QUNO
Quaker United Nations Office

A Government Official's Toolkit inspiring urgent climate action

12 concise cases
Referenced to over 100 published papers

Including the IPCC Special Reports on:

Climate Change 2021: The Physical Science

Global Warming of 1.5C

Climate Change and Land

Ocean and Cryosphere in a Changing Climate

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Detmer Yens Kremer,
and Andres Naranjo

2021 Edition

Welcome

This publication is written to support government officials—at local, regional and national levels—who are concerned about the impact of climate change on their citizens, their country, and the planet.

The publication is organized into 12 concise cases, with points quoted from, and linked to, peer-reviewed papers. The quotes include the latest science findings from the Intergovernmental Panel on Climate Change (IPCC), whose Summary for Policy Makers (SPM) are approved by Governments.

We offer a range of concise cases to help you engage with different concerns, and integrate scientific, rights-based, and Indigenous knowledge and approaches throughout the Toolkit.

As an accredited observer of the United Nations Framework Convention on Climate Change (UNFCCC) and the IPCC, we have been closely involved in both the international climate negotiations and the communication of climate science. We believe all people should have easy access to this information.

We hope this publication will support you, your colleagues and citizens in understanding what is happening, why it is happening, and how you can help ensure the safety and well-being of your citizens, of nature, and the stability of your countries. Political will is essential if humanity is to avoid experiencing global catastrophic climate change. We hope this publication inspires you to be a champion at this critical time in human history.

Acknowledgements

This booklet follows A Negotiator's Toolkit[1], prepared by QUNO for country delegations at the international climate change negotiations, and was inspired by a side event at a climate conference in May 2017, co-hosted by QUNO, Brahma Kumaris and Newcastle University. The current edition of the Government Official's Toolkit follows two prior versions which included the invaluable work and support of Isobel Edwards and Justine Taylor. For more information please contact Lindsey Fielder Cook, our Representative for Climate Change: lfcook@quno.ch

Cover photo: A primary school student gathers signatures from negotiators at the UN Climate Change Conference that took place in Bonn, Germany in June 2015 (Photo by Lindsey Fielder Cook).

1 QUNO (2018), A Negotiator's Toolkit, Second edition, (Geneva). https://quno.org/resource/2018/4/negotiators-toolkit-second-edition

Contents

The Climate Science Case

What is happening, and why?

- It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.[2]

- Human activities include fossil fuel extraction and combustion, black carbon (i.e.: soot, the incomplete combustion of fossil fuels, biofuel and biomass), deforestation and forest degradation, intensive and animal agriculture, industry, transport, buildings[3] and, increasingly, hydrofluorocarbons.

- Average global temperature for 2015-2019 is on track to be the warmest of any equivalent period on record. It is currently estimated to be 1.1°C above pre-industrial (1850-1900) times and 0.2°C warmer than 2011.[4]

- In comparison, warming from the last ice age (20,000 to 10,000 years ago) to the preindustrial climate, was approximately 0.5°C to 1°C per 1,000 years.[5][6]

- In 2021, the Intergovernmental Panel on Climate Change (IPCC) has concluded that, if we continue under a very high rate of greenhouse gas emissions, global surface temperature could rise by 3.3C to 5.7C by 2100, compared to preindustrial levels.[7] Temperatures can rise higher after 2100. The more carbon we burn, the more surface temperatures will rise.[8][9]

- In 2019, atmospheric CO2 (carbon dioxide) concentrations were higher than at any time in at least 2 million years (high confidence), and concentrations of CH4 (methane) and N2O (nitrous oxide) were higher than at any time in at least 800,000 years (very high confidence).[10]

- Other environmental crises include land use change, ocean acidification, chemical pollution, and the highest species extinction rate in our human history.[11] Many human activities causing climate change also create these environmental crises.

- About 2/3 of the carbon dioxide emission quota consistent with a 2°C temperature rise limit has already been used.[12]

- CO2 emissions from fossil fuel use continue to grow by over 1% annually and 2% in 2018, reaching a new high. Growth of coal emissions resumed in 2017.[13]

- The Paris Agreement commits to holding the increase in the global average temperature to *"well below 2 °C above pre-industrial levels and pursuing efforts to 1.5 °C above pre-industrial levels."*[14] The Agreement requires all Countries to put forward their best efforts through nationally determined contributions (NDCs) and to strengthen these efforts in the years ahead.

- The total global GHG emission level in 2030, taking into account implementation of all the latest NDCs, is expected to be 16.3 per cent above the 2010 level. According to the SR1.5, to be consistent with global emission pathways with no or limited overshoot of the 1.5 °C goal, global net anthropogenic CO2 emissions need to decline by about 45 per cent from the 2010 level by 2030, reaching net zero around 2050.[15]

How does this affect the ecosystems on which our lives depend?

- It is virtually certain that the global ocean has warmed unabated since 1970 and has taken up more than 90% of the excess heat in the climate system. Since 1993, the rate of ocean warming has more than doubled. Marine heatwaves have very likely doubled in frequency since 1982 and are increasing in intensity.[16]

- The ocean has taken up between 20–30% of total anthropogenic CO2 emissions since the 1980s causing further ocean acidification.[17]

- The ocean's oxygen content (globally)

2 IPCC (2021), Climate Change 2021 The Physical Science Basis, Summary for Policy Makers, A.1 p. 5 . August 2021, https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

3 IPCC, (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, p. 88, Box 3.2, https://www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf

4 Science Advisory Group to UN Climate Action Summit (2019), United in Science, p. 5. https://ane4bf-datap1.s3-eu-west-1.amazonaws.com/wmocms/s3fs-public/ckeditor/files/United_in_Science_ReportFINAL_0.pdf

5 Shakun, J., et al., (2012). Global warming preceded by increasing carbon dioxide concentrations during the last deglaciation. Nature. 484. p. 49-55. http://www.atm.damtp.cam.ac.uk/mcintyre/shakun-co2-temp-lag-nat12.pdf

6 Marcott, S., et al., (2013). A Reconstruction of Regional and Global Temperature for the Past 11,300 Years. Science. 339. p. 1198-1201. https://science.sciencemag.org/content/339/6124/1198

7 IPCC, Climate Change 2021 : The Physical Science Basis, p. 17 (B.1.1) https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

8 The Royal Society, (2014). In: Climate change: evidence and causes, p. 10. https://royalsociety.org/~/media/Royal_Society_Content/policy/projects/climate-evidence-causes/climate-change-evidence-causes.pdf

9 IPCC,(2014).ClimateChange2014SynthesisReportSummary for Policymakers. In: IPCC's Fifth Assessment Report (AR5). https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf Figure SPM.5(b) on page 9 shows the warming predicted in 2100 as a function of the total accumulated amount of CO2 emitted by humankind 1870-2100, very simply the greater the total amount emitted the greater the warming.

10 IPCC 2021, Climate Change 2021 : The Physical Science Basis, p. 9 (A.2.1) https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

11 Steffen, W., et al., (2015). Planetary boundaries: Guiding human development on a changing planet. Science. https://science.sciencemag.org/content/347/6223/1259855

12 Friedlingstein, P. and Andrew, R., (2014). Persistent growth of CO2 emissions and implications for reaching climate targets. Nature Geoscience. 7, p. 709. https://www.globalcarbonproject.org/global/pdf/Friedlingstein_2014_Persistent__growth__of_CO2_emissions_and_implications_for_reaching_climate_targets.NatureG.pdf

13 Science Advisory Group to UN Climate Action Summit (2019), United in Science, p. 5. https://ane4bf-datap1.s3-eu-west-1.amazonaws.com/wmocms/s3fs-public/ckeditor/files/United_in_Science_ReportFINAL_0.pdf

14 UNFCCC, (2015). The Paris Agreement. https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

15 UNFCCC Secretariat, (2021), Nationally determined contributions under the Paris Agreement, adopted by CMA 3 for COP26, p. 5 (para.12) https://unfccc.int/sites/default/files/resource/cma2021_08_adv_1.pdf.

16 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 8, A2. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

17 Idem, p. 9, A2.5.

declined by 2% in the last 50 years.[18] Increased carbon dioxide and warming oceans led to the greatest marine extinction, 252 million years ago.[19]

- Global mean sea level is rising, with acceleration in recent decades due to increasing rates of ice loss from the Greenland and Antarctic ice sheets, as well as continued glacier mass loss and ocean thermal expansion.[20]

- Increases in tropical cyclone winds and rainfall, and increases in extreme waves, combined with relative sea level rise, exacerbate extreme sea level events and coastal hazards.[21]

- Due to relative sea level rise, extreme sea level events that occurred once per century in the recent past are projected to occur at least annually at more than half of all tide gauge locations by 2100 (high confidence).[22]

- It is virtually certain that the land surface will continue to warm more than the ocean surface (likely 1.4 to 1.7 times more). It is virtually certain that the Arctic will continue to warm more than global surface temperature, with high confidence above two times the rate of global warming.[23]

- In 2011–2020, annual average Arctic Sea ice area reached its lowest level since at least 1850 (high confidence). The global nature of glacier retreat, with almost all of the world's glaciers retreating synchronously, since the 1950s is unprecedented in at least the last 2000 years (medium confidence).[24]

- An irreversible melting of the Greenland ice sheet could be triggered around 1.5°C to 2°C of global warming.[25]

- Widespread permafrost thaw is projected for this century and beyond. (This) leads to the cumulative release of … permafrost carbon as CO2 and methane to the atmosphere with the potential to exacerbate climate change.[26]

- Limiting global warming to 1.5°C compared to 2°C is projected to reduce increases in ocean temperature as well as associated increases in ocean acidity and decreases in ocean oxygen levels. Consequently, limiting global warming to 1.5°C is projected to reduce risks to marine biodiversity, fisheries, and ecosystems, and their functions and services to humans.[27]

18 Schmidtko, S., Stramma, L. and Visbeck, M., (2017). Decline in global oceanic oxygen content during the past five decades. Nature. 542. p. 335–339. https://www.nature.com/articles/nature21399?foxtrotcallback=true

19 The University of Edinburgh, (2016). Greatest extinction driven by acidic oceans. In: 2015 news. https://www.ed.ac.uk/news/2015/acidoceans-090415

20 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 10, A3. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

21 Ibid.

22 IPCC 2021, Climate Change 2021: The Physical Science Basis, p. 33 (C.2.5)https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

23 Idem, p. 19, B.2.1.

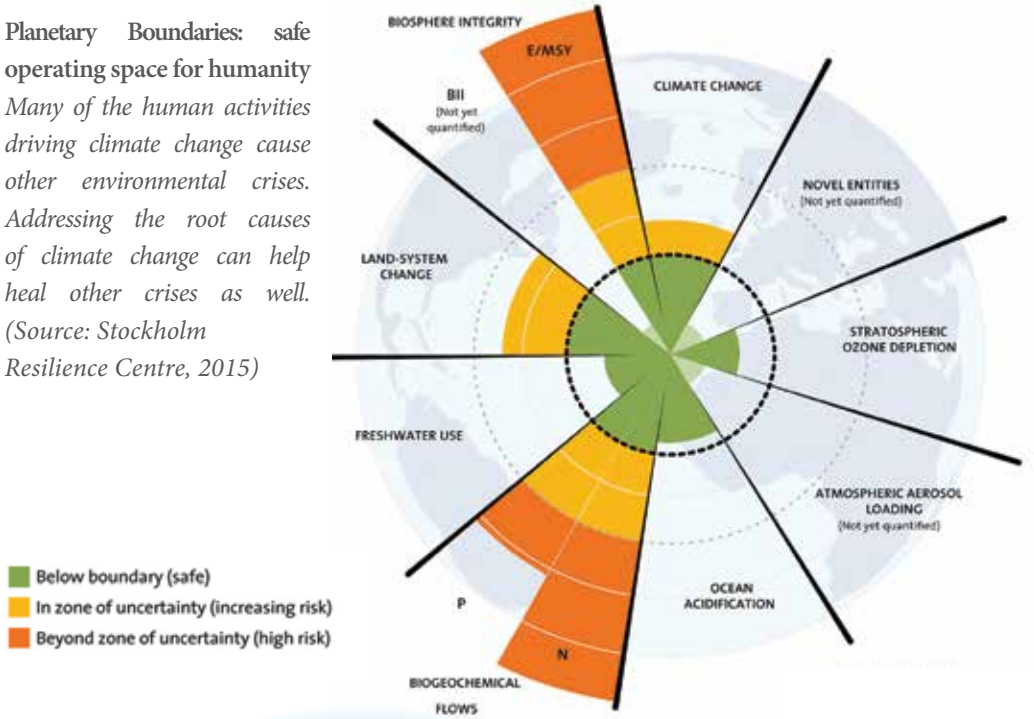
24 Idem, p. 9, A.2.3.

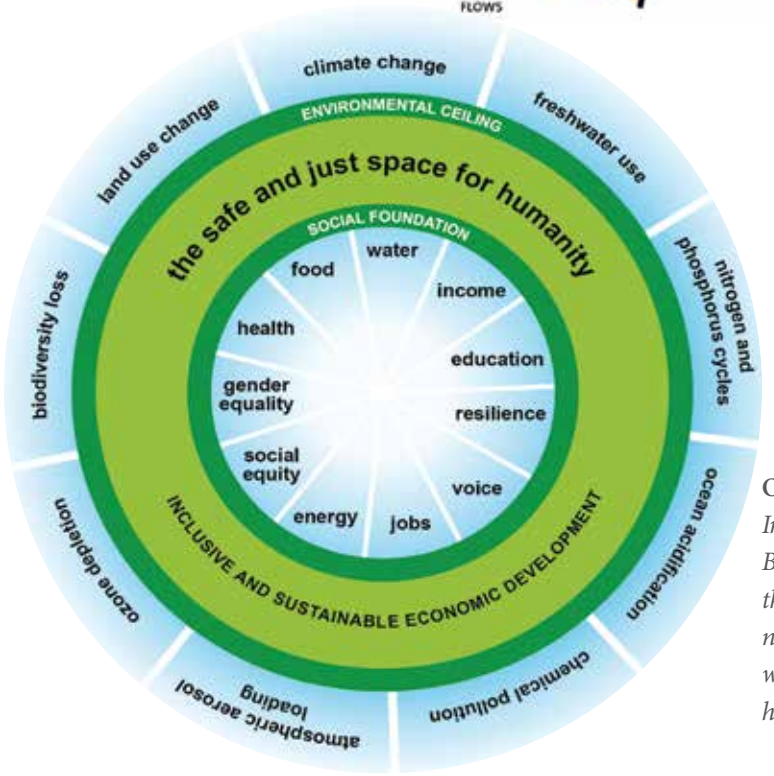
25 IPCC, (2018). Summary for Policymakers. In: Special Report on Global Warming of 1.5C, p. 9, B.2.2. http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

26 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 20, B1.4. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

27 IPCC, (2018). Summary for Policymakers. In: Special Report on Global Warming of 1.5C, p. 8, B.4. http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

Planetary Boundaries: safe operating space for humanity
Many of the human activities driving climate change cause other environmental crises. Addressing the root causes of climate change can help heal other crises as well. (Source: Stockholm Resilience Centre, 2015)





Oxfam Doughnut
Inspired by the "Planetary Boundaries" image above, the "Oxfam Doughnut" connects environmental health with a safe and just space for humanity. (Source: Oxfam)

The Economic Case

Why does climate action make economic sense?

- Estimates suggest that overall, the transition to low carbon economies worldwide will be a net generator of jobs, with as many as 18 million new jobs appearing by 2030.[28]

- Risks to global aggregated economic growth due to climate change impacts are projected to be lower at 1.5°C than at 2°C by the end of this century.[29]

- Deferral of GHG emissions reductions from all sectors implies trade-offs including irreversible loss in land ecosystem functions and services required for food, health, habitable settlements and production, leading to increasingly significant economic impacts on many countries in many regions of the world.[30]

The low-carbon transformation is underway

- Climate action should not be viewed as an impediment to economic growth but as an impetus for decoupling economic growth from emissions and resource extraction, and a catalyst for a green economic transition, labour rights improvements, and poverty elimination efforts.[31]

- The majority of proven coal, oil and gas reserves may be considered "un-burnable" if global temperature increases are to be limited to 2° C. This could lead to "stranded carbon" investment assets which are no longer able to earn an economic return, as a result of changes associated with the transition to a low-carbon economy.[32]

- Fossil fuel subsidies are large, amounting to 6.5% of global GDP in 2015.[33]

- In recent years, technology prices for solar panels and wind energy have tumbled. In many parts of the world, renewables are now the lowest-cost source of new power generation.[34]

- The global South will account for roughly two-thirds of global infrastructure investment. Building climate-smart, resilient infrastructure is an excellent opportunity for developing countries to bypass inefficient and polluting systems.[35]

- The Divest-Invest movement mobilizes private and public capital to speed the global energy transition from carbon intensive fossil fuels to clean, sustainable forms of energy compatible with a safe climate. Fossil fuel divestment pledges now surpass USD 2.6 trillion.[36]

- The prevailing economic model relies on a continual, exponential expansion of the economy. This economic growth is without historical precedent and is totally at odds with finite resources and the fragile ecology on which we depend for survival.[37]

- The global economy is almost five times the size it was half a century ago and has already been accompanied by the degradation of an estimated 60% of the world's ecosystems.[38]

- An over-reliance on the private sector could lead to a climate apartheid scenario in which the wealthy pay to escape overheating, hunger, and conflict, while the rest of the world is left to suffer.[39]

What can we do?

- In order to achieve the Sustainable Development Goals, what is needed now is a dedicated initiative, backed (but not constrained) by national governments, to formulate a more relevant economic and development model or models.[40]

- Near-term action to address climate change adaptation and mitigation, desertification, land degradation and food security can bring social, ecological, economic and development co-benefits (which) can contribute to poverty eradication and more resilient livelihoods for those who are vulnerable.[41]

- Environmental agencies or programmes should ensure that the social and economic

28 International Labor Organization (2019), Persons with Disabilities in a Just Transition to a Low-Carbon Economy, p. 5. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_727084.pdf

29 IPCC, (2018). Summary for Policymakers. In: Special Report on Global Warming of 1.5C, p. 11, B5.5. http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

30 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 41, D3.3. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

31 United Nations Human Rights Council, (2019), Climate change and poverty: Report of the Special Rapporteur on extreme poverty and human rights, Section V.C.53. https://www.ohchr.org/Documents/Issues/Poverty/A_HRC_41_39.pdf

32 Carney, M. (2014). Open letter from Mark Carney to Joan Walley MP on Stranded Assets. UK Parliament. https://www.parliament.uk/documents/commons-committees/environmental-audit/Letter-from-Mark-Carney-on-Stranded-Assets.pdf

33 Coady, D., et al., (2017) How Large Are Global Fossil Fuel Subsidies? World Development, Volume 91, March 2017, Highlights. https://sciencedirect.com/science/article/abs/pii/S0305750X16304867

34 UNFCCC, (2019), The Heat is on: Taking Stock of Global Climate Ambition, p. 13. https://unfccc.int/sites/default/files/resource/NDC%20Outlook.pdf

35 The New Climate Economy, 2016. Executive Summary. In: The Sustainable Infrastructure Imperative. p. 8. https://newclimateeconomy.report/2016/executive-summary/

36 UNFCCC, (2015). Fossil fuel divestment pledges surpass $2.6 trillion. UNFCCC News. https://unfccc.int/news/fossil-fuel-divestment-pledges-surpass-26-trillion

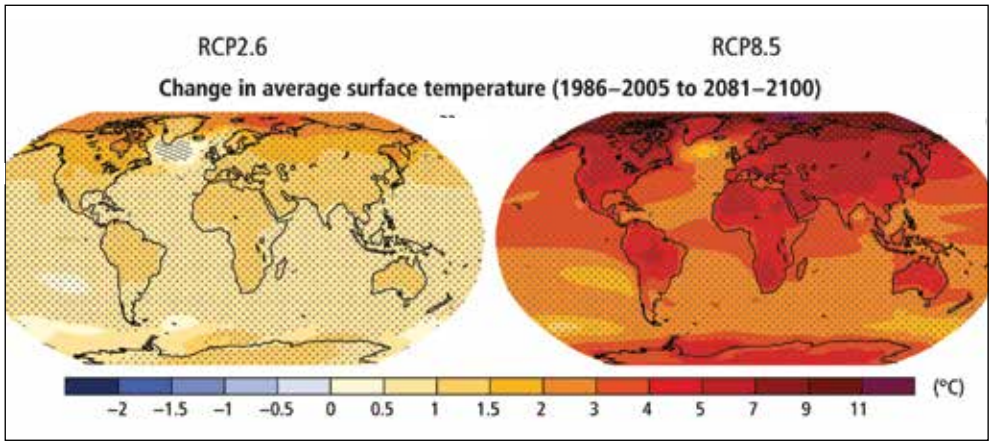
37 Jackson, T. (2017). Prosperity without Growth: Foundations for the Economy of Tomorrow. 2nd Edition. Routledge, London and New York. p. 13. http://archive.ipu.org/splz-e/unga13/prosperity.pdf

38 Jackson, T. (2009). Prosperity without Growth? - The transition to a sustainable economy. Sustainable Development Commission. p. 102. http://www.sd-commission.org.uk/data/files/publications/prosperity_without_growth_report.pdf

39 United Nations Human Rights Council, (2019), Climate change and poverty: Report of the Special Rapporteur on extreme poverty and human rights, Section V.B.50. https://www.ohchr.org/Documents/Issues/Poverty/A_HRC_41_39.pdf

40 The Club de Madrid´s Environmental Sustainability and Shared Societies Working Group, (2017). A New Paradigm: For Sustainable Development? Summary of the deliberations of the Club de Madrid Working Group on Environmental Sustainability and Shared Societies, p.10. http://www.clubmadrid.org/wp-content/uploads/2017/10/SS_Contribution_Agenda2030-3.pdf

41 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 39, D2. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf



Without urgent action, RCP8.5 will remain our current warming pattern. (AR5/IPCC)

impacts of environmental policies are considered, as well as screening economic and social policies for their impact on the environment. Equally, economic agencies should consider the impact of economic policies on the environment and society.[42]

- Reflecting the environmental costs of land-degrading agricultural practices can incentivise more sustainable land management.[43]

- Recently, the concept of a circular economy has gained traction. The concept is simple: minimize the disposal of waste and the need for raw materials by keeping existing materials and assets in the production cycle.[44]

- Adaptation actions bring about economic benefits by: 1) reducing risk, as adaptation actions lower financial costs, increasing security, and making investments more appealing in regions, cities, or industries where those investments would otherwise appear too vulnerable; 2) improving the productivity of resources and people, adaptation actions boost incomes; and 3) through the challenge of finding solutions, driving innovation and creating new technologies and unforeseen market opportunities.[45]

42 The Club de Madrid´s Environmental Sustainability and Shared Societies Working Group, (2017). A New Paradigm: For Sustainable Development? p. 11. http://www.clubmadrid.org/wp-content/uploads/2017/10/SS_Contribution_Agenda2030-3.pdf

43 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 32, C2.2. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

44 Altamirano, J-C., Maassen, A., and Prieto, O., (2017). Moving Beyond "Take, Make, Waste": Developing Cities Show the Possibilities of the Circular Economy. World Resources Institute. https://www.wri.org/blog/2017/10/moving-beyond-take-make-waste-developing-cities-show-possibilities-circular-economy

45 Global Commission on Adaptation, (2019), Adapt Now: A Global Call for Leadership on Climate Resilience, p. 14. https://cdn.gca.org/assets/2019-09/GlobalCommission_Report_FINAL.pdf

The Biodiversity and Food Security Cases

Why does biodiversity matter?

- Biodiversity is the diversity of plant and animal life.[46] Over the last two decades alone, the Earth has lost one-tenth (3.3 million km2) of global wilderness areas.[47] [48]

- Current rates of extinction are about 1000 times the background rate of extinction. These are higher than previously estimated and likely still underestimated.[49] [50]

- The Living Planet Index has recorded an overall decline of 60% in species population sizes between 1970 and 2014, with South and Central America suffering an 89% loss, and Freshwater Living Planet Index shows an 83% decline.[51]

- Nearly 50% of coastal wetlands have been lost over the last 100 years, as a result of the combined effects of localised human pressures, sea level rise, warming and extreme climate events.[52]

- As a result, biodiversity and related ecosystem health and resilience that underpin all life on Earth are under serious threat.[53]

How does climate change affect biodiversity and food security?

- Climate change creates additional stresses on land, exacerbating existing risks to livelihoods, biodiversity, human and ecosystem health, infrastructure, and food systems. Increasing impacts on land are projected under all future GHG emission scenarios. Some regions will face higher risks, while some regions will face risks previously not anticipated.[54]

- Risks of severe impacts on biodiversity,

46 Biodiversity, (1995). The Oxford English Reference Dictionary, Oxford University Press. https://en.oxforddictionaries.com/definition/biodiversity

47 Watson, J. et al., (2016). Catastrophic Declines in Wilderness Areas Undermine Global Environment Targets. Current Biology, Volume 26, Issue 21, p. 2929 – 2934. https://www.cell.com/current-biology/fulltext/S0960-9822(16)30993-9

48 Keto, A., et al., (2018). Ecosystem Integrity, Forests & Paris Agreement Goals: Where are we? Submission for the Talanoa Dialogue. https://www.griffith.edu.au/__data/assets/pdf_file/0029/483932/Submission-Talanoa-Dialogue-March18.pdf

49 Ibid.

50 Pimm, S.L. et al., (2014). The biodiversity of species and their rates of extinction, distribution, and protection. Science, 344. p. 987. http://senate.ucsd.edu/media/206192/science-2014-pimm-extinction-review.pdf

51 WWF. 2018. Living Planet Report - 2018: Aiming Higher. Grooten, M. and Almond, R.E.A.(Eds). WWF, Gland, Switzerland, p. 11. http://d2ouvy59p0dg6k.cloudfront.net/downloads/lpr2018_full_report_spreads_2.pdf

52 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 13, A6.1. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

53 IPBES, (2018). Biodiversity and Nature's Contributions Continue Dangerous Decline, Scientists Warn. IPBES Media Release. https://ipbes.net/news/media-release-updated-biodiversity-nature's-contributions-continue-dangerous-decline-scientists

54 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 15, A5. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

structure and function of coastal ecosystems are projected to be higher for elevated temperatures under high compared to low emissions scenarios in the 21st century and beyond.[55]

- Crop pollination and seed setting stages are some of the most temperature-sensitive plant lifecycles, and prolonged exposure to extreme temperatures during the pollination stage of initial grain and fruit will reduce yield potential.[56] 87 of the world's leading crops depend on insect pollination, with many dependent on just 1 or 2 species of bees.[57]

- At 2 °C degrees of warming, 100-400 million more people could be at risk of hunger and 1-2 billion more people may no longer have adequate water.[58]

- At around 2°C of global warming the risk from permafrost degradation and food supply instabilities are projected to be very high. Additionally, at around 3°C of global warming risk from vegetation loss, wildfire damage, and dryland water scarcity are also projected to be very high.[59]

- There are relatively few studies on the consequences to an average 4°C rise by 2100 (at least 5-7°C locally in many areas). However, it may be impossible for many countries to adapt above a 4°C or 5°C temperature rise.[60]

How can changes in our agriculture and food production help stabilize climate change?

- If emissions associated with pre- and post-production activities in the global food system are included, the emissions are estimated to be 21-37% of total net anthropogenic GHG emissions.[61]

- Agriculture currently accounts for ca. 70% of global fresh-water use.[62]

- Soil erosion from agricultural fields is estimated to be currently 10 to 20 times (no tillage) to more than 100 times (conventional tillage) higher than the soil formation rate.[63]

- Sustainable land management [...] options include inter alia agroecology (including agroforestry), conservation agriculture and forestry practices, crop and forest species diversity, appropriate crop and forest rotations, organic farming, integrated pest management, the conservation of pollinators, rain water harvesting, range and pasture management, and precision agriculture systems.[64]

- Agricultural practices that include Indigenous and local knowledge can contribute to overcoming the combined challenges of climate change, food security, biodiversity conservation, and combating desertification and land degradation.[65]

- Limiting global warming to 1.5°C compared to 2°C is projected to lower the impacts on terrestrial, freshwater and coastal ecosystems and to retain more of their services to humans.[66] However, almost all warm-water coral reefs are projected to suffer significant losses of area and local extinctions, even if global warming is limited to 1.5°C.[67]

- Delayed action to reduce GHG emissions could result in policies with a dangerous reliance on widespread bioenergy with carbon capture and storage, known as BECCS.[68] Widespread bioenergy is of concern because of potential effect on land use, food security and eco-system health, and carbon capture storage because of its potential to delay rapid reduction of fossil fuel use.

- Bioenergy production from biomass raises profound questions about carbon neutrality, land availability, competition with food production, and competing demands for bioenergy from the transport, heating, and industrial sectors. The logistics of collating and transporting vast quantities of bioenergy—equivalent to up to half of the total global primary energy consumption—are seldom addressed.[69]

55 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 29, B6. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

56 Hatfield, J.L., and Prueger, J.H., (2015). Temperature extremes: Effect on plant growth and development. Weather and Climate Extremes. 10, (A). p. 4, 5. https://www.sciencedirect.com/science/article/pii/S2212094715300116

57 Kjøhl, M., Nielsen, A., and Christian Stenseth, N., (2011). Climate Change and Crop Pollination. In: Potential Effects of Climate Change on Crop Pollination, Rome: Food and Agriculture Organization of the United Nations (FAO). p. 1-8. http://www.fao.org/fileadmin/templates/agphome/documents/Biodiversity-pollination/Climate_Pollination_17_web__2_.pdf

58 United Nations Human Rights Council, (2019), Climate change and poverty: Report of the Special Rapporteur on extreme poverty and human rights, Section III.A.9. https://www.ohchr.org/Documents/Issues/Poverty/A_HRC_41_39.pdf

59 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 16, A5.3. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

60 Porter, J.R., et al., (2014). Food security and food production systems. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., et al. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 18. https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-PartA_FINAL.pdf

61 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 7, A3. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

62 Idem, p. 2, A1.3.

63 Idem, p. 3, A1.5.

64 Idem, p. 24, footnote 33.

65 Idem, p. 34, C4.3.

66 IPCC, (2018). Summary for Policymakers. In: Special Report on Global Warming of 1.5C (6 October 2018 final, subject to Copy Edit), p. 10 (B.3). http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

67 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 29, B6.4. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

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69 Anderson, K., and Peters, G., (2016). The Trouble with Net Emissions, Science: 354, 6309, p. 182-183. http://www.geoengineeringmonitor.org/2016/10/the-trouble-with-negative-emissions/

The Human Rights Case

How does climate change affect human rights?

- Rising global temperatures threaten the effective enjoyment of human rights, including the right to life, adequate food, the enjoyment of the highest attainable standard of physical and mental health, adequate housing, self-determination, and safe drinking water and sanitation.[70]

- In 2021, The Human Rights Council recognized "the right to a safe, clean, healthy and sustainable environment as a human right that is important for the enjoyment of human rights."[71]

- Climate change heightens existing social and economic inequalities, intensifies poverty and reverses progress towards improvements in children's well-being. All children are exceptionally vulnerable to the negative impacts of climate change, with the youngest children being most at risk.[72]

How are people's lives affected already?

- Since the mid-20th century, the shrinking cryosphere (frozen part of the Earth's surface) in the Arctic and high-mountain areas has led to predominantly negative impacts on food security, water resources, water quality, livelihoods, health and well-being, infrastructure, transportation, tourism and recreation, as well as culture of human societies, particularly for Indigenous peoples.[73]

- In the Arctic, negative impacts of cryosphere change on human health have included increased risk of food- and waterborne diseases, malnutrition, injury, and mental health challenges especially among Indigenous peoples. In some high-mountain areas, water quality has been affected by contaminants, particularly mercury, released from melting glaciers and thawing permafrost.[74]

- Both global warming and urbanisation can enhance warming in cities and their surroundings (heat island effect), especially during heat related events, including heat waves. Night-time temperatures are more affected by this effect than daytime temperatures. Increased urbanisation can also intensify extreme rainfall events over the city or downwind of urban areas.[75]

70 United Nations General Assembly / Human Rights Council (2017). Human rights and climate change, Geneva: United Nations. https://www.ohchr.org/Documents/Issues/ClimateChange/COP21.pdf

71 United Nations Human Rights Council, (2021), The human right to a clean, healthy and sustainable environment, p.3, para. 2. https://undocs.org/a/hrc/48/l.23/rev.1.

72 OHCHR Summary (2017), Climate change and the full and effective enjoyment of the rights of the child (A/HRC/35/13). https://www.ohchr.org/Documents/Issues/ClimateChange/RightsChild/ChilrenOnePager.pdf.

73 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 16, A7. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

74 Idem, p. 16, A7.2.

(flickr/Pallab Seth)

What human rights obligations are triggered by the impacts of climate change?

- States and enterprises have moral and legal responsibilities to take effective actions to prevent the harmful human rights impacts of climate change.[76] International law entails obligations to act cooperatively to protect and advance fundamental human rights, including in the context of climate change and its effects on people's ability to exercise such rights.[77]

- Through the widespread ratification of international human rights treaties, States have committed to respect, protect and fulfil the human rights of all persons. The Paris Agreement commits States to respecting, promoting and considering their respective obligations on human rights, the right to health, the rights of Indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity.[78]

75 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 12, A4.6. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

76 Expert Group on Global Climate Obligations, (2014). Oslo Principles on Global Climate Change Obligations, Oslo, Norway, p. 1. https://globaljustice.yale.edu/sites/default/files/files/OsloPrinciples.pdf

77 Idem, p. 2.

78 United Nations Framework Convention on Climate Change, (2015). Adoption of the Paris Agreement, 21 Conference of

- Incorporating human rights in climate policies and actions is known as a rights-based approach. Integrating a rights-based approach to local, national and international policies promotes policy coherence, legitimacy and sustainable outcomes.[79]

- Constitutional rights to a healthy environment has proved to have real advantages, including: raising the profile of environmental protection; providing a basis for the enactment of stronger environmental laws; helping provide a safety net to protect against gaps in statutory laws; and creating opportunities for better access to justice.[80]

- There are also international agreements that establish norms and rights relevant to climate change risks, such as the Universal Declaration of Human Rights, the International Covenant on Civil and Political Rights, and the International Covenant on Economic, Social and Cultural Rights.[81]

- Lack of resources (financial, human, technical and political) and failure to act in the face of preventable harm (starvation, drowning, diseases, displacement and death), reflects a lack of compassion, solidarity and commitment that must be addressed globally.[82]

- Human rights actors need a more robust, detailed, and coordinated inter-disciplinary approach that brings together law, climate science, labour rights, and economics to tackle issues around emissions, mitigation, social protection, and just transition head-on, and provide a path forward that States can follow.[83]

- In 2021, the Human Rights Council emphasized the Guiding Principles on Business and Human Rights, which underscore the responsibility of all business enterprises to respect human rights, including the rights to life, liberty and security of human rights defenders working in environmental matters, referred to as environmental human rights defenders.[84]

the Parties, Paris: United Nations. https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf

79 Knox, J., (2016). Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment. In: Report to the 31st session of the UN Human Rights Council. p. 20. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2729611

80 Knox, J., (2018). Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment. https://ap.ohchr.org/documents/dpage_e.aspx?si=A/HRC/37/58

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83 United Nations Human Rights Council, (2019), Climate change and poverty: Report of the Special Rapporteur on extreme poverty and human rights, Section D.5.iii.74. https://www.ohchr.org/Documents/Issues/Poverty/A_HRC_41_39.pdf

84 United Nations Human Rights Council, (2021), The human right to a clean, healthy and sustainable environment, p.2, para.7. https://undocs.org/a/hrc/48/l.23/rev.1.

The Healthier World Case

A healthier world vision is often forgotten in fearful narratives of climate change, yet it is arguably the most powerful motivator for change.

- Transforming fear, anger, and confusion into compassion, clarity, and hope will inspire environmental action.[85]

- The Sustainable Development Goals (SDGs) call for transformative policies to deliver on our collective promise to build a life of dignity for all on a cleaner, greener planet.[86]

- Prompt action on climate mitigation and adaptation aligned with sustainable land management and sustainable development depending on the region could reduce the risk to millions of people from climate extremes, desertification, land degradation and food and livelihood insecurity.[87]

- The solutions to the negative effects of climate change are also the paths to a safer, healthier, cleaner and more prosperous future for all. However, for such a future to become reality, citizens in all countries, at all levels of government, society and enterprise, need to understand and be involved.[88]

- Many adaptation actions generate significant additional economic, social, and environmental benefits, which accrue on an ongoing basis starting at the time of investment and are not dependent on the future state of the climate. In other words, they are both more certain and more immediate.[89]

- Harnessing climate change actions for health benefits can play a transformative role in the climate debate—strengthening public and policymaker will for action.[90]

- Currently, 25-30% of total food produced is lost or wasted. These factors are associated with additional GHG emissions. Changes in consumption patterns have

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86 United Nations Department of Economic and Social Affairs, (2016). 'New UN report: Inequalities cause and exacerbate climate impacts on poor and vulnerable people', New York, 3 October. https://www.un.org/development/desa/en/news/policy/wess-2016.html

87 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 40-41, D3.1. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

88 Paas, L., (2016). Action for Climate Empowerment: Guidelines for accelerating solutions through education, training and public awareness. Paris, France: UNESCO and UNFCCC, p. 2. http://unesdoc.unesco.org/images/0024/002464/246435e.pdf

89 Global Commission on Adaptation, (2019), Adapt Now: A Global Call for Leadership on Climate Resilience, p. 4. https://cdn.gca.org/assets/2019-09/GlobalCommission_Report_FINAL.pdf

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contributed to about 2 billion adults now being overweight or obese. An estimated 821 million people are still undernourished.[91]

- Balanced diets, featuring plant-based foods, such as those based on coarse grains, legumes, fruits and vegetables, nuts and seeds, and animal-sourced food produced in resilient, sustainable and low-GHG emission systems, present major opportunities for adaptation and mitigation while generating significant co-benefits in terms of human health.[92]

- There are huge opportunities for near-term, rapid, and deep reductions today at little to modest cost, such as improving energy efficiency, encouraging low-carbon behaviors, and continued deployment of renewable energy technologies.[93]

- Efficient cookstoves improve health especially for Indigenous and poor rural communities.[94]

- Household energy efficiency has positive health impacts on children's respiratory health, weight, and susceptibility to illness, and the mental health of adults. Household energy efficiency improves winter warmth, lowers relative humidity with benefits for cardiovascular and respiratory health.[95]

- Isolated, stressful, consumer-focused lifestyles can be replaced by a sense of connection with community and nature, delivering enormous benefits in physical and psychological well-being.[96]

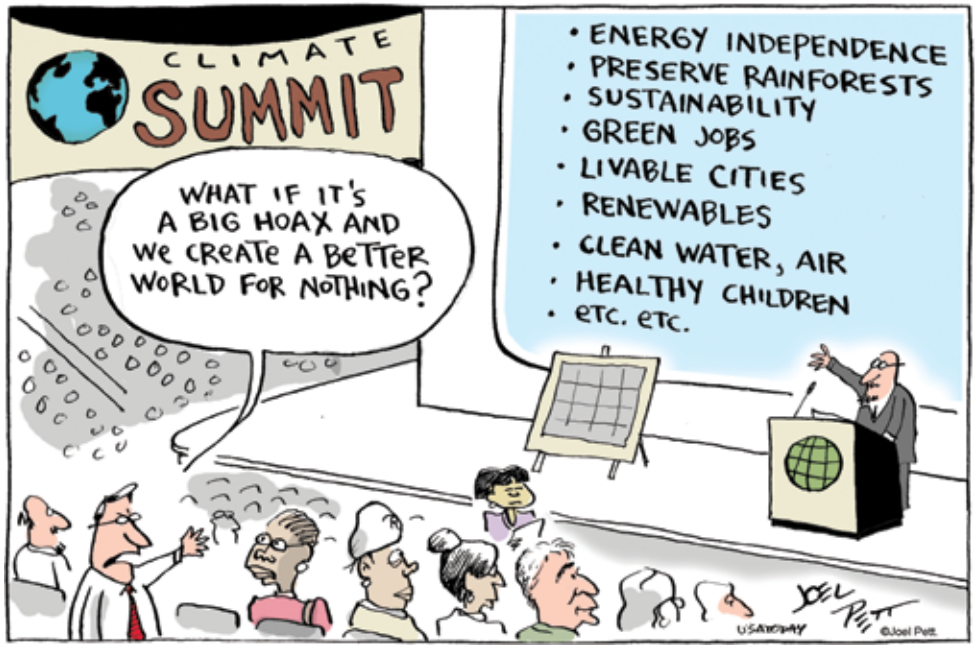
- Changing our approach to the production and ownership of energy—who generates it, and who profits—could have many wider benefits, including that communities could benefit financially from local renewable energy projects.[97]

- Limiting warming to 1.5°C will make it markedly easier to achieve the SDGs for poverty eradication, water access, safe cities, food security, healthy lives, and inclusive economic growth, and will help to protect terrestrial ecosystems and biodiversity.[98]

- An alternative to the industrial agricultural model, agroecology has been promoted as a means of mitigating the environmental impacts of food production (including GHG emissions), while at the same time enhancing famers' ability to adapt to changing growing conditions.[99]

- Land restoration and rehabilitation measures improve livelihood systems and provide both short-term positive economic returns and longer-term benefits in terms of climate change adaptation and mitigation, biodiversity and enhanced ecosystem functions and services .[101]

- Experience to date – for example, in responding to sea level rise, water-related risks in some high mountains, and climate change risks in the Arctic – also reveal the enabling influence of taking a long-term perspective when making short-term decisions, explicitly accounting for uncertainty of context-specific risks beyond 2050, and building governance capabilities to tackle complex risks.[102]



Joel Pett (2009) [100]

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92 Idem, p. 26, B6.2.

93 Anderson, K., Peters, Glen., (2016). The trouble with negative emissions. Science, 354: 6309, p. 182-183. http://smartstones.nl/wp-content/uploads/2016/12/Kevin-Anderson-2016.10.13-the-Trouble-with-Negative-Emissions-Science-2016.pdf

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95 Ibid.

96 Centre for Alternative Technology, (2017). Zero Carbon Britain: Making It Happen, Powys: Allan Shepherd. p. 267. http://www.zerocarbonbritain.org/images/pdfs/ZeroCarbonBritain-MakingItHappen.pdf

97 Idem, p. 226 and 229.

98 IPCC, (2018). Chapter 5: Sustainable Development, Poverty Eradication and Reducing Inequalities In: Special Report on Global Warming of 1.5C p. 5-12. Subject to copy edit. http://report.ipcc.ch/sr15/pdf/sr15_chapter5.pdf.

99 Smith, C., Elliott, D., and Bragdon, S.H., (2015). Realizing the right to food in an era of climate change. Geneva: Quaker United Nations Office. p. 14. http://quno.org/sites/default/files/resources/Realizing the right to food in an era of climate change.pdf

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101 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 40, D2.2. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

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The Peace and Conflict Cases

What relationship are we seeing between climate change and violent conflict?

- Climate change is a direct threat in itself and a multiplier of many other threats, from poverty to displacement to conflict.[103] "It is no coincidence that seventy per cent of the most climate vulnerable countries are also among the most politically and economically fragile." (United Nations Secretary-General Antonio Guterres, 2020). [104]

- The best way to diminish the threats posed by the compound climate-fragility risks is to mitigate climate change.[105]

- "Reducing greenhouse gases as rapidly as possible is probably the most urgent global disaster risk treatments. It is core to achieving the global targets in the Sendai Framework and of course to the Paris Agreement and the Sustainable Development Goals more broadly."—(Robert Glasser, UNISDR, 2017)[106]

- The proper goal of security should be grounded in the wellbeing of people in their social and ecological context, rather than the interests of a nation state as determined by its elite.[107]

- World military expenditure is estimated to have reached $1822 billion in 2018, the highest level since the end of the cold war.[108]

How can we contribute to peacebuilding in an era of climate change?

- Conflict in itself is not negative. Conflict becomes destructive when root causes are not addressed, including a breakdown of communication among groups, damaging social relations and exacerbating tensions that can lead to violence.[109]

- Addressing conflict over resources constructively not only helps to prevent violence but can also facilitate wider social change, building sustainable peace by bridging divides and changing attitudes between groups.[110]

- Prevention of destructive conflict around natural resources, including escalation to violence, can be understood as a process of peacebuilding—creating the personal and institutional capacities needed to handle conflict constructively and addressing the root causes that lead to destructive conflict such as inequality and marginalization.[111]

- The extent to which these changes are likely to lead to destructive conflict will often depend on the capacity of individuals, communities and institutions to respond to them in a positive way.[112]

- For example, shifting distributions of fish stocks between governance jurisdictions will increase the risk of potential conflicts among fishery area users and authorities or between two different communities within the same country.[113]

- Coordination and complementarity between national and transboundary regional policies can support efforts to address risks to resource security and management, such as water and fisheries.[114]

What approaches are critical?

- **Rapid reduction of GHG emissions**: The best way to diminish the threats posed by climate-fragility risks is to mitigate climate change.[115]

- **Strong institutions**: Where institutions and governments are unable to manage the stress, or absorb the shocks of a changing climate, the risks to the stability of states and societies will increase.[116]

- **Rights-based approaches**: Local, national and international policies that include a rights-based approach promote policy coherence, legitimacy and sustainable outcomes.[117]

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104 Antonio Guterres, (2020). Address at Columbia University 'The State of The Planet,' 02 December 2020. https://www.un.org/sites/un2.un.org/files/sgspeech-the-state-of-planet.pdf

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111 Idem, p. 26.

112 Idem, p. 7.

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115 Rüttinger, L., Smith, D., Stang, G., Tänzler, D., and Vivekananda, J., (2015). A New Climate For Peace: Taking Action on Climate and Fragility Risks. adelphi, International Alert, Woodrow Wilson International Center for Scholars, European Union Institute for Security Studies. p. xi. https://www.newclimateforpeace.org/sites/default/files/NewClimateForPeace_FullReport_small_0.pdf

116 Idem, p. vii.

117 Elliott, D., and Cook, L. F., (2016). Climate justice and the use of human rights law in reducing greenhouse gas emissions. Geneva: Quaker United Nations Office. p. 8. https://quno.org/sites/default/files/resources/Climate Justice_August_2016.pdf

The Gender Case

The gender gap

- Climate change affects everyone. However, women and men may experience the impacts of climate change differently, with women often disproportionately affected.[118]

- This is because women, compared to men, often have limited access to resources, less access to justice, limited mobility, and limited voice in shaping decisions and in influencing policy.[119]

- Women tend to be poorer than men and experience higher poverty rates than men with the same characteristics.[120]

- Poor women in developing countries are often the most vulnerable[121] to climate impacts, with women and children 14 times more likely to die during natural disasters.[122]

- Women, on average, make up 43%[123] of the agricultural labor force in developing countries, and around 50% in sub-Saharan Africa.[124]

- The impact of a storm, flood, drought or earthquake is more than twice as significant for poor people than anyone else. The poorest people are more likely to live in fragile housing in disaster-prone areas, and work in sectors susceptible to extreme weather events, like farming and agriculture.[125]

- Informal sector jobs are often the worst hit—and slowest to recover—when disasters strike. A disproportionately large number of women work in the informal sector.[126]

- Climate change is also likely to cause an increase in health problems in affected societies, due to disruptions to food and water supplies as well as an increase in chances of a natural disaster.[127] It is likely that women's unpaid care work will increase further as climate change symptoms worsen.[128]

What can we do?

- Efforts to reduce poverty and gender inequalities, and to enhance food, health and water security can reduce vulnerability to climate change.[129]

- A wealth of research over the last twenty years has demonstrated that policies and interventions accounting for gender differences have a better chance of sustained and successful impact.[130]

- Building effective responses to climate change requires an understanding of how gender equality affects access to, and control of, institutional structures; social, cultural and formal networks; and decision-making processes.[131]

- Policies that can address land rights and barriers to women's participation in sustainable land management include financial transfers to women under the auspices of antipoverty programmes, spending on health, education, training and capacity building for women, subsidised credit and program dissemination through existing women's community-based organisations.[132]

- At COP23 in 2017, the first UN Climate Gender Action Plan was adopted, to highlight the role of women in climate action and advance gender-responsive climate policy work. [133]

- In March 2018, the Committee on the Elimination of Discrimination Against Women adopted the first general recommendation by a human rights treaty-body that focused on disaster risk reduction and climate change and the disproportionate impact these issues will have on women and girls.[134]

118 Capacity Building Initiative (ecbi), (2017). Pocket Guide to Gender Equality Under the UNFCCC, p. 3. https://wedo.org/wp-content/uploads/2017/11/2018-Edition-of-Pocket-Guide-to-Gender_1.pdf

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131 Ibid.

132 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 35, C4.4. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

133 United Nations Framework Convention on Climate Change (UNFCCC), (2016). Decision 21/CP.22 - Gender and Climate Change, p. 19, para 27. https://unfccc.int/files/gender_and_climate_change/application/pdf/pages_17-20_from_10a02.pdf

134 Committee on the Elimination of Discrimination against Women (CEDAW), (2018). Sixty-ninth session: Statement of the Committee on the Elimination of Discrimination against Women on gender related dimensions of disaster risk reduction in the context of climate change. Office of the United Nations High Commissioner for Human Rights. https://www.ohchr.org/Documents/HRBodies/CEDAW/Statements/StatementGR_DRRCC.pdf

The Poverty Case

- Poverty is not a solely economic issue. It is characterized by "the sustained or chronic deprivation of the resources, capabilities, choices, security and power necessary for the enjoyment of an adequate standard of living and other civil, cultural, economic, political and social rights." [135]

- Climate change will exacerbate existing inequities by widening the gap between people with wealth and people living in poverty, adding to gender inequities, and increasing the already unfair burden on future generations.[136]

- Climate change could lead to significant impacts on extreme poverty by 2030.[137] Extreme poverty is characterized by a combination of income poverty, human development poverty and social exclusion, for it is both a cause and a consequence of human rights violations.[138]

- The urban poor, and particularly those in informal settlements, are uniquely vulnerable. They are the most likely to live in low-lying areas, on steep slopes, in ravines, and in other risk prone areas. The quality of their housing is poorest and least resistant to extreme weather events. They lack the resources, and often the information, to respond in ways to mitigate their increasingly precarious situations.[139]

- In countries where decades-long deforestation caused extensive soil erosion, such as in Haiti, poor neighborhoods suffered the most from landslides that destroyed their homes built on the hillsides when many hurricanes occurred in the same year 2008.[140]

- People with highest exposure and vulnerability to current and future hazards from ocean and cryosphere changes are often also those with lowest adaptive capacity, particularly in low-lying islands and coasts, Arctic and high mountain regions with development challenges.[141]

135 UN ECOSOC (2001), Statement by the Committee on Economic, Social and Cultural Rights (E/C.12/2001/10 para.8). https://www2.ohchr.org/english/bodies/cescr/docs/statements/E.C.12.2001.10Poverty-2001.pdf

136 Global Commission on Adaptation, (2019), Adapt Now: A Global Call for Leadership on Climate Resilience, p. 11. https://cdn.gca.org/assets/2019-09/GlobalCommission_Report_FINAL.pdf

137 IPCC, (2018). Chapter 5: Sustainable Development, Poverty Eradication and Reducing Inequalities In: Special Report on Global Warming of 1.5C p. 5-10. Subject to copy edit. http://report.ipcc.ch/sr15/pdf/sr15_chapter5.pdf

138 UN Human Rights Council (2008) Reference A/HRC/7/15, para.18. https://www.ohchr.org/Documents/Publications/OHCHR_ExtremePovertyandHumanRights_EN.pdf

139 International Housing Coalition, (2011), Adapting to Climate Change: Cities and the Urban Poor, p. 1. https://ihcglobal.org/wp-content/uploads/2016/04/Climate-Change-and-the-Urban-Poor.pdf

140 ATD Fourth World (2014). Participatory research evaluating the MDGs from the viewpoint of people living in extreme poverty. Challenge 2015: Towards Sustainable Development that Leaves No One Behind, p. 58. http://www.atd-fourthworld.org/challenge-20153588/

141 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 35, C1.4. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

What can we do?

- The Paris Agreement recognizes the impacts of measures taken in response to climate change; the Agreement emphasizes their relationship with equitable access to sustainable development and eradication of poverty.[142]

- The adoption of sustainable land management and poverty eradication can be enabled by improving access to markets, securing land tenure, factoring environmental costs into food, making payments for ecosystem services, and enhancing local and community collective action.[143]

- Land policies (including recognition of customary tenure, community mapping, redistribution, decentralisation, co-management, regulation of rental markets) can provide both security and flexibility in response to climate change.[144]

- Green Economy policies, however, can entail complex social impacts and when these are overlooked, the costs fall on poor and marginal social groups.[145]

- It is imperative that 'clean energy' programmes prioritize the most vulnerable communities and make sure that people living in poverty benefit from training and job creation in the context of transitioning to a 'Green Economy'.[146]

- Effective policy actions that "leave no one behind" include: [147]

- **Involve** those in poverty in determining prevention, adaptation or mitigation strategies.

- **Ensure** that people living in poverty have access to better energy and technology options, and to new scientific developments and products that can improve their living standard

- **Design** policies which avoid or lower adverse impacts of climate projects on people living in extreme poverty and their communities.

142 UNFCCC (2015) Preamble of the Paris Agreement on Climate Change. https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf

143 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 32, C2. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

144 Idem, p. 31, C1.2.

145 Raworth, K., Wykes, S, and Bass, S. (2014). Securing social justice in green economies: a review and ten considerations for policymakers. IIED Issue Paper p. 4. http://pubs.iied.org/pdfs/16578IIED.pdf

146 ATD Fourth World (2015). Five Climate Change Solutions that-Leave No One Behind, p. 7. https://www.atd-fourthworld.org/wp-content/uploads/sites/5/2015/09/MemoATDClimateChange25Sept15-v2.pdf

147 ATD Fourth World and Franciscans International (2015). Making Human Rights Work for People Living in Extreme Poverty. p. 41-42. http://www.atd-fourthworld.org/wp-content/uploads/sites/5/2015/05/2015-09-01-GuidingPrinpIsEPHR-HANDBOOK-EN-ATD_FI_Handbook_English_WEB-1.pdf

The Environmental Discrimination Case

How do inequalities magnify suffering in climate change?

- People with the highest exposure and vulnerability are often those with lowest capacity to respond.[148]

- On a national or local level, those people who are most vulnerable to the adverse environmental and health consequences of climate change include poor people, members of minority groups, women, children, older people, indigenous peoples, people with chronic diseases and disabilities, those residing in areas with a high prevalence of climate-related diseases, and workers exposed to extreme heat or increased weather variability.[149]

- Climate change and climate variability worsen existing (levels of) poverty and exacerbate inequalities, especially for those disadvantaged by gender, age, race, class, caste, Indigeneity and (dis)ability. [150]

- Long-standing configurations of power and privilege result in the poorest and most vulnerable people facing the greatest risks from climate change. Ethnic and racial minorities are overrepresented among these populations, and are disproportionately impacted by pollution and extreme weather events, both globally and within individual countries.[151]

- Vulnerable communities in coral reef environments, urban atoll islands and low-lying Arctic locations are approaching high to very high risks from sea level rise well before the end of this century in (the) case of high emissions scenarios.[152]

- Indigenous people are especially vulnerable to the adverse consequences of climate change, in part because their lives are closely tied to the natural environment.[153]

- Environmental consequences of climate change can affect the physical well-being of Indigenous people, such as their ability to obtain adequate food, water, and shelter, but also their spiritual well-being, in part because land is often an integral part of their culture and spiritual identity.[154]

- Years after Hurricane Katrina, thousands of low-income families in New Orleans still cannot find adequate housing. While the affluent and tourist areas of the city have been rebuilt, the traditionally under-resourced neighborhoods have not.[155]

What can we do?

- The fundamental societal and systemic changes to achieve sustainable development, eradicate poverty and reduce inequalities while limiting warming to 1.5°C would require a set of institutional, social, cultural, economic and technological conditions to be met.[156]

- Prioritizing measures to address social vulnerability and equity underpins efforts to promote fair and just climate resilience and sustainable development, and can be helped by creating safe community settings for meaningful public participation, deliberation and conflict resolution.[157]

148 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 34, C1. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

149 Levy, B.S., Patz, J.A., (2015). Climate Change, Human Rights, and Social Justice. Annals of Global Health. 81, 3, p. 310-322. https://www.sciencedirect.com/science/article/pii/S2214999615012242

150 IPCC, (2018). Chapter 5: Sustainable Development, Poverty Eradication and Reducing Inequalities In: Special Report on Global Warming of 1.5C p. 10. Subject to copy edit. http://report.ipcc.ch/sr15/pdf/sr15_chapter5.pdf

151 Krause, D., and Yomoah, D.A., (2018). Environmental Justice in the United States – What's Missing? UNRISD Blogs and Think Pieces. http://www.unrisd.org/80256B3C005BE6B5/search/83877A520A40C5F7C1258256005235AF?OpenDocument&newstype=viewpoint

152 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 32, B9.2. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

153 Levy, B.S., Patz, J.A., (2015). Climate Change, Human Rights, and Social Justice. Annals of Global Health. 81, 3, p. 310-322. https://www.sciencedirect.com/science/article/pii/S2214999615012242

154 Ibid.

155 Olson M.G., Stornelli K., Victoire Marie., (2012). Not Meant to Live Like This – Weathering the Storm of Our Lives in New Orleans. ATD Fourth World Publications. https://4thworldmovement.org/publications_wp/not-meant-to-live-like-this/

156 IPCC, (2018). Chapter 5: Sustainable Development, Poverty Eradication and Reducing Inequalities In: Special Report on Global Warming of 1.5C p. 6. Subject to copy edit. http://report.ipcc.ch/sr15/pdf/sr15_chapter5.pdf

157 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 42, C4.6. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

Lakka, Sierra Leone, Africa. (flickr / Eduardo Fonseca Arraes)

The Civil Society Case

Partnerships between governments and civil society can lead to successful climate action.

- Civil society is to a great extent the only reliable motor for driving institutions to change at the pace required.[158]

- Working with civil society can result in government policies better meeting the needs of the general population, meaning these policies have more legitimacy and support from citizens. [159] [160]

- The effectiveness of decision-making and governance is enhanced by the involvement of local stakeholders (particularly those most vulnerable to climate change including Indigenous peoples and local communities, women, and the poor and marginalised) in the selection, evaluation, implementation and monitoring of policy instruments for land-based climate change adaptation and mitigation.[161]

- It is critical that climate policies are of benefit to the local communities, in order for them to help implement, support and ultimately ensure success of those actions.[162]

- Community involvement in decision-making around natural resources is key to building peaceful, equitable and effective management. To make this involvement possible, the power dynamics between local communities and higher-level decision makers, as well as the dynamics between and within communities, need to be recognized and addressed.[163]

- When civil society groups and local communities are not able to have a voice in resource management or hold decision makers accountable, implementation of good policy frameworks often remains limited. This can result in management rules and practices that are unclear, contradictory or perceived as illegitimate by certain groups.[164]

158 IPCC, (2018). Chapter 4: Strengthening and Implementing the Global Response. In: Special Report on Global Warming of 1.5C (6 October 2018 final, subject to Copy Edit), p. 352. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_Chapter4_Low_Res.pdf

159 Rietig, K., (2018). The Links Among Contested Knowledge, Beliefs, and Learning in European Climate Governance: From Consensus to Conflict in Reforming Biofuels Policy. Policy Studies Journal. 46, 1. p. 137-159. https://onlinelibrary.wiley.com/doi/full/10.1111/psj.12169

160 Weible, C. M., (2008). Expert-based information and policy subsystems: A review and synthesis. Policy Studies Journal. 36, 4. p. 615–635. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1541-0072.2008.00287.x

161 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 34, C4. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

162 Younger, P.L., (2007). Pro-poor Water Technologies Working both Ways: Lessons From a Two-way, South-North Interchange. Geoforum. 38, 5. p. 828-840. https://www.sciencedirect.com/science/article/pii/S0016718506001291

163 Roberts, E. and Finnegan, L., (2013). Building Peace around water, land and food: Policy and practice for preventing conflict, Quaker United Nations Office, Geneva. p. 26. https://quno.org/sites/default/files/resources/QUNO (2013) Building peace around water land and food.pdf

164 Idem, p. 4.

Environmental activists march in Washington, D.C. (Greenpeace / Amanda J. Mason)

- Environmental NGOs often have greater capacity than governments on areas of compliance and concerns. Also, the NGO network across sectors can facilitate implementation and can increase support for a policy.[165]

- Public health policies to improve nutrition, such as increasing the diversity of food sources in public procurement, health insurance, financial incentives, and awareness-raising campaigns, can potentially influence food demand, reduce healthcare costs, contribute to lower GHG emissions and enhance adaptive capacity.[166]

- Land restoration and rehabilitation efforts can be more effective when policies support local management of natural resources, while strengthening cooperation between actors and institutions, including at the international level.[167]

- Terrestrial and marine habitat restoration, and ecosystem management tools…are most successful when they are community-supported, are science-based whilst also using local knowledge and Indigenous knowledge, have long-term support that includes the reduction or removal of nonclimatic stressors, and under the lowest levels of warming.[168]

- Promotion of climate literacy and drawing on local, Indigenous and scientific knowledge systems enables public awareness, understanding and social learning about locality specific risk and response potential.[169]

165 Bomberg, E., (2007). Policy Learning in an Enlarged European Union: Environmental NGOs and New Policy Instruments. Journal of European Public Policy. 14, 2. p. 248-268. https://www.tandfonline.com/doi/abs/10.1080/13501760601122522

166 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 33, C2.4. https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

167 Idem, p. 32, C2.1.

168 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 35, C2.2. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

169 IPCC (2019), Summary for Policy Makers. In: Special Report on the Ocean and Cryosphere in a Changing Climate, p. 42, C4.4. https://report.ipcc.ch/srocc/pdf/SROCC_SPM_Approved.pdf

The Ethical Case

- "Future generations will never forgive us if we miss the opportunity to protect our common home. We have inherited a garden: we must not leave a desert to our children." (Head of the COP26 conference - Alok Sharma, 2021)[170]

- We can be the first generation to succeed in ending poverty; just as we are the last to have a chance of saving the planet…The future of humanity and of our planet lies in our hands…We have mapped the road to sustainable development; it will be for all of us to ensure that the journey is irreversible.[171]

- The poorest half of the world's population—3.5 billion people—is responsible for just 10% of carbon emissions, while the richest 10% are responsible for a full half. A person in the wealthiest 1% uses 175 times more carbon than one in the bottom 10%.[172]

- We know our human activities and behaviors are driving current climate change, so we have an ethical duty, or moral obligation, to act urgently to protect all living species from a rate of global temperature rise that would lead to profound suffering and loss, transforming the environment and human civilization as we know it.[173]

- Many polluting activities may appear financially lucrative, but they are destroying the ability of our children and all future generations...to live on this Earth.[174]

- "Excessive pollution from fossil fuels threatens to destroy the gifts bestowed on us by God – gifts such as a functioning climate, healthy air to breathe, regular seasons, and living oceans. But our attitude to these gifts has been short-sighted, and we have abused them. What will future generations say of us, who leave them a degraded planet as our legacy?"[175]

- This challenge is a call to conscience, recognizing a personal and collective responsibility to ensure the poorest and most vulnerable peoples now, and all our future generations, do not suffer because of our actions.[176]

- Several Indigenous world views state that true human well-being depends on the quality of our connection to the Earth and our attitude towards our relationship with nature.[177]

- It is not enough, however, to think of different species merely as potential "resources" to be exploited, while overlooking the fact that they have value in themselves. Each year sees the disappearance of thousands of plant and animal species which we will never know, which our children will never see, because they have been lost forever. The great majority become extinct for reasons related to human activity. Because of us, thousands of species will no longer give glory to God by their very existence, nor convey their message to us. We have no such right.[178]

- "The deep psychic change needed to withdraw us from the fascination of the industrial world, and the deceptive gifts that it gives us, is too difficult for simply the avoidance of its difficulties or the attractions of its benefits. Eventually only our sense of the sacred will save us."—*(Thomas Berry, 2003, UNEP)*[179]

- All countries have a responsibility to spend more money on environmental programmes rather than on military programmes.[180]

- Whatever we do, whatever place we are in, we should ask first not what shall I do, but what does this place, what does this Earth require of me? In other words, we are called not simply to action, but to service. [181]

170 Alok Sharma, (2021), Meeting on "Faith and Science: Towards COP26," promoted by the Embassies of Great Britain and Italy to the Holy See, together with the Holy See, 04 October 2021. https://press.vatican.va/content/salastampa/en/bollettino/pubblico/2021/10/04/211004f.html.

171 UN General Assembly, (2015). Transforming our world: the 2030 Agenda for Sustainable Development. 21 October 2015, A/RES/70/1, paragraphs 45 and 48. https://sustainabledevelopment.un.org/post2015/transformingourworld

172 United Nations Human Rights Council, (2019), Climate change and poverty: Report of the Special Rapporteur on extreme poverty and human rights, Section III.C.14. https://www.ohchr.org/Documents/Issues/Poverty/A_HRC_41_39.pdf

173 UNFCCC side event (2017). A Negotiator's tool-kit: a range of powerful arguments to engage with busy Ministries on clear and concise reasons for urgent climate action. 8 May 2017. 11 minutes 26 seconds. [online video]. https://drive.google.com/file/d/0B3c9HJGvfPsAczRyVmd0emVMTGM/view

174 Franciscans International and Brahma Kumaris, (2017). Joint Oral Statement at 36th Session of the UN Human Rights Council Agenda, Item 4: General Debate. 19 September 2017. https://franciscansinternational.org/fileadmin/media/2017/Global/UN_Work/2017.09.19_Oral_Statement_CC_and_HR.pdf

175 IFEES, (2015), The Islamic Declaration on Global Climate Change, Preamble, 1.3. http://www.ifees.org.uk/wp-content/uploads/2016/10/climate_declarationmMWB.pdf

176 Michaelis, L., and Cook, L.F., (2014). Call to Conscience. Geneva: Quaker United Nations Office. http://quno.org/sites/default/files/resources/QUNO%20Call%20to%20Conscience.pdf

177 Four Arrows (aka Donald Trent Jacobs), (2016). Point of Departure: Returning to Our More Authentic Worldview for Education and Survival. Charlotte, NC: Information Age Publishing Inc.

178 Pope Francis, (2015), Encyclical Letter Laudato Si, Vatican Press, para 33. http://w2.vatican.va/content/dam/francesco/pdf/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si_en.pdf

179 Berry, T. (2003). Prosperity: Transform societies to have sustained, inclusive and sustainable economic growth, and sustainable lifestyle. In: Environment, Religion and Culture in the Context of the 2030 Agenda for Sustainable Development (2016). United Nations Environment Programme, Nairobi, p. 27. http://fore.yale.edu/files/Environment_Religion_and_Culture_in_the_Context_of_2030_Agenda.pdf

180 Yang, T., (2010), "Towards an Egalitarian, Global Environmental Ethics", in Environmental Ethics and International Policy, Ten Have, H. A. M. J. (editor), UNESCO, p. 41. http://publishing.unesco.org/chapters/978-92-3-104039-9.pdf

181 Spirit of Humanity Forum. (2017). Climate Action – the Ethical Perspective. https://www.sohforum.org/2017/07/06/climate-action-ethical-perspective/

What We Can Do

Almost all the solutions here lead to regenerative economic outcomes that create security, produce jobs, improve health, save money, facilitate mobility, eliminate hunger, prevent pollution, restore soil, clean rivers, and more.[182] *The most effective short and long-term climate actions include:*

- Sustainable economic and development models[183]
- Rapid reduction of fossil fuel extraction and combustion[184]
- Deep reductions in emissions of methane and black carbon[185]
- Energy efficiency[186]
- Refrigerant management[187]
- Onshore wind turbines[188]
- Rooftop solar[189]
- Solar farms[190]
- Educating girls[191]
- Family planning[192]
- Clean cooking stoves[193]
- Offshore wind turbines[194]
- Protection of peatland areas[195]
- Sustainable transport[196]
- Tropical staple tree regeneration[197]
- Reduced food waste[198]
- A plant-rich diet[199]
- Sustainable afforestation[200]
- Reforestation[201]
- Sustainable agriculture practices[202]
- Sufficient climate finance[203]
- Restoration of tropical forests[204]
- Restoration of temperate forests[205]

182 Hawken, P., (2017). Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming. New York: Penguin Books. https://www.drawdown.org/

183 The Club de Madrid´s Environmental Sustainability and Shared Societies Working Group, (2017). A New Paradigm: For Sustainable Development? http://www.clubmadrid.org/es/wp-content/uploads/sites/2/2017/11/Shared_Societies-Report-13.pdf

184 IPCC, (2018). Summary for Policymakers. In: Special Report on Global Warming of 1.5C (6 October 2018 final, subject to Copy Edit), p. 16, SPM3b http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

185 Idem, p. 14 (C.1.2).

186 Idem, C.2.2.

187 Hawken, P., (2017). Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming. New York: Penguin Books, p. 164-65. https://www.drawdown.org/

188 Idem, p. 2-3.

189 Idem, p. 10-11.

190 Idem, p. 8-9.

191 Idem. p. 81.

192 Idem, p. 78-79.

193 Idem, p. 44-45.

194 Idem, p. 2-3.

195 Idem, p. 136-156.

196 Ibid.

197 Idem, p. 66-67.

198 IPCC, (2019), Summary for Policy Makers. In: Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, p. 21, B2.3, https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf

199 Idem, p. 26, B6.2.

200 Idem, p. 26, B7.

201 Ibid.

202 Idem, p. 24, B5.1 & p. 34, C4.1.

203 UNFCCC, (2019), The Heat is on: Taking Stock of Global Climate Ambition, p. 24. https://unfccc.int/sites/default/files/resource/NDC%20Outlook.pdf

204 Griscom, B.W., (2017). Natural climate solutions PNAS, 114 (44), p. 11646. http://www.pnas.org/content/pnas/114/44/11645.full.pdf

205 Ibid.

- Pathways limiting global warming to 1.5°C with no or limited overshoot would require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems.[206]

- In 1.5°C pathways with no or limited overshoot, renewables are projected to supply 70–85% of electricity in 2050.[207]

- Limiting warming to 1.5°C implies reaching net zero CO2 emissions globally around 2050 and concurrent deep reductions in emissions of non-CO2 forcers, particularly methane.[208]

- Renewable energies are competing with fossil fuel industries that are subsidized both directly (government incentives) and indirectly (no accountability for polluters).[209]

- Solutions are not solely technological, they are also ecological, economic and social [210] actions which can lead to regenerative economic outcomes.[211]

- Mitigation options limiting the demand for land include sustainable intensification of land use practices, ecosystem restoration and changes towards less resource-intensive (plant rich) diets.[212]

- Behavior, lifestyle and culture have a considerable influence on energy use and associated emissions, with high mitigation potential. Emissions can be substantially lowered through changes in consumption patterns, adoption of energy savings measures, dietary change and reduction in food wastes.[213]

- Dietary shifts could contribute one-fifth of the mitigation needed to hold warming below 2°C, with one-quarter of low-cost options.[214]

- Family planning and poverty reduction are linked to population stabilization.[215] The current world population of 7.7 billion is expected to reach 9.7 billion in 2050.[216]

206 IPCC, (2018). Summary for Policymakers. In: Special Report on Global Warming of 1.5C (6 October 2018 final, subject to Copy Edit), C.2 (SPM 3.A). http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

207 Idem, p. 17, C2.2.

208 IPCC, (2018). Underlying Chapter 2. In: Special Report on Global Warming of 1.5C (6 October 2018 final, subject to Copy Edit), p. 95 https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_Chapter2_Low_Res.pdf

209 Union of Concerned Scientists, (2017). Barriers to Renewable Energy Technologies. https://ucsusa.org/resources/barriers-renewable-energy-technologies

210 Hawken, P., (2017). Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming. New York: Penguin Books, p. ix. https://www.drawdown.org/

211 Idem, p. x.

212 IPCC, (2018). Summary for Policymakers. In: Special Report on Global Warming of 1.5C (6 October 2018 final, subject to Copy Edit), p. 18 (SPM C2.5). http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

213 IPCC, (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, p. 29. https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf

214 IPCC, (2018). Chapter 4: Strengthening and implementing the global response, in Special Report on Global Warming of 1.5C p. 4-23, http://report.ipcc.ch/sr15/pdf/sr15_chapter4.pdf

215 UNFPA, (2014). Family Planning and the Environment: Stabilizing Population Would Help Sustain the Planet, p. 23. http://onu.org.pe/wp-content/uploads/2014/12/Family-Planning-and-the-Environment.pdf

216 UN DESA, (2019). World Population Prospects 2019: Highlights. https://www.un.org/development/desa/publications/world-population-prospects-2019-highlights.html

- Education, information, and community approaches, including those that are informed by Indigenous knowledge and local knowledge, can accelerate the wide-scale behaviour changes consistent with adapting to and limiting global warming to 1.5°C.[217]

- The role of natural climate solutions have been underestimated.[218] Examples of response options with immediate impacts include the conservation of high-carbon ecosystems such as peatlands, wetlands, rangelands, mangroves and forests.[219]

- Many land-related responses that contribute to climate change adaptation and mitigation can also combat desertification and land degradation and enhance food security. These options include sustainable food production, improved and sustainable forest management, soil organic carbon management, ecosystem conservation and land restoration, reduced deforestation and degradation, and reduced food loss and waste.[220]

- Early warning systems for extreme weather and climate events are critical for protecting lives and property and enhancing disaster risk reduction and management.[221]

- Delaying action as is assumed in high emissions scenarios could result in some irreversible impacts on some ecosystems, which in the longer-term has the potential to lead to substantial additional GHG emissions from ecosystems that would accelerate global warming.[222]

- Changes in forest cover for example from afforestation, reforestation and deforestation, directly affect regional surface temperature through exchanges of water and energy. Where forest cover increases in tropical regions cooling results from enhanced evapotranspiration.[223]

- Depending on the farming and pastoral systems and level of development, reductions in the emissions intensity of livestock products may lead to absolute reductions in GHG emissions.[224] Livestock on managed pastures and rangelands accounted for more than one half of total anthropogenic nitrous oxide (N2O) emissions from agriculture in 2014.[225]

- Responses to sea-level rise and associated risk reduction present society with profound governance challenges. These challenges can be eased using locally appropriate combinations of decision analysis, land-use planning, public participation, diverse knowledge systems and conflict resolution approaches that are adjusted over time as circumstances change.[226]

- Ocean renewable energy can support climate change mitigation, and can comprise energy extraction from offshore winds, tides, waves, thermal and salinity gradient and algal biofuels. The emerging demand for alternative energy sources is expected to generate economic opportunities for the ocean renewable energy sector.[227]

- Increased government investment in clean energy—via subsidies, loan assistance, and research and development—is needed.[228]

When climate policy fails to address the root causes of climate change

- There is a danger that technological innovation today looks for solutions that help avoid the change needed. We need to change social, economic, political, institutional, and legal areas if we are to tackle the roots of the problems we face.[229]

- Negative emission technologies (NETs) may have a useful role to play but, on the basis or current information, not at the levels required to compensate for inadequate mitigation measures.[230] Relying on NETs to compensate for failures to adequately mitigate emissions may have serious implications for future generations.[231]

- Although bio-energy and carbon capture storage (BECCS) is subject to scientific and political uncertainties, it dominates the scenario landscape. Its land-use impacts could include terrestrial species losses equivalent to, at least, a 2.8°C temperature rise, leading to difficult trade-offs between biodiversity loss and temperature rise. There is little robust analysis of the trade-offs between large-scale deployment of BECCS (and all negative-emission technologies) and the SDGs.[232]

- Avoiding efforts to address the root causes of climate change, and focusing on end-of pipe geoengineering technologies, is a political choice. It says that it is more acceptable to risk irreparable harm to our planet than alter the dominant economic system.[233]

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