/10.1098/rsta.2021.0147#d1e234>

9. <https://www.cato.org/briefing-paper/what-should-policymakers-do-about-climate-change#conclusion>

meaningful expectations regarding policy change and avoid a needless tendency to treat policymaking like a ‘black box’. ^[10]

How these strategies are designed and implemented matters. According to the IPCC, “adaptation and mitigation actions that prioritise equity, social justice, climate justice, rights-based approaches, and inclusivity lead to more sustainable outcomes, reduce trade-offs, support transformative change, and advance climate-resilient development.” ^[11]

10. <https://pmc.ncbi.nlm.nih.gov/articles/PMC10724653/>

11. <https://www.pew.org/en/research-and-analysis/articles/2023/05/22/people-whove-contributed-least-to-climate-change-are-most-affected-by-it>



04. Climate Action: from Victim Perspectives

Overall, the path from victims to activists seems to involve enormous challenges, including becoming aware of the harms they are suffering from, dismantling victimhood as a passive status, organising themselves, and demonstrating to the public why they should be regarded as victims and why it is worth the fight. ^[12]

From a human perspective, ecocentrism attempts to strike a balance between the need to utilise resources for human survival and the need to develop rules that facilitate the benign use of the ecosphere. Thus, for example, ensuring the preservation of biocentric values becomes integral to maintaining long-term human needs. To do this means minimising the victimisation of both the human and the non-human — in essence, to assert a form of ecological citizenship. ^[13]

Victims may also seek to help others by changing laws to prevent similar tragedies from recurring, and some victims see their activism as a way of fulfilling significant obligations to their communities, their families, and their deceased relatives. ^[14]

Certain stereotypes about women have become commonplace in climate and development literature. One example is that women are either represented as “saviours” who protect nature, or as “victims” more vulnerable to climate impacts than men and less equipped to cope. ^[15]

The UN estimates that 80% of the people displaced by climate change are women. Last year's devastating floods alone left almost 650,000 pregnant Pakistani women deprived of access to healthcare, forced to give birth under the open sky. The relentless floods also

12. https://www.researchgate.net/publication/342595074_Environmental_Victims_and_Climate_Change_Activists

13. <https://academic.oup.com/policy-press-scholarship-online/book/15136/chapter-abstract/169591871?redirectedFrom=fulltext>

14. <https://www.cambridge.org/core/journals/perspectives-on-politics/article/finding-meaning-in-politics-when-victims-become-activists/65847C4C76BDD1CD8F58027DB9B32ACB>

15. <https://www.downtoearth.org.in/climate-change/women-are-seen-as-saviours-or-victims-in-climate-change-debates-why-this-is-a-problem>

left eight million girls and women without access to basic menstrual hygiene products and toilets to manage their period. As gender-based violence exacerbates in the wake of the climate crisis, girls are increasingly being traded off into child marriages in return for food amidst climate-induced starvation across the world. Climate change, then, is not just an environmental phenomenon; it is a social injustice crisis that aggravates already existing injustices in communities. It is for this reason that any discussion on climate action is tokenistic in nature and futile in structure, unless it addresses the plight of women in the climate crisis. [16]

Data on climate refugees – those forced to flee due to disasters and other weather events – is limited, which is why they are called the “forgotten victims of climate change”. Australian think tank IEP predicts that at least 1.2 billion people could be displaced by such climate-related events by 2050. There is an urgent need to clarify the definition of climate change refugees, including comprehensive data on IDPs, and create an international mechanism to protect them. [17]

However, there is another category of people who suffer from climate change and

have no recourse. They are rarely mentioned. They are practically invisible at the COP26 climate change conference. They are the stateless. Who are the stateless of the world? They are individuals who live in countries that do not grant them citizenship or permanent residency – and all the rights that come with citizenship, such as free education and health care. They number in the millions. They include the Muslim Rohingya community in Myanmar, North Koreans in China, the Roma in Serbia and many other groups. [18]

Structural and cultural disparities make women disproportionately vulnerable to the impacts of climate change. Women are more likely than men to die during and in the aftermath of natural disasters and climate change-related events. For the women who survive, many often lack legal assets and rights to property, which leaves them few resources with which to rebuild their lives. As women travel greater distances to collect essential resources like water, firewood and food to support their families, they are often threatened and abused. [19]

WHO data indicates 2 billion people lack safe drinking water and 600 million suffer from foodborne illnesses annually, with children under 5 bearing 30% of foodborne fatalities. Climate stressors heighten -

16. <https://www.unicef.org/rosa/blog/climate-changes-greatest-victims-are-women-and-girls>

17. <https://www.weforum.org/stories/2021/06/climate-refugees-the-world-s-forgotten-victims/>

18. <https://www.npr.org/sections/goatsandsoda/2021/11/09/1053818525/theyre-the-invisible-victims-of-climate-change>

19. <https://www.theguardian.com/commentisfree/2015/dec/01/women-victims-climate-change-keys-climate-action>

waterborne and foodborne disease risks. In 2020, 770 million people faced hunger, predominantly in Africa and Asia. Climate change affects food availability, quality and diversity, exacerbating food and nutrition crises. [20]

Climate change has caused extreme weather conditions such as floods, droughts, and heat waves that stress animal and crop husbandry, resulting in low production. Changes in climate patterns have led to the movement of pests and diseases into regions that were previously unaffected by them, such as avian influenza. On the other hand, agricultural practices have contributed to soil depletion and degradation through continuous cropping and animal husbandry, leading to loss of soil fertility, deforestation, water pollution, and acidification. Although deforestation increases photosynthesis on crops through carbon dioxide fertilisation, crop yields lack nutrient content, and deforestation is a significant contributor to carbon dioxide emissions, which are responsible for global warming and subsequent changes in climatic patterns. Paddy rice and livestock produce methane, which is a critical greenhouse gas responsible for global warming. The agriculture sector, in general, accounts for approximately a quarter of total greenhouse gas emissions -

worldwide, impacting food and environmental security. [21]

Every year, the effects of climate change become more tangible (Lindsey & Dahlman, 2020). From rising sea levels to the acidification of oceans, more and more species struggle to survive within their rapidly changing environments (UN, 2019). The extinction rate of today wildly surpasses anything seen before in human history (UN, 2019). While the threat of human extinction may not be at the forefront of most people's concerns, there are groups of people, communities and even entire nations that are encumbered with the reality of losing their livelihoods, culture, and entire identity as a result of climate change. [22]

Global climate change is not a future problem. Changes to Earth's climate driven by increased human emissions of heat-trapping greenhouse gases are already having widespread effects on the environment: glaciers and ice sheets are shrinking, river and lake ice is breaking up earlier, plant and animal geographic ranges are shifting, and plants and trees are blooming sooner. Effects that scientists had long predicted would result from global climate change are now occurring, such as sea ice loss, accelerated sea level rise, and longer, more intense heat waves. [23]

20. <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

21. <https://nesa-center.org/reimagining-agriculture-as-a-culprit-and-victim-of-climate-change-in-the-global-village/>

22. <https://thrivabilitymatters.org/the-vulnerable-victims-of-climate-change/>

23. <https://science.nasa.gov/climate-change/effects/>

Climate breakdown will impact us differently depending on our circumstances and where we live. Let us take a closer look at some of the communities hit hardest by the climate crisis. [24]

Climate change is a crisis for everyone, but the most impoverished people in the world are feeling its effects first and worst. Moreover, the poorest countries most affected by climate change are paying a high price for the greenhouse gases emitted by wealthier people in polluting countries. [25]

Worst of all is the detriment to human health. Minority cultures and poor populations are most at risk, but everyone everywhere is starting to feel the impacts of climate change on their health. Greenhouse gases are polluting the air, meaning everyone is breathing in more toxins. Microplastics, various types of waste, and toxins are polluting our water. Crops and livestock are being affected, which results in food shortages. Rising temperatures and heatwaves make us more vulnerable to specific health conditions, such as heat stroke and skin cancer. [26]

24. <https://friendsoftheearth.uk/climate/who-most-affected-climate-crisis>

25. <https://www.oxfamamerica.org/explore/issues/climate-action/which-countries-are-most-affected-by-climate-change/>

26. <https://earth.org/impacts-of-climate-change/>



05. Climate Action: Reality Matrix

Anthropogenic climate change is projected to impact human and natural systems, with differential consequences across regions, economic sectors, and time. The magnitude and extent of future impacts depend not just on the dynamics of the Earth system, but also on socio-economic developments. These developments determine the future climate forcing and society's ability to prepare for, avoid and respond to climate change impacts. Relevant socio-economic factors include population dynamics, economic development, technological change, social, cultural and institutional changes, and policies. It is important to assess the potential long-term consequences of decisions made today, as the relationship between today's decisions and future climate change and impacts is beset with inertia and uncertainty.^[27]

Climate change will have wide-ranging, adverse impacts on humanity and well-being, which brings the issue of social vulnerability to the forefront of social scientific studies on climate change. Social vulnerability refers to the ability of communities and/or individuals to deal with the harms and stresses caused by climate change.^[28]

Scientists are observing changes in the Earth's climate in every region and across the whole climate system, according to the latest Intergovernmental Panel on Climate Change (IPCC) Report, released today. Many of the changes observed in the climate are unprecedented in thousands, if not hundreds of thousands of years, and some of the changes already set in motion—such as continued sea level rise—are irreversible over hundreds to thousands of years.^[29]

27. <https://link.springer.com/article/10.1007/S10584-013-0906-1>

28. <https://www.sciencedirect.com/science/article/pii/S1462901121001441>

29. <https://www.ipcc.ch/2021/08/09/ar6-wg1-20210809-pr/>

Human-induced climate change is causing dangerous and widespread disruption in nature and affecting the lives of billions of people around the world, despite efforts to reduce the risks. People and ecosystems least able to cope are being hardest hit, said scientists in the latest Intergovernmental Panel on Climate Change (IPCC) report, released today. [30]

The urgency of sustainable finance for cities in the Global South cannot be overstated, as they face rapid urbanisation and increasing climate vulnerabilities. With over half of the global population residing in cities and an even greater share expected to do so over the next three decades—mainly in the Global South—these regions are particularly at risk from climate change due to poor infrastructure, large informal settlements, heightened exposure to extreme weather events, and pollution. [31]

Climate change presents a fundamental threat to human health. It affects the physical environment as well as all aspects of both natural and human systems – including social and economic conditions and the functioning of health systems. It is therefore a threat multiplier, undermining and potentially reversing decades of health progress. [32]

New projections highlight potential climate risks to exploitable fish biomass for nearly all regions of the world's ocean, including top producer countries and those with high reliance on aquatic foods, according to a report released today by the Food and Agriculture Organisation of the United Nations (FAO). [33]

Climate change has both positive and negative effects on forests. Variations in rainfall, temperature, and extreme weather events impact forest productivity, health and habitat suitability for species. Climate change also increases the risk of forest fires and the spread of forest pests, particularly in mountain, dryland, and coastal forests. Predicted changes in climate are expected to exceed the natural adaptability of many forest species and ecosystems. In addition, extreme climate events and disasters may overwhelm countries' abilities to respond to them effectively. [34]

Climate change is the defining issue of our time. Not only is it an environmental and ecological concern affecting all natural systems, but it also has important implications for the global development agenda. Elevated temperatures, land and water scarcity, precipitation variability and extreme weather conditions have adverse -

30. <https://www.ipcc.ch/2022/02/28/pr-wgii-ar6/>

31. <https://www.c40.org/news/sustainable-finance-roadmap/>

32. <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

33. <https://www.fao.org/newsroom/detail/climate-risks-projected-to-affect-fish-biomass-around-the-world's-ocean--fao-report-says/en>

34. <https://www.fao.org/forestry/sfm/forests-and-climate-change/en>

impacts on agricultural production and destroy food systems. Population groups who are already vulnerable to food insecurity and malnutrition risk sinking lower into a food and nutrition crisis under climate change. [35]

Climate change represents an unprecedented challenge to the world's biosphere and the global community. It also represents a unique challenge for plant health. Human activities and increased global marketisation, coupled with rising temperatures, have led to a situation that is favourable to pest movement and establishment. This scientific review assesses the potential effects of climate change on plant pests and, consequently, on plant health. The evidence strongly indicates that climate change has already expanded some pests' host range and geographical distribution, and may further increase the risk of pest introduction to new areas. This calls for international cooperation and development of harmonised plant protection strategies to help countries successfully adapt their pest risk management measures to climate change. [36]

Across the world, climate change is shifting the delicate balance that keeps plants – and everything they support – healthy. As temperatures rise, rains become less –

predictable, and extreme weather strikes – more often, plant pests and diseases are spreading in ways not seen before. The consequences reach far beyond crops. In a world where human, animal, plant and environmental health are deeply connected, protecting plant health has never been more critical. [37]

Climate change is affecting everybody everywhere. The poorest people, primarily in the global South and Small Island States, are the least responsible for the climate crisis and least resourced to deal with the consequences. The climate crisis has exacerbated inequalities and social injustice, which have also been sharply highlighted during the COVID-19 pandemic. With rising climate catastrophes – floods, cyclones, landslides, heatwaves, and forest fires—making headlines every day, individual stories often get lost in the data on death tolls and destruction. [38]

Meanwhile, Big Polluters like oil and coal companies are not going down without a fight. After all, they are making billions from dirty energy while the rest of us pay to clean up their mess. That is why they have spent decades running well-funded campaigns to mislead and deceive the public about what is happening to the planet. [39]

35. <https://openknowledge.fao.org/server/api/core/bitstreams/6f00ca3a-90ae-432b-8124-d748533b277a/content>

36. <https://openknowledge.fao.org/items/8a6aa7fd-8e86-4c95-886a-ce52f1f6d01d>

37. <https://www.fao.org/one-health/highlights/how-climate-change-impacts-plant-health>

38. <https://climatenetwork.org/our-work/centering-climate-impacts-to-ensure-that-governments-respond/>

39. <https://www.climaterealityproject.org/climate-101>



06. Multiple Sectoral Implications of Climate

We would now like to examine the direct and indirect impacts of climate change on multiple sectors and their consequences.



A. Agriculture & Food Processing

The Impact of Climate Change on Agriculture & Food Processing have been featured below with references and global voices:

A longer growing season can have both positive and negative impacts on raising food. When plants absorb large amounts of ground-level ozone, they experience reduced photosynthesis, slower growth, and higher sensitivity to diseases. Temperature and precipitation changes will also very likely expand the occurrence and range of insects, weeds, and diseases. This could lead to a greater need for weed and pest control. Heat and humidity can also affect the health and productivity of animals raised for meat, milk,

and eggs. Heavy rains can also increase agricultural runoff into oceans, lakes, and streams, which can harm water quality. Runoff can carry nutrients, fertiliser, and pesticides into neighbouring water bodies. When coupled with warming water temperatures brought on by climate change, runoff can lead to depleted oxygen levels in water bodies.

Sea level rise and storms also pose threats to coastal agricultural communities. These threats include erosion, agricultural land losses, and saltwater intrusion, which can contaminate water supplies. Agricultural workers face several climate-related health risks, such as prolonged exposure to heat and other extreme weather, more pesticide exposure due to expanded pest presence, disease-carrying pests like mosquitoes and ticks, and degraded air quality. ^[40]

40. <https://www.epa.gov/climateimpacts/climate-change-impacts-agriculture-and-food-supply>

Agriculture and food systems are vulnerable to climate change, with direct effects from temperature and precipitation changes, and must urgently adapt to these new conditions. At the same time, agriculture and food systems are an essential source of global greenhouse gas (GHG) emissions. Policies can help the sector be part of the solution by reducing on-farm and supply chain emissions, limiting deforestation, and improving carbon sequestration in biomass and soils. ^[41]

Climate change and food and nutrition insecurity pose two of the most significant development challenges of our time. However, a more sustainable food system can not only heal the planet, but also ensure food security for all. ^[42]

When it comes to global warming, the major media tend to focus on industrial emissions. However, agriculture is still the world's leading driver of climate change, which in turn can decimate the world's forests, farms, and fields – putting our entire food supply at risk. ^[43]

Feeding nine to ten billion people by 2050 presents an enormous challenge. According to Godfray et al. (2010), several options have been proposed to help address the issue, -

including closing the yield gap (i.e. making the difference between the attainable yield and that realized smaller), increasing the production potential of crops (mainly through the use of new technologies and investment in research), reducing waste, changing diets and expanding aquaculture. ^[44]



B. Education

The Impact of Climate Change on Education have been featured below with references and global voices:

Climate change is increasing the frequency and intensity of extreme weather events, such as cyclones, floods, droughts, heatwaves, and wildfires. These extreme weather events, in turn, are disrupting schooling, precipitating learning losses, dropouts, and long-term impacts. Even if the most drastic climate mitigation strategies were implemented, extreme weather events would continue to have detrimental impacts on education outcomes. ^[45]

The Climate Crisis Disrupts the Education of 40 Million Children Every Year
Climate-induced disasters affect children's ability to go to or stay in school. Even when -

41. <https://www.oecd.org/en/topics/sub-issues/climate-change-agriculture-and-food-systems.html>

42. <https://www.worldbank.org/en/topic/climate-smart-agriculture>

43. <https://www.ecosystemmarketplace.com/articles/14979/>

44. <https://www.sciencedirect.com/science/article/abs/pii/S0048969722035355>

45. <https://openknowledge.worldbank.org/entities/publication/761bcf7b-4bb6-4fea-b75b-146603d437bb>

children stay in school, climate and environmental changes – such as rising temperatures, droughts and floods – affect their ability to learn. These negative impacts on learning exacerbate cycles of poverty and inequality and drive conflict for increasingly scarce natural resources. [46]

Education is a critical agent in addressing the issue of climate change. The UN Framework Convention on Climate Change (UNFCCC) assigns responsibility to Parties of the Convention to undertake educational and public awareness campaigns on climate change, and to ensure public participation in programmes and information access on the issue. [47]

Climate change affects the living conditions of every section of the world population, and children are also experiencing the effects. One of the most essential elements that transforms human life is education. The primary impact of climate change on education arises from the effects of extreme weather events, such as heavy rain accompanied by flash floods, strong winds, and hailstorms, with short and long-term consequences. Some of the essential defects of Climate Change on Education, challenges and risks to education from Climate Change in Society, Destruction of the School Infrastructure, Health Complications or -

School students, Impacts of Climate Change on Education and so on. Climate Change affects the teaching staff too, in turn reducing their contribution to the student community and society, leading to a reduction in the rate of transformation and radical changes in society. [48]



C. Energy

The Impact of Climate Change on Energy have been featured below with references and global voices:

Our energy system is vulnerable to a wide range of climate change impacts. These include rising temperatures and heat waves, cold and snow events, severe drought, intense rainfall, sea level rise, hurricanes, and wildfires. While these impacts differ from one region to another, they will continue to affect all areas of the world. [49]

The global energy system is the bedrock of modern economies and societies. However, the production and consumption of energy are also responsible for 75% of greenhouse gas emissions, making it the primary driver of climate change. As temperatures around the world continue to break records, the case for swiftly transforming the global energy system has never been stronger. [50]

46. <https://www.educationcannotwait.org/news-stories/press-releases/the-climate-crisis-disrupts-the-education-40-million-children-every>

47. <https://www.un.org/en/climatechange/climate-solutions/education-key-addressing-climate-change>

48. https://www.researchgate.net/publication/379962817_Causes_and_Effects_of_Climate_Change_in_Education

49. <https://www.epa.gov/climateimpacts/climate-change-impacts-energy>

50. <https://www.iea.org/topics/climate-change>

The burning of fossil fuels for power generation is the single most important cause of climate change. However, energy is the key foundation for economic and social development. A sustainable and needs-based energy supply for all must therefore be climate-neutral. ^[51]

Fossil fuels are by far the most significant contributor to global climate change, accounting for over 75 per cent of global greenhouse gas emissions and nearly 90 per cent of all carbon dioxide emissions. As greenhouse gas emissions blanket the Earth, they trap the sun's heat, leading to global warming and climate change. The world is now warming faster than at any point in recorded history. Warmer temperatures over time are changing weather patterns and disrupting the usual balance of nature. ^[52]

The sustainable energy transition is a transformative shift in how energy is produced, distributed and consumed, aiming to move away from fossil fuels towards a system centred on renewable energy sources. This energy transition is critical to tackling the climate crisis, as fossil fuels still provide 80 per cent of the global energy supply. Accelerating the energy transition -

requires scaling up renewable energy production and energy storage, decarbonising sectors reliant on fossil fuels, accelerating energy efficiency measures, creating an enabling environment and adopting innovative financing mechanisms. ^[53]

One of the most effective solutions to combat climate change is the transition to clean and renewable energy sources. Clean energy refers to energy sources that produce minimal greenhouse gas emissions, while renewable energy is derived from naturally replenishing resources such as sunlight, wind, and water. ^[54]



D. Healthcare & Life Sciences

The Impact of Climate Change on Healthcare & Life Sciences have been featured below with references and global voices:

A *Lancet* study predicts a fivefold increase in heat-related deaths by 2050 or sooner in multiple regions. Emergency departments face surging cases of heat stroke, dehydration, and cardiovascular complications triggered by rising -

51. <https://www.bmz.de/en/issues/climate-change-and-development/energy-and-climate>

52. <https://www.un.org/en/climatechange/science/causes-effects-climate-change>

53. <https://climatepromise.undp.org/news-and-stories/what-sustainable-energy-transition-and-why-it-key-tackling-climate-change>

54. <https://www.theclimategroup.org/understanding-climate-change-focus-clean-energy-and-global-action>

temperatures—particularly critical as populations age. Climate change accelerates zoonotic spillover (pathogens jumping from animals to humans). COVID-19 demonstrated the risks, but future pandemics tied to habitat destruction, deforestation, and changing animal migration patterns are a near certainty. Hospitals already treat injuries from floods, hurricanes, and wildfires. In the US alone, FEMA reported \$165 billion in disaster-related damages in 2022, leading to millions of ER visits when there is a growing shortage of clinicians. [55]

While healthcare systems vary in their environmental impact, providers are increasingly prioritising sustainability and climate resilience through mature ESG strategies. These strategies focus on science-based targets, net-zero emissions, and climate-resilient healthcare delivery. Efforts include reducing direct emissions, influencing supply chain sustainability, and leveraging data-driven insights to improve environmental performance. This commitment to sustainability strengthens stakeholder trust, attracts and retains talent, and aligns with evolving regulatory requirements. [56]

Climate change is impacting health in a myriad of ways, including the health impacts of increasingly frequent extreme weather events, such as heatwaves, hurricanes, and floods. These events have led to disruptions in the food supply chain, increases in zoonoses, changing patterns of vector-borne diseases, and rising mental health issues. Without intervention, the crisis threatens to undo much of the progress made in global health and poverty reduction. [57]

Climate change is a threat multiplier, undermining and potentially reversing decades of health progress. As climatic conditions change, more frequent and intensifying weather and climate events are observed, including storms, extreme heat, floods, droughts and wildfires. These weather and climate hazards affect health both directly and indirectly, increasing the risk of deaths, noncommunicable diseases, the emergence and spread of infectious diseases, and health emergencies. [58]

Health is key to our well-being, happiness, and general quality of life. It is also important for economic progress and productivity. A person's health may depend on many factors, such as their income, race, sex, age, existing -

55. <https://www.hfsresearch.com/research/healthcare-life-sciences-sector/>

56. <https://www.deloitte.com/uk/en/Industries/life-sciences-health-care/research/climate-resilience-and-sustainable-healthcare-systems.html>

57. <https://pmc.ncbi.nlm.nih.gov/articles/PMC10016220/>

58. <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

medical conditions or genetics, occupation, and where they live. Personal choices and social support structures also play a role in a person's health. [59]



E. Environment Services

The Impact of Climate Change on Environmental Services have been featured below with references and global voices:

The demand for environmental services has grown significantly in recent years, in part due to increasingly stringent standards and regulations aimed at addressing global challenges such as climate change, resource depletion and waste generation. Public utilities have traditionally played an important role in the supply of environmental services. However, the trend towards the privatisation of public utilities has increased the participation of private sector operators and created more trade opportunities. [60]

Virtually every child on the planet is already affected by climate change. Natural disasters, environmental degradation, and biodiversity loss can devastate agriculture, cutting children off from nutritious foods and safe water. They can lead to dangerous environments and disease outbreaks, and -

destroy the safe shelter, quality health care and education systems children need to survive and thrive. [61]

A sustainable world is one in which human needs are met equitably without sacrificing the ability of future generations to meet their needs and without harm to the environment and ecosystem function and service. Meeting this formidable challenge requires a substantial effort in the face of climate change, economic development, and population growth. [62]

The current rate of global warming, being 1.0–1.1 °C above pre-industrial levels, has caused various natural disasters that pose significant challenges for human living environments. In the coming decades, the rate of global warming is expected to hit the threshold of 1.5 °C with severe environmental, economic, and social consequences. [63]

Human activities cause climate change and threaten life on Earth as we know it. With rising greenhouse gas emissions, climate change is occurring at rates much faster than anticipated. Its impacts can be devastating, including extreme and changing weather patterns and rising sea levels. [64]

59. <https://www.epa.gov/climateimpacts/climate-change-impacts-health>

60. https://www.wto.org/english/tratop_e/serv_e/environment_e/environment_e.htm

61. <https://www.unicef.org/environment-and-climate-change>

62. <https://journalijecc.com/index.php/IJECC>

63. <https://www.mdpi.com/topics/25PZ93O6HG>

64. <https://www.un.org/sustainabledevelopment/climate-change/>



F. Industrial & Manufacturing

The Impact of Climate Change on Industrial & Manufacturing have been featured below with references and global voices:

Industrial emissions significantly impact climate change, with key sectors such as cement, iron, steel, and chemicals accounting for around 20% of worldwide CO2 emissions. These emissions are challenging to eliminate since they originate not only from energy use but also directly from the industrial processes involved. Furthermore, human activities, especially fossil fuel combustion, are primary drivers of the current global warming trend, surpassing natural factors like solar variations or volcanic activity. ^[65]

The industrials sector emits 25% of global CO2 emissions. Including construction inputs such as cement, steel and iron, as well as petrochemicals such as plastics and ammonia, the sector includes many high-emitting activities known to be hard to decarbonise. As the global economy accelerates its efforts to meet the goal of net-zero emissions by 2050, the industrials sector will have both a crucial role in decarbonising the global economy and face substantial transition risks. Growing policy pressures, risk of legal and reputational damage, and -

technological innovations will reduce the market share of conventional producers with less carbon-intensive alternatives. ^[66]

Climate change will have an impact on both industrial raw material supplies and processes. Although the most significant effect will most likely be through global market development, climate change can have notable impacts on those industrial sectors in Finland whose raw materials are heavily dependent on weather and other changes in the natural environment. ^[67]

The manufacturing industry must accept its heavy responsibility for emissions of greenhouse gases. In the US, manufacturing accounts for 23% of direct carbon emissions, according to the Environmental Protection Agency. In Europe, the situation is equally dire: the industry emits an annual total of 880 million tonnes of carbon dioxide equivalents, making it one of the largest emitters of greenhouse gases on the continent. ^[68]

This means that manufacturing plays a crucial role in our collective efforts to combat climate change. By finding ways to reduce carbon emissions in this sector, we can make a significant impact on the overall reduction of greenhouse gases. ^[69]

65. <https://oizom.com/how-do-industrial-emissions-contribute-to-climate-change/>

66. <https://www.unepfi.org/themes/climate-change/climate-risks-in-the-industrials-sector/>

67. <https://www.climateguide.fi/articles/impacts-of-climate-change-on-industrial-production>

68. <https://www.weforum.org/stories/2021/06/manufacturing-industry-climate-change-goals/>

69. <https://www.netnada.com/post/how-to-reduce-carbon-emissions-in-manufacturing-industry>



G. Pharma & Biotech

The Impact of Climate Change on Pharma & Biotech have been featured below with references and global voices:

The pharmaceutical industry produces a large proportion of health system greenhouse gas (GHG) emissions, contributing to climate change. This urgently needs to be addressed. We aimed to examine pharmaceutical company climate change targets, GHG emissions, and strategies to reduce them. ^[70]

A report by Trinity Life Sciences found that currently, 4.4% of carbon emissions globally are attributed to the healthcare sector, with 70% of these emissions coming from the supply chain in pharmaceuticals. ^[71]

Rising global temperatures will, for example, enhance the spread of mosquito-borne diseases like malaria and Zika, increasing the need for effective vaccines. Water-borne illnesses are also likely to become more common, as increased rain and storm surges contribute to flooding and contaminated runoff. ^[72]

Pharmaceutical companies are at risk from climate-related events due to several factors.

First, the global nature of the sector means they are exposed to a wide range of climate-related impacts from extreme heat to cold snaps and flooding. The nature of the sector also makes them more vulnerable to climate risks due to specialised processes and high asset tangibility, or dependence on specific physical assets for production. ^[73]

The consequences of climate change are far-reaching and have some perhaps unsuspected effects on health, Moderna CEO Stéphane Bancel reminded the audience and panellists. Beyond the spread of tropical diseases, which Bancel said have become “more prevalent, and not just in the global south,” he also spoke of the health impact of extreme heat and air pollution. Focusing on sleep disorders caused by extreme heat, Bancel talked about their impact on brain health, connection to Alzheimer’s disease and their effect on the immune system. ^[74]

Biotechnology provides robust solutions to many of today’s climate, health and sustainability challenges, but implementing them comes with its own set of issues. Transformative biosolutions face long approval processes before they can be released on the market, making the development of new and more sustainable products less attractive. Legislators, -

70. <https://pmc.ncbi.nlm.nih.gov/articles/PMC9967855/>

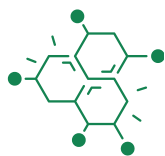
71. <https://www.earth-scan.com/blog/pharmaceutical-companies-climate-risk>

72. <https://pharmaphorum.com/views-and-analysis/pharmas-climate-change-vulnerability-and-opportunity>

73. <https://www.oxfordeconomics.com/resource/the-pharmaceutical-sector-must-find-a-remedy-for-its-climate-related-risks/>

74. <https://pharmaboardroom.com/articles/key-insights-from-pharma-leaders-at-davos-2025-climate-change-ai-and-geopolitical-challenges/>

regulators and industry must partner to adopt a new generation of biotech solutions, while business leaders and governments must collaborate. [75]



H. Chemicals

The Impact of Climate Change on Chemicals have been featured below with references and global voices:

Chemical pollution can make species already struggling due to climate change even more vulnerable; climate change could increase the impacts of chemical pollution; climate change is amplifying the release of hazardous chemicals in the environment; the chemical industry is responsible for high levels of greenhouse gas emissions. [76]

Climate change and chemical pollution are interdependent planetary threats. Climate change mitigation could increase chemical pollution and associated harm. Chemical pollution must be addressed in climate mitigation efforts. Transitioning from fossil fuels requires reducing the production and consumption of chemicals. [77]

An interrogation of industrial accident databases indicated that up to 5% of industrial accidents that impact facilities that process or store hazardous substances were triggered by natural events (Krausmann et al., 2011). Hurricane Harvey, which hit the United States coast near Houston, Texas, in August 2017, resulted in multiple leaks and industrial spills, polluting the local environment (Kiaghadi & Rifai, 2019). The extreme rainfalls experienced have been directly attributed to global warming (Van Oldenborgh et al., 2017). A further study identified 872 highly hazardous chemical facilities as being located within 50 miles of the hurricane-prone U.S. Gulf Coast alone, with approximately 4,374,000 people, 1,717 schools, and 98 medical facilities being within 1.5 miles of these facilities. As natural disasters become more severe and extreme weather events become more frequent, the public and environmental health risks of disruptions to these facilities grow (Anenberg & Kalman, 2019). [78]

The physical changes in temperature, wind, and rainfall caused by climate change will affect the distribution and breakdown of chemicals in complex ways. The effect on -

75. <https://www.weforum.org/stories/2022/05/biosolutions-clear-path-to-fight-climate-change/>

76. <https://chemtrust.org/climate/>

77. <https://www.sciencedirect.com/science/article/abs/pii/S221042242500005X>

78. https://minamataconvention.org/sites/default/files/documents/2021-07/Climate_Change_Interlinkages.pdf

human exposure will vary widely according to the properties of specific chemicals and chemical combinations, soil and water conditions, wind patterns, topography, land use, level of development, and human population characteristics. [79]

A range of different approaches is being investigated to harness this potential. Water, nitrogen and carbon dioxide from the environment can be combined in different ways using electrical energy from solar PV cells. Other pathways use photocatalytic materials that absorb light to facilitate reactions. These photocatalysts can be inorganic, transition metal compounds or biological molecules like enzyme complexes and chlorophyll centres. Biohybrid devices go further and incorporate parts of living organisms or whole genetically modified organisms in artificial surroundings to direct reactions towards desirable chemical compounds. [80]



I. Real Estate

The Impact of Climate Change on Real Estate have been featured below with references and global voices:

Responsible for about 40% of all greenhouse gas emissions globally, the real estate sector is already confronted by high climate risks and will face fundamental changes as the global economy decarbonises to meet climate goals. [81]

Higher temperatures lead to more extreme weather systems and an increase in large-scale incidents, from massive hurricanes to wildfires, from gale-force storms to flooding. Where the real estate market is concerned, these incidents are making it more challenging to manage the costs and condition of property every year. [82]

Climate change is fundamentally transforming real estate, influencing where we live, how properties are valued, and the risks of ownership. Rising sea levels, intensifying weather events, and increasing insurance costs make some areas increasingly vulnerable or uninhabitable. As the challenges grow, the real estate industry needs to innovate, adopt sustainable practices, and learn how to build for a more resilient future. [83]

At the 2025 Climate Business and Investment Conference at Columbia Business School, two

79. https://cdn.who.int/media/docs/default-source/chemical-safety/ifcs/managing-chemicals-in-changing-climate.pdf?sfvrsn=d71a100c_13

80. <https://www.rsc.org/policy-and-campaigning/environmental-sustainability/chemistry-and-climate-change>

81. <https://www.unepfi.org/themes/climate-change/climate-risks-in-the-real-estate-sector/>

82. <https://www.forbes.com/councils/forbesbusinesscouncil/2022/03/01/the-impacts-of-climate-change-on-the-real-estate-market/>

83. <https://esg.ssmu.ca/2024/12/08/the-relationship-between-climate-change-and-real-estate-understanding-the-impact-and-evolving-trends/>

expert panels explored the intersection of real estate and climate risk. The discussions highlighted how rising temperatures, intensifying storms, and regulatory changes are reshaping the way we build, invest, and live in cities—especially in New York City. [84]

Climate risks have a permeating effect on a real estate portfolio. Weather events impact the physical structure of a property and the appeal of a geographic market; energy efficiency has an impact on operational costs; and green ratings affect marketability and tenant demand. A climate risk analysis considers a broad spectrum of environmental data to assess the various ways that climate change and sustainable building practices can affect property performance. This includes taking into account the frequency of natural disasters, sea level rise, rising temperatures and air quality, as well as potential impacts on infrastructure and livability. [85]

Climate risks are already materialising for the real estate sector, and their frequency and severity are expected to increase in the coming years. Physical and transition risks threaten real estate asset cashflows as well as the future value of the assets themselves. Extreme weather and physical hazards, such -

as hurricanes, floods, and wildfires, can cause substantial damage to real estate located in vulnerable areas. The sector (directly and indirectly) is responsible for about 40% of all greenhouse gas (GHG) emissions globally (UNEP FI, 2022). As a result, actions taken to decarbonise the global economy to meet climate goals will have substantial cost implications for the sector. [86]



J. Financial Services

The Impact of Climate Change on Financial Services have been featured below with references and global voices:

In 2015, the Governor of the Bank of England and Chairman of the Financial Stability Board highlighted the potential adverse effects of climate change on financial stability and long-term prosperity. This issue was further highlighted by the European Central Bank's Financial Stability Review, which specified that climate risks could negatively affect the balance sheets of financial institutions, particularly if markets mispriced these risks. [87]

Climate risk poses an existential threat to humankind. Like the pandemic, climate, -

84. <https://business.columbia.edu/insights/magazine/how-climate-reshaping-real-estate>

85. <https://www.jll.com/en-us/insights/value-in-a-time-of-climate-risk-how-owners-can-adapt>

86. <https://www.unepfi.org/wordpress/wp-content/uploads/2023/03/Real-Estate-Sector-Risks-Briefing.pdf>

87. <https://www.sciencedirect.com/science/article/pii/S0040162524005559>

change can also cause short-term disruptions, such as supply chain disruptions and restrictions on daily life. Changes like democratic and societal restrictions, governmental disruptions, and a shift from global to nationalistic values will emerge in the longer term. The impact of a climate crisis on the global economy will thus be long-lasting and unprecedented. The financial services industry, too, will bear the brunt of this impact. The Bank for International Settlements (BIS) has opined that climate change can provoke ‘green swan’ events that could lead to systemic financial crisis unless timely action is taken. [88]

Asset owners and managers face increasing scrutiny as regulatory requirements and shareholder expectations for Environmental, Social and Governance (“ESG”) commitments evolve at breakneck speed. Without paying close attention to how supply chains in underlying companies are impacting the environment, the risk of being caught in a greenwashing scandal is high and costly. Balancing stretch goals and promises to shareholders with material action will require excellent strategic prioritisation and communication. There will likely be technological innovation and adoption inflexion points which will have significant -

business and, by extension, financial implications. The risk versus return, and therefore cost, of capital profiles will differ across the new technologies needed. This, alongside the capital investment requirements of high upfront costs leading to low operating costs, presents risks and opportunities for the financial sector. [89]

The financial services industry contributes to climate change through investments in fossil fuels and high-emission sectors, but also holds the potential to drive positive change through sustainable finance initiatives. By adopting green bonds, ESG investing, and adhering to regulatory policies, financial institutions can help mitigate climate impacts. [90]



K. Transport & Logistics

The Impact of Climate Change on Transport & Logistics have been featured below with references and global voices:

Extreme weather events, such as global warming, floods, and hurricanes, which are the result of global climate change not only affect the lives of societies but also impact supply chains. The first areas to experience -

88. <https://www.tcs.com/content/dam/global-tcs/en/pdfs/insights/whitepapers/climate-risk-strategy-finance-sustainable-future.PDF>

89. <https://www.teneo.com/insights/articles/the-impact-of-climate-change-on-financial-services/>

90. <https://sustainablefinancedaily.com/sustainable-finance-insights/net-zero-decarbonization/causes-and-consequences-of-climate-change-the-role-of-the-financial-services-industry/>

the effects of extreme weather conditions due to climate change are production centres worldwide and the international transportation sector, which ensures that goods from these facilities reach markets.^[91]

For the logistics sector specifically, the direct and indirect costs of weather-related disruption include delayed shipments, infrastructure damage, and poor customer satisfaction. Flooding, for example, disrupts urban logistics systems, causing road and bridge closures, damaging warehouses and vehicles, and interrupting communication systems.^[92]

Climate change and the freight transportation industry are very much intertwined. The freight industry generates eight to ten per cent of the world's carbon emissions, making it one of the biggest carbon polluters on Earth. In turn, climate impacts create secondary effects, ranging from infrastructure damage to micro-scale problems like surety bond claims.^[93]

Companies delay action on climate change mitigation, especially climate adaptation, for multiple reasons. Reasons include risk and uncertainty, lack of information and planning tools, difficulties in communicating and promoting adaptation within the company, -

difficulties in integrating climate risks into core business processes, and lack of incentives to act. In particular, the high uncertainty surrounding climate-related risks makes it difficult for companies to make optimal decisions. This uncertainty arises from, e.g., projections of future emissions pathways and associated forecasts of changing weather and climate events, interactions between natural systems, future policy and market developments, and technological advances. This uncertainty can lead to diverse business responses to climate change. Therefore, the pace and scale of adaptation must be significantly increased to address rising physical climate risks.^[94]

Climate change stands as one of the most significant challenges of the 21st century, exerting widespread effects on all aspects of human life. Among the sectors severely impacted is global transportation. The impact of climate change on transportation not only disrupts infrastructure performance but also influences costs, safety, and efficiency. This article provides a comprehensive examination of the impact of climate change on transportation worldwide and proposes strategies to address this pressing issue.^[95]

Road transportation in its present form is the most environmentally harmful form of logistics, partly because it is so widespread. -

91. https://www.researchgate.net/publication/380746388_Impacts_of_Climate_Change_on_Logistics_and_Supply_Chains

92. <https://www.mdpi.com/2305-6290/9/1/32>

93. <https://supplychaingamechanger.com/climate-impacts-on-logistics-and-supply-chain/>

94. <https://www.sciencedirect.com/science/article/pii/S2590198224000885#s0025>

95. <https://irsalogistics.com/the-impact-of-climate-change-on-global-transportation/>

Aeroplanes are the next worst, producing a range of pollutants including water vapour, carbon, nitrogen and sulphur oxides, hydrocarbons, black carbon and even lead. Large ships also produce large amounts of sulphur and nitrogen oxides through the use of unrefined heavy fuel oil, which can cause smog and acid rain as well as global warming. Rail transport is the least environmentally harmful logistics solution, but it still makes a significant negative impact on its immediate surroundings. ^[96]



L. Mining & Metals

The Impact of Climate Change on Mining and Metals have been featured below with references and global voices:

Metal production causes severe environmental impacts, which may increase in the future when demand for metals rises. Knowledge is lacking about the future impacts of many metals, especially minor metals essential for the energy transition. A better understanding of the future impacts of metals is needed, considering rising demand and impacts beyond GHG emissions. ^[97]

There have been many documented instances of environmental pollution caused by mining operations,

which are often caused by leakages of mining tailings. Mining tailings are the materials left behind after the economically valuable fraction of material has been extracted. These materials are often stored in large tailings dams to prevent environmental damage as tailings are often radioactive, toxic or acidic. Tailings consist of valuable substances used in the extraction process, such as cyanide, mercury or arsenic; therefore, modern mining programmes often aim to remove these harmful but valuable chemicals to reuse for further mineral separation. In addition to improving efficiency and cutting costs, this minimises the risk of environmental damage by reducing the toxicity of the tailings. ^[98]

Mining and mineral processing contribute to climate change in two key ways: by emitting greenhouse gases (GHGs) and by decreasing carbon storage due to the loss of vegetation cover. The increasing demand for minerals promotes the extraction of low-grade ore in extensive quantities, further leading to an increase in fossil fuel consumption and GHG emissions. The decline in vegetation cover is attributed to the decline of water resources, conversion of fertile land to wasteland and change in land use patterns. The variation in climatic factors such as temperature, precipitation and the melting of glaciers accelerates the environmental degradation. -

96. <https://www.openaccessgovernment.org/logistics-industry-climate-change/57322/>

97. <https://www.sciencedirect.com/science/article/pii/S0921344924001678>

98. <https://earth.org/environmental-problems-caused-by-mining/>

Metal contamination due to tailing dam failure or runoff from waste dumps is expected to increase under the influence of climate change. It is difficult to quantify the role of mines on climate change, considering the indirect factors such as loss of vegetation cover, acid mine drainage, quantity of waste generated and decline in water resources. The present study attempts to understand the role of these indirect factors in climate change. Similarly, the contribution of mines to climate change can be reduced by replacing the use of non-renewable energy with renewable energy. It would reduce the carbon footprint of mines. ^[99]

Mining operations often lead to habitat destruction, soil erosion, and water contamination, which can disrupt local ecosystems. These environmental consequences are expected to escalate with climate change, as shifting weather patterns and more extreme weather events influence mining sites. For instance, increased rainfall can lead to higher rates of sediment runoff and flooding, while heightened temperatures may alter the performance of machinery and affect worker safety. Companies must assess how these climatic impacts will affect their operational efficiency and regulatory compliance. ^[100]

Mining-induced water consumption, pollution and biodiversity loss substantially -

affect local ecosystems, with tropical rainforests and deserts being especially vulnerable. Around 70% of global metal extraction is linked to international supply chains. Enhanced environmental assessments, stricter implementation of policies, and coordinated actions across sectors throughout supply chains (mining, processing, consumers and financial markets) can help to mitigate the environmental impacts of mining. ^[101]



M. Tourism & Quality Of Life

The Impact of Climate Change on Tourism & Quality of Life have been featured below with references and global voices:

Tourism has long been recognised as a vital economic driver for many destinations worldwide, contributing significantly to GDP, employment, and cultural exchange. However, the rapid growth of tourism in recent decades has placed increasing pressure on many destinations, leading to two critical and interconnected global challenges: climate change and over-tourism. Climate change, driven by anthropogenic greenhouse gas emissions, is affecting natural and built environments at an unprecedented scale, resulting in rising sea levels, increased frequency of extreme -

99. <https://link.springer.com/article/10.1007/s10653-025-02556-z>

100. <https://miningworld.com/the-impact-of-climate-change-on-mining/>

101. <https://www.nature.com/articles/s43017-025-00683-w>

weather events, and biodiversity loss (IPCC, 2021; United Nations, 2022). ^[102]

Climate is a key resource for tourism, and the sector is susceptible to the impacts of climate change and global warming, many elements of which are already being felt. Tourism is estimated to be responsible for 5% of global CO₂ emissions. Threats for the sector are diverse, including direct and indirect impacts such as more extreme weather events, increasing insurance costs and safety concerns, water shortages, biodiversity loss and damage to assets and attractions at destinations, among others. Globally, all major coral reefs are expected to be severely degraded by 2050, and there is a 32% risk of die-off by 2050. ^[103]

Rising global temperatures are already affecting the tourism industry - here is how Hot weather is what many people go on holiday for. However, record global temperatures have been sending people home early from their vacations this July, raising questions about what kind of impact the climate crisis could have on the tourism sector – and tourism-dependent economies. ^[104]

Climate change places significant pressure on the tourism sector by altering environmental and socio-economic conditions that influence tourist -

behaviour and the attractiveness of destinations. Rising temperatures, changing precipitation patterns and the increasing frequency and severity of extreme weather events affect tourism supply and demand. ^[105]

The Glasgow Declaration was officially launched at the COP26 UN Climate Change Conference. It proposes a coordinated plan for tourism to support the global commitment to halve emissions by 2030 and achieve net zero by 2050, and requests signatories to make tangible commitments around planning, measuring and reporting. ^[106]

Climate change threatens all life on the planet, as well as the very destinations that tourism relies on. From lush tropical islands to snowy mountain peaks, your favourite vacation spots could be at risk. As the planet warms, rising sea levels, extreme weather, and increasing temperatures are impacting ecosystems and communities around the world. Beaches are shrinking, coral reefs are bleaching, and alpine resorts are left snowless and dry. If we want to save our planet and protect these special places, it is up to every one of us to reduce our impact. ^[107]

Climate change is no longer in the future; it is an evolving business and policy reality for tourism. Extreme weather events, including heavy rainfall and flooding, drought, heat -

102. https://www.researchgate.net/publication/384777941_Tourism_Under_Pressure_Analyzing_the_Impacts_of_Climate_Change_and_Over-Tourism_on_Destinations

103. <https://koe.org/2019/05/03/tourism-and-climate-change/>

104. <https://www.weforum.org/stories/2023/08/temperatures-tourism-climate-impact/>

105. <https://www.emerald.com/insight/content/doi/10.1108/978-1-83753-244-520241003/full/html>

106. <https://www.unwto.org/sustainable-development/climate-action>

107. <https://sustainabletravel.org/our-work/climate-change/>

waves, storms, and wildfires, have become more frequent and intense, affecting tourism destinations and demand everywhere in the world. Climate change also affects essential tourism assets. Snowfall has become less reliable in many winter destinations, while sea level rise and ocean warming threaten resources such as beaches and coral reefs. There is also a rising cost of travel associated with climate change. ^[108]



N. Information & Communication Technology

The Impact of Climate Change on ICT have been featured below with references and global voices:

The impact of human activities on the environment – and climate change in particular – is an issue of growing concern confronting life on Earth. At the same time, information and communication technologies (ICTs) are being rapidly deployed around the world. Although ICTs require energy resources, they offer new opportunities to mitigate and adapt to climate change. ICTs help to monitor and analyse short- and long-term climate trends, raise awareness, help protect the environment and reduce carbon emissions. ^[109]

This analytical report looks at the potential role that information and communication technologies (ICTs) play at different stages of the process of climate change, from contributing to global warming, to monitoring it, to mitigating its impact on the most vulnerable parts of the globe, to developing long-term solutions, both directly in the ICT sector and in other sectors like energy, transport, buildings etc. ^[110]

Major companies in the information and communications technology (ICT) sector are stepping up their efforts to reduce their greenhouse gas emissions and to decarbonise the entire global economy, with several firms now demonstrating that the sector is ready to put its money where its mouth is. The UN's Momentum for Change Initiative is showcasing some of the best examples that show how the sector can be instrumental in making huge impacts to cut emissions in the next 15 years. ^[111]

Climate change remains one of the world's significant threats today, and thus Sustainable Development Goal (SDG) 13 prioritises countries to reduce global greenhouse gas emissions and mitigate climate change by 2030. Recent studies have scrutinised the impact of Information and Communications Technologies (ICTs) on the environment. However, the majority of these studies -

108. <https://www.tandfonline.com/doi/full/10.1080/14616688.2024.2332359>

109. <https://www.itu.int/en/ITU-D/Climate-Change/Pages/climatechangemain.aspx>

110. <https://www.uncclearn.org/resources/library/icts-and-climate-change/>

111. <https://unfccc.int/news/ict-sector-helping-to-tackle-climate-change>

assumed that the environmental impact of ICT is homogeneous across countries. This study, therefore, investigated the impact of ICT on environmental degradation, considering the difference in ICT quality among countries. ^[112]



O. Human Capital Innovation

The Impact of Climate Change on Human Capital Innovation have been featured below with references and global voices:

Climate change poses a considerable economic risk to developing countries. Human capital plays a central role in economic growth. However, leading macroeconomic models of climate change abstract from human capital, potentially underestimating the long-run consequences of climate change. This project studies the impact of climate on human capital accumulation, structural change and economic growth in developing countries, focusing on two mechanisms. The first mechanism is that extreme heat hinders the ability of students to learn, decreasing the effectiveness of schooling and reducing the incentive to attend school. ^[113]

Climate change severely impacts critical facets of human capital across the life cycle.

This is particularly alarming as both the frequency and intensity of extreme weather shocks continue to increase, and extremes appear to be the main channel of causality. At the same time, human capital has a vital role in driving effective climate change mitigation and adaptation. Here, we provide a framework for analysing the multiple interlinkages between climate change and human capital, and document the existing evidence on the impacts of climate change damages, as well as the effects of climate change mitigation and adaptation, on human capital across the life cycle. ^[114]

Climate change is making weather events more extreme, disrupting education, undermining livelihoods, and exacerbating health issues. The numbers are alarming. For instance, heat-related deaths have surged by 68% in the last two decades. ^[115]

Addressing climate change requires individual behaviour change and voter support for pro-climate policies, yet surprisingly little is known about how to achieve these outcomes. In this paper, we estimate the causal effects of additional education on pro-climate outcomes using new compulsory schooling law data across 20 European countries. We analyse the effects on proclimate beliefs and behaviours, as well as novel data on policy preferences and -

112. <https://journals.sagepub.com/doi/abs/10.1177/0958305X221118877>

113. <https://steg.cepr.org/projects/impact-climate-change-human-capital-accumulation-macroeconomic-perspective>

114. <https://www.ifo.de/en/cesifo/publications/2023/working-paper/climate-changes-affect-human-capital>

115. <https://blogs.worldbank.org/en/investinpeople/human-capital-investments-are-climate-investments>

voting for green parties. Results show that a year of education substantially increases pro-climate beliefs, behaviours, and policy preferences. ^[116]

116. https://direct.mit.edu/rest/article-abstract/doi/10.1162/rest_a_01444/120189/Human-Capital-and-Climate-Change?redirectedFrom=fulltext



07. The Role of Humankind is to Find The Right Mind

The role of humankind is to find the right mindset, behaviour, and action. In this regard, values can play a pivotal role in embracing and empowering a values-based approach in policy making and policy execution for the people, planet, and their prosperity. KULABO (クラブ) is the process that enables everybody to accomplish their learning [L] through knowledge [K] and understanding [U] till owning [O] the belief [B] through successful application [A], ultimately everywhere and every day in a Continuous Improvement (change/ improve for better) way! Continuous Improvement Culture- Practices make people perfect; similarly, habits create culture! Therefore, through knowledge and capacity building, we can ultimately create the momentum and develop the habit of transforming our habits positively into an Improvement Culture. While embracing sustainability within the values-based ecosystem on climate action, we need to consider a values-based approach with the KULABO process (<http://dx.doi.org/10.13140/RG.2.2.27283.76326>).



08. Last Hope

We are the people who make all impossibles possible. Why not embrace sustainability within a values-based ecosystem on climate action? We can do it as soon as we acknowledge it as our problem and consider solutions that benefit us collectively. Therefore, humans are the last hope for the course of action for other humans and greater impacts.

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