01

Climate Change, Carbon Cycles and Forests

Our surroundings are changing. The winds blow less, they blow more. Rain comes more frequently and with greater force than before, or it does not rain for far too long. Over the past 150-200 years, human activity has upset the fine balance in the complex web of relationships between the sun, the soil, the oceans, the rivers and other waterways, the forests and the countless lifeforms on Earth. Humans are part of these relationships, and we need them to function harmoniously. When they do not, the consequences can be devastating. Food fails to grow or is destroyed by floods or drought. Wells and rivers dry out. Animals, birds and insects cannot be found where they normally are. Because of this, people also increasingly have to move.[6] Scientists tell us this is happening because of **climate change** and say that the climate is changing because humans are letting too much carbon dioxide into the sky (often they use the word 'atmosphere' instead of 'sky').

Box 2: What is climate change?

Climate is the term used to describe weather patterns in a place over a long period of time. For example, many tropical climates are hot and humid with a lot of rainfall, while many temperate climates are cooler with cold winters.[7] Climate change refers to the changes in the world's climate patterns that we are experiencing and will continue to experience; for example, changes in how hot it is and how much it rains. These changes have serious impacts on life on Earth. The climate is changing because of human activity. In the past approximately 150-200 years, humans – especially large companies and governments in richer countries – have been extracting **fossil fuels** from the earth and burning them to run engines, create electricity or heat homes. This has led to the release of gases (often called **emissions)** that cause climate change. People and countries are not equally responsible for climate change. Over the past 170 years, the United States (US) and Europe have released almost half the total emissions that are responsible for climate change.[8] While indigenous peoples have contributed almost nothing to creating climate change, they are among the groups in the world that are most affected by it.[9]

What is carbon and what role does it play in climate change?

Carbon is a (chemical) element that is a very important building block of all living things on the planet. Plants, trees, animals and humans are made up of carbon. Carbon moves around between the land, the sky and the oceans and it takes on different forms. For example, when animals and people breathe, we let out some of the carbon we are made of into the sky in the form of a gas called **carbon dioxide** (or CO2). Usually when people talk about 'carbon' they are talking about carbon dioxide or CO2 specifically.

CO_2 is the main gas that is causing Earth to warm.[10] When it is in a gas form, we cannot see it. When plants and trees burn, they release CO_2 into the sky. But CO_2 is also absorbed from the sky and stored in plants, soils and oceans. For example, as plants and trees grow, they take back CO_2 from the sky and use it as food to get bigger. This circulation of carbon between the soil, the oceans and the sky is known as a **carbon cycle**, and when carbon circulates in these ways, it is known as a fast or short-term carbon cycle.[11]

When plants and animals on land and in the oceans die, some of the carbon they were made of is buried into the ground. Over millions of years, these once-living things are pushed deep into the earth's surface and some turn into oil, natural gas and coal. Together these are referred to as fossil fuels. Other carbon has over time become absorbed into rocks through other processes. It takes a really long time for these forms of carbon to naturally return to the atmosphere (it can happen, for example, through a volcanic eruption). This is known as the slow or long-term carbon cycle.[12]

When fossil fuels are extracted from the earth and burned – for example to generate electricity – and when forests are cut down – for example to make way for large-scale industrial agriculture – the carbon that had been stored underground or in the trees is released (emitted) into the sky. This is where the imbalance that creates climate change is coming from: all the extra CO_2 in the air makes it easier for the atmosphere to trap heat. There are other gases that also have this effect and the general term that is used to describe all of them is **greenhouse gases**.[13] The more greenhouse gases that are emitted into the atmosphere, the warmer Earth becomes. Even small changes in the average temperature on Earth can have huge impacts on the world around us.

What role does reducing CO_2 in the atmosphere play in addressing climate change?

Scientists that advise governments on how to fight climate change say that greenhouse gas emissions must be reduced – by a lot. This means that we must **stop releasing** greenhouse gases. Not burning fossil fuels will be very important in this effort.[14] Many scientists and governments also believe that even if countries manage to stop a lot of the gases from being released, it will still also be necessary to pull CO_2 back out of the atmosphere and store it somewhere else.[15] This is referred to as **carbon sequestration**. CO_2 can be naturally sequestered by plants or in soil. Humans can also force CO_2 to become trapped into rocks, soil and oceans through technologies, though many of these technologies are experimental and have not been tested for long-term effect.[16]

Forests play an important role in storing and sequestering carbon naturally, because of the way plants and trees absorb CO_2. Therefore, as a response to climate change, there are many efforts to protect forests (to make sure the carbon they store is not released by cutting down or burning trees) and plant more trees (so they can pull down and store CO_2 from the atmosphere). Often these efforts fall into the category of REDD+ (Reducing Emissions from Deforestation and Degradation - see Box 3 below).[e] It is vital to highlight that a growing body of research is confirming **that indigenous peoples are the actors that are best able to protect forests**.[17] Forests managed and customarily owned by indigenous peoples and other communities with customary tenure systems are generally in better health than forests under any other type of management.[18] Tenure security is an important condition that enables peoples and communities to challenge threats from external actors and to maintain respectful relationships with their lands, territories and forests, guided by their distinct cosmologies, livelihoods and traditional knowledge.

e Even though there are many other natural ecosystems that also store carbon, in these explainers we focus specifically on forests, how they link to carbon markets and potential implications for indigenous peoples.

Box 3: The link between REDD+, carbon markets and indigenous peoples

The term 'REDD+' is often used to describe a broad range of activities (such as projects, programmes, national strategies, and agreements between two or more governments) that have an objective of reducing greenhouse gas emissions from deforestation and forest degradation in exchange for financial support.[19] REDD+ is also sometimes used more narrowly to refer to the specific framework developed under the UN Framework Convention on Climate Change (UNFCCC) since the mid-2000s for how to include forests in strategies to address climate change.

A key part of the idea behind REDD+ is that 'developing countries' that protect their forests should be paid to do so. In 2013, countries that are parties to the UNFCCC agreed on systems and frameworks needed for forest countries to be able to receive payments for so-called REDD+ results.[20] Since then, certain governments have supported REDD+ activities in tropical forest countries directly and through international funds, such as the Green Climate Fund.[21] At the same time, within countries, smaller REDD+ projects run by private actors or NGOs have attracted money through the emerging 'voluntary carbon market' (voluntary carbon markets are discussed in Explainer 2).[22] Today, national level efforts, and efforts within specific districts and departments within countries, are also starting to access funding for REDD+ activities from private actors (like companies) and public actors (like governments) through the voluntary carbon market.[23] A framework and rules for an international carbon trading market regulated by the UN are also underway. However, it is still not clear whether and how REDD+ activities that seek to prevent or avoid emissions will be included in the UN market scheme (see Box 4 in Explainer 2).[24]

Indigenous peoples across the world report differently on whether they see REDD+ as a threat or an opportunity. Some highlight that REDD+ has opened up additional political space in national policy-making and catalysed land titling processes.[25] However, overall, 15 years of evidence from REDD+ 'readiness' and pilot programmes across Latin American, African and Asian tropical countries suggests that REDD+ protections for land rights and free prior and informed consent (FPIC) have often not been applied effectively.[26] Further, evidence suggests REDD+ activities have had limited success in preventing deforestation. [27]

The cycling of carbon

This graphic shows how carbon moves between sky, land and water. The carbon/CO2 is represented by the small bubbles. On the right hand side you see the generally naturally occurring carbon cycles (blue arrows). On the left hand side, a factory is burning fossil fuels which has been extracted from its long term storage under ground. This adds extra CO2 in the atmosphere that is not all absorbed in to the natural carbon cycles.

1. **When animals and people breathe, we let out some of the carbon we are made of into the sky in the form of CO2.**

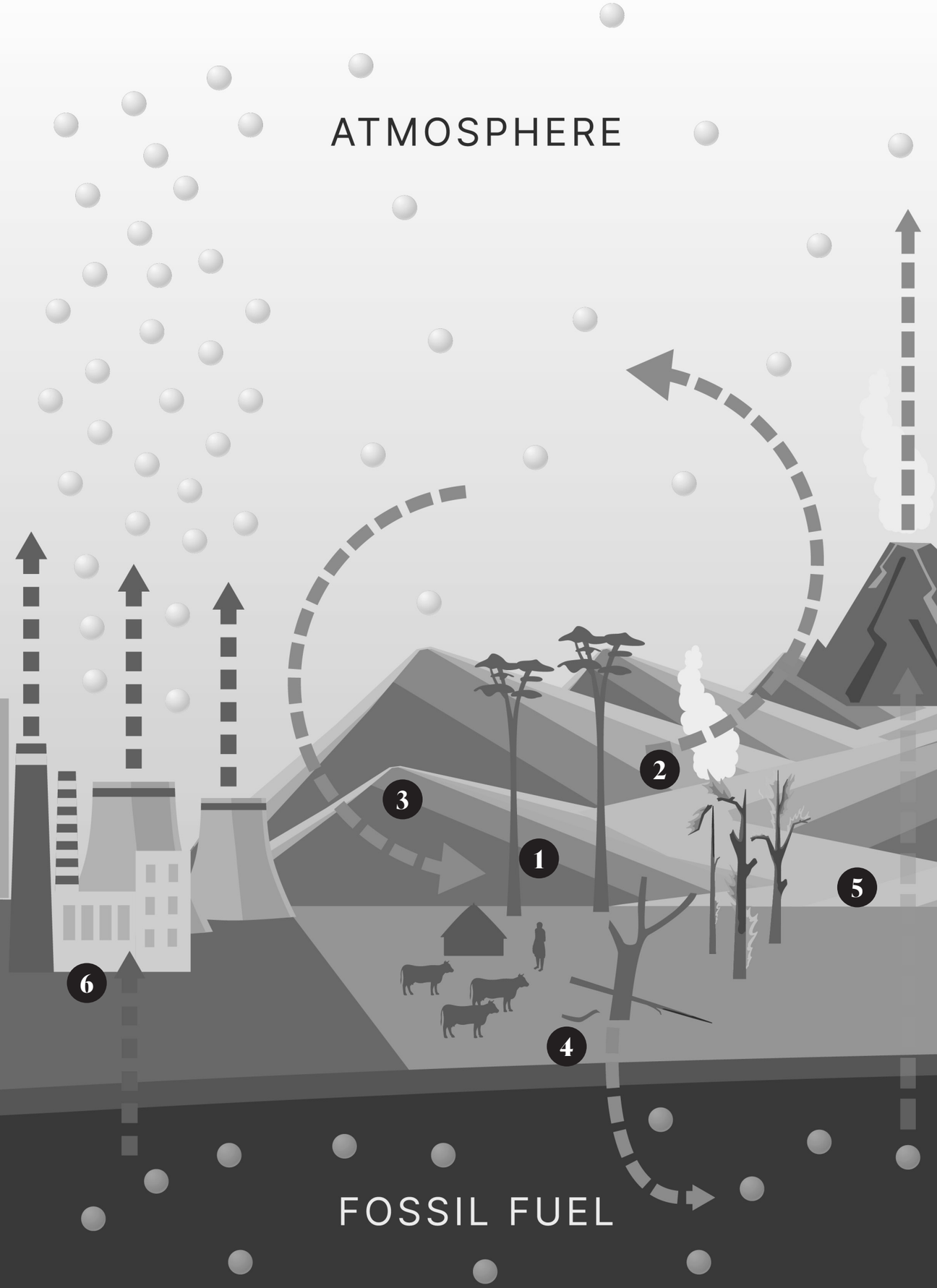
2. **When living things die, they let out some of the carbon they are made of. This happens also when trees and plants burn.**

3. **As plants and trees grow, they take back CO2 from the sky and use it as food to get bigger. When animals and people eat the plants they also incorporate the carbon.**

4. **When plants and animals on land and in the oceans die, some of the carbon they were made of is buried into the ground. Over millions of years, these once-living things are pushed deep into the earth's surface and some turn into oil, natural gas and coal.**

5. **It takes a really long time for these forms of carbon to naturally return to the atmosphere. It can happen, for example, through a volcanic eruption.**

6. **When fossil fuels are extracted from the earth and burned – for example to generate electricity – and when forests are cut down – for example to make way for large-scale industrial agriculture – the carbon that had been stored underground or in the trees is released (emitted) into the sky. This is where the imbalance that creates climate change is coming from: all the extra CO2 in the air makes it easier for the atmosphere to trap heat.**



Disclaimer: This depiction is a simplification of natural processes and is not intended as a scientifically accurate representation.

Further Resources:

- Asia Indigenous Peoples Pact. (2012, November). *Indigenous Peoples and REDD+* [Video]. https://vimeo.com/54351554
- World Meteorological Organisation. (2018, November). Carbon Cycle [Video]. https://www.youtube.com/watch?v=U7DbEeBXQBQ
- Friends of the Earth International. (2016, November) *Dirty energy is at the root of climate injustice* [Video]. https://www.youtube.com/watch?v=lOKvBF_4n4g

Endnotes

6 Abraham Lustgarten, "The Great Climate Migration," *New York Times*, July 23, 2020, https://www.nytimes.com/interactive/2020/07/23/magazine/climate-migration.html.

7 National Geographic, "All About Climate," accessed September 11, 2023, https://education.nationalgeographic.org/resource/all-about-climate/.

8 Hannah Ritchie, "Who has contributed most to global CO2 emissions?" *Our World in Data*, October 1, 2019, https://ourworldindata.org/contributed-most-global-co2.

9 United Nations (UN), "Indigenous Peoples Disproportionately Impacted by Climate Change, Systematically Targeted for Defending Freedoms, Speakers Tell Permanent Forum," Permanent Forum on Indigenous Issues, Seventeenth Session, 5th & 6th Meetings, April 18, 2018, https://press.un.org/en/2018/hr5389.doc.htm.

10 United States Environmental Protection Agency (EPA), "Overview of Greenhouse Gases," accessed September 11, 2023, https://www.epa.gov/ghgemissions/overview-greenhouse-gases.

11 Riebeek, Holli, "The Carbon Cycle," *NASA Earth Observatory*, June 16, 2011, https://earthobservatory.nasa.gov/features/CarbonCycle

12 Riebeek, "Carbon Cycle," 2011.

13 EPA, "Overview of Greenhouse Gases," accessed September 11, 2023, https://www.epa.gov/ghgemissions/overview-greenhouse-gases.

14 Intergovernmental Panel on Climate Change (IPCC), "The evidence is clear: the time for action is now. We can halve emissions by 2030," IPCC Newsroom, April 4, 2022, https://www.ipcc.ch/2022/04/04/ipcc-ar6-wgiii-pressrelease/.

15 See for e.g., World Resources Institute (WRI), "Closing the Emissions Gap: A Climate Action Roadmap for Limiting Warming to 1.5 Degrees C," October 26, 2022, https://www.wri.org/insights/climate-action-progress-1-5-degrees-c#:~:text=Limiting%20warming%20to%201.5%20degrees%20C%20will%20require%20dramatically%20reducing,as%20effectively%20halting%20peatland%20degradation; UNEP, "REDD+," accessed September 11, 2023, https://www.unep.org/explore-topics/climate-action/what-we-do/redd.

16 Center for International Environmental Law (CIEL), "Fuel to the Fire: How Geoengineering Threatens to Entrench Fossil Fuels and Accelerate the Climate Crisis," February 2019, https://www.ciel.org/wp-content/uploads/2019/02/CIEL_FUEL-TO-THE-FIRE_How-Geoengineering-Threatens-to-Entrench-Fossil-Fuels-and-Accelerate-the-Climate-Crisis_February-2019.pdf

17 Damian Carrington, "Indigenous peoples by far the best guardians of forests - UN Report," The Guardian, March 25, 2021, https://www.theguardian.com/environment/2021/mar/25/indigenous-peoples-by-far-the-best-guardians-of-forests-un-report.

18 Rainforest Alliance, "The World's Best Forest Guardians: Indigenous Peoples," August 4, 2022, https://www.rainforest-alliance.org/insights/indigenous-peoples-the-best-forest-guardians/

19 UN Framework Convention on Climate Change (UNFCCC), "What is REDD+:," accessed Sep 11, 2023, https://unfccc.int/topics/land-use/workstreams/redd/what-is-redd#:~:text='REDD'%20stands%20for%20'Reducing,enhancement%20of%20forest%20carbon%20stocks.

20 UN Environment Programme (UNEP), "REDD+," accessed September 11, 2023, https://www.unep.org/explore-topics/climate-action/what-we-do/redd

21 See for e.g., Organisation for Economic Co-operation and Development (OECD), "Norad Factsheet," accessed September 11, 2023, https://www.oecd.org/dac/evaluation/Norad-Factsheet-interactive-final.pdf; Nature Conservancy & Conservation International, "Eligibility Requirements for REDD+ Standards and Financing," May 2021, https://www.nature.org/content/dam/tnc/nature/en/documents/EligibilityRequirementsforREDDPlus_Financing_2021.pdf

22 See for e.g., Conservation International, "Why are carbon projects important," accessed September 11, 2023, https://www.conservation.org/projects/why-are-carbon-projects-important.

23 Nature Conservancy & Conservation International, "Eligibility Requirements for REDD+ Standards and Financing," May 2021, https://www.nature.org/content/dam/tnc/nature/en/documents/EligibilityRequirementsforREDDPlus_Financing_2021.pdf

24 Carbon Market Watch, "FAQ: Deciphering Article 6 of the Paris Agreement," accessed September 13, 2023, https://carbonmarketwatch.org/2021/12/10/faq-deciphering-article-6-of-the-paris-agreement/#article-6-running; private communications with authors.

25 Forest Peoples Programme (FPP), "Taking stock: a rapid review and critical analysis of UNFCCC COP26 outcomes and potential implications for indigenous peoples' rights," June 2022, p. 23, https://www.forestpeoples.org/sites/default/files/documents/Taking%20stock%20-%20a%20rapid%20review%20COP26.pdf.

26 FPP, "Taking stock," 2022. And see for e.g., Rainforest Foundation UK, "A critical analysis of the safeguards framework of the Mai Ndombe," PIREDD project, August 2017, https://www.rainforestfoundationuk.org/media.ashx/piredd-safeguards-rfuk-august-2017.pdf

27 Thales A. P. West et al., "Action needed to make carbon offsets from forest conservation work for climate change mitigation," *Science* 381, issue 6660 (August 24, 2023): 873-877, DOI: 10.1126/science.ade3535.