

PROJECT NATURE NEWSLETTER

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JANUARY, 2020 ISSUE

Events



Coffee, Cocoa & Birds

Blendon Woods Metro Park - Nature Center
18th & 19th January 10:00 am - 2:00 pm
Drop by and enjoy a steaming cup while watching birds at our viewing window

Top 10 Natives in Winter

Inniswood Metro Gardens - Innis House
18th January 10:00 am - 11:00 am
Learn about the top native plants in the winter landscape

47th Annual Winter Hike Series

Scioto Audobon Metro Park - Climbing Wall
18th January 10:00 am - 12:00 pm
Enjoy a 1- or 2-mile hike along the Greenway and park trails

Weekly Bird Hike

Scioto Audobon Metro Park - Grange Insurance Center
18th & 25th January 10:00 am - 11:30 am
Hike with experienced birders to find and learn about birds

Tracks & Signs

Blendon Woods Metro Park - Nature Center
19th January 2:00 pm - 3:00 pm
Hike 2 miles to search for some common animal tracks & signs

Teeth, Jaws & Claws

Battelle Darby Metro Park - Nature Center
19th January 1:00 pm - 2:00 pm
This talk looks at the tremendous diversity of theropods, carnivorous dinosaurs, and why scientists say birds are living dinosaurs

Backyard Birds Open House

Highbanks Metro Park - Nature Center
19th January 11:00 am - 1:00 pm
Enjoy the birds visiting the feeders, and learn how to tell them apart. We might see Pileated Woodpeckers, Blue Jays, sparrows, hawks, and more.

Off-Trail Raptor Hike

Glacier Ridge Metro Park - Shelter House
19th January 2:00 pm - 4:00 pm
Trek approximately 3 miles through parts of the park not usually seen and look for birds of prey

Insects in Winter

Blacklick Woods Metro Park - Nature Center
25th January 2:00 pm - 3:00 pm
Learn how insects survive in winter, then dig through leaf litter, turn over logs and shake tree branches to find some

Coffee, Cocoa & Birds

Blendon Woods Metro Park - Nature Center
25th & 26th January 10:00 am - 2:00 pm
Drop by and enjoy a steaming cup while watching birds at our viewing window

47th Annual Winter Hike Series

Clear Creek Metro Park - Thomas-Mathias Parking Lot
25th January 10:00 am - 1:00 pm
Enjoy a 1 or 3-mile self guided hike or choose from one of two guided 5-mile hikes

Bison: Behind the Scenes

Battelle Darby Metro Park - Nature Center
25th January 1:00 pm - 3:00 pm
See how park staff tend to our bison

Events



For Kids: Wildlife Signs & Hot Cocoa

Highbanks Metro Park - Nature Center

25th January 2:00 pm - 3:00 pm

Take a 1-mile hike looking for tracks and other evidence of animals. Warm up with hot cocoa afterwards in the nature center

Winter Tree ID

Battelle Darby Metro Park - Cedar Ridge

26th January 2:00 pm - 3:30 pm

No Leaves? No Problem! Learn to identify trees by the rest of their features

47th Annual Winter Hike Series

Inniswood Metro Gardens - Gardens Entrance

26th January 2:00 pm - 3:00 pm

Join for a 2-mile hike along the trails and garden paths

Winter Hawks

Rocky Fork Metro Park - Bulletin Board

26th January 9:00 am - 10:00 am

Search for winter hawks on a 1.5 mi hike

Morning Coffee & Wildlife Watch

Blacklick Woods Metro Park - Nature Center

1st February 8:00 am - 10:00 am

View animals through the nature center windows and enjoy a cup of coffee

47th Annual Winter Hike Series

Blendon Woods Metro Park - Play Area Shelter

1st February 10:00 am - 12:00 pm

Join for a 2-, 4-, or 6-mile hike. Refreshments served beginning at 10am

Howl at the Moon Dog Hike

Highbanks Metro Park - Nature Center

1st February 5:00 pm - 7:00 pm

Bring your canine friend on a 3.5-mile hike. Dogs must be leashed.

Owls - Whoo's Calling?

Battelle Darby Metro Park - Indian Ridge

1st February 5:30 pm - 6:30 pm

Lure in owls using calls on a 1-mile hike

Barred Owl Hike

Glacier Ridge Metro Park - Shelter House

1st February 5:30 pm - 7:00 pm

Try to lure in these raptors on a 1.5 mile hike

Super Fowl Sunday

Blendon Woods Metro Park - Nature Center

2nd February 1:00 pm - 2:00 pm

Enjoy a walk out to Thoreau Lake to watch waterfowl before watching the big game!

Bison

Battelle Darby Metro Park - Nature Center

2nd February 2:00 pm - 3:00 pm

Enjoy a hike to see North America's largest land mammal

First Sunday Winter Birding Series

Highbanks Metro Park - Nature Center

2nd February 9:00 am - 10:30 am

On the first Sunday of the month, take a 2.5 mile hike to look for winter birds. All skill levels welcome. Limited amount of binoculars available.

Events



47th Annual Winter Hike Series

*Scioto Grove Metro Park - Arrowhead Shelter
2nd February 2:00 pm - 4:00 pm
Enjoy a 1- or 2-mile hike along the Scioto River*

47th Annual Winter Hike Series

*Highbanks Metro Park - Northern Shelter
8th February 10:00 am - 12:00 pm
Join for the winter hike with options for 2.5 or 5 miles.
Refreshments afterward.*

Tracks & Trails

*Three Creeks Metro Park - Confluence Area
8th February 2:00 pm - 3:00 pm
Learn about animal tracks as we search for tracks and signs*

Coffee, Cocoa & Birds

*Blendon Woods Metro Park - Nature Center
8th & 9th February 10:00 am - 2:00 pm
Drop by and enjoy a steaming cup while watching birds at our viewing window*

Animal Courtship Display

*Blacklick Woods Metro Park - Nature Center
8th February 8:00 am - 6:00 pm
Discover some of the fascinating ways wild animals attract a mate*

Bird Hike

*Blendon Woods Metro Park - Nature Center
9th February 9:00 am - 10:00 am
View and learn about the wintering Waterfowl at Thoreau Lake*

Full Moon Hike

*Battelle Darby Metro Park - Cedar Ridge
9th February 6:00 pm - 9:30 pm
Take a brisk 4-mile hike through fields and forests*

Wildlife Hike

*Battelle Darby Metro Park - Indian Ridge
9th February 1:00 pm - 2:30 pm
Take a 2-mile hike and look for winter animal activity*

Noon Native Teas

*Battelle Darby Metro Park - Nature Center
8th February 12:00 pm - 1:00 pm
Learn about native and wild plants that can be used to make tea and then make your own blend*

The Coyotes Among Us

*Three Creeks Metro Park - Confluence Area
9th February 2:00 pm - 3:00 pm
Learn about our secretive neighbors as you wander off-trail in search of signs*

Owls of February

*Three Creeks Metro Park - Confluence Area
8th February 6:00 pm - 7:00 pm
Learn about Ohio's owls as we walk through the woods and try to lure our resident barred owls in with calls*

47th Annual Winter Hike Series

*Glacier Ridge Metro Park - Shelter House
9th February 2:00 pm - 4:00 pm
Enjoy a brisk 2-mile hike through the grassland and forest*

IPCC Report On Climate Change

In October 2018, a report on climate change, published by the IPCC, was released. The report instantly made news worldwide and was a wake up call on the fast changing global climate. According to the report, at the current rate of greenhouse gas emissions, the severe impacts of climate change would be felt much sooner than previously estimated. The Paris Agreement of 2015 was made between several governments of the world, who pledged to limit global warming to below 2°C (3.6°F) from pre-industrial levels, and pursue efforts to limit it within 1.5°C (2.7°F). The IPCC report assessed the two scenarios and found that with the current pledges of emission cuts made by different countries, the global average temperature could increase by 1.5°C in only 15-30 years, which itself has very high risks. But it found significantly higher risks associated with a global temperature rise of 2°C compared to 1.5°C. The report stated that in order to limit global warming to below 1.5°C, it would require immediate and unprecedented steps by the governments of the world to cut greenhouse gas emissions, in addition to several other efforts to actively remove carbon dioxide (CO₂) from the atmosphere.

IPCC

The **Intergovernmental Panel on Climate Change (IPCC)** is a body of the **United Nations** dedicated to assessing the science related to climate change. Created in 1988 by the **World Meteorological Organization (WMO)** and the **United Nations Environment Programme (UNEP)**, the IPCC makes regular scientific assessments and identifies points of agreement among the scientific community on topics related to climate change. There are currently **195 Member Countries** in IPCC. The objective of IPCC is to provide the governments of the world at all levels with scientific information that they can use to inform policies. It provides policymakers with the scientific basis and a current scientific understanding of issues related to climate change, their implications, and options to mitigate them. The IPCC reports are also a key input for the

international climate change negotiations such as the UN Climate Conference – the **United Nations Framework Convention on Climate Change (UNFCCC)**.

IPCC does not provide policymakers with an action plan; only presents projections of future climate change based on different scenarios, the risks, as well as response options to thwart the effects of climate change. IPCC does not conduct its own research. Instead, leading scientists and experts from all over the world volunteer their time to review the current published research and author a comprehensive summary. Stress is laid on keeping the review process open and transparent, and making a comprehensive and objective assessment of current science that reflects the views of a diverse group of scientists.

Since its inception, IPCC has produced five Assessment Reports – the most comprehensive scientific reports on climate change produced worldwide. Additionally, it has produced numerous Special Reports, Methodology Reports, and Technical Papers, in response to requests for information on specific issues or subjects from UNFCCC, governments and international organizations. IPCC is currently in its **Sixth Assessment Cycle**, where it will prepare three Special Reports, a Methodology Report and the Sixth Assessment Report. The first of these Special Reports was the **Global Warming of 1.5°C (SR15)** that was published in October, 2018.

In 2007, the IPCC and U.S. Vice-President Al Gore were jointly awarded the **Nobel Peace Prize** “for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change”.

IPCC Reports

IPCC **Assessment Reports** cover the full scientific, technical and socio-economic assessment of climate change. There are **Special Reports** for specific issues. **Methodology Reports** provide practical guidelines for the preparation of greenhouse gas inventories under the UNFCCC. The reports also include a **Summary for Policymakers (SPMs)**, which generally includes headline statements, providing a top-level summary and narrative of the key findings.

Authors

For selecting the authors, nominations are invited from governments and IPCC observer organizations. A team of **Lead Authors** is selected on the basis of their expertise, which reflects a range of scientific, technological and socio-economic views and backgrounds, and strikes a good balance in terms of gender and geographical representation. Several hundred more experts are involved in drafting specific contributions as **Contributing Authors** and commenting on the chapters of the report as **Expert Reviewers**.

Review of Reports and Endorsement

The review process takes place in multiple stages and Expert Reviewers and governments are invited at each stage to comment on the overall assessment and balance of drafts. Teams of Review Editors provide a thorough monitoring mechanism to ensure that review comments are addressed.

The final step is the endorsement of the report by the member governments. This step is based on a dialogue between the authors of the report (scientists and experts) and the governments of the member countries who will be making use of the report. Endorsement by the member governments acknowledges the report as a definitive assessment.

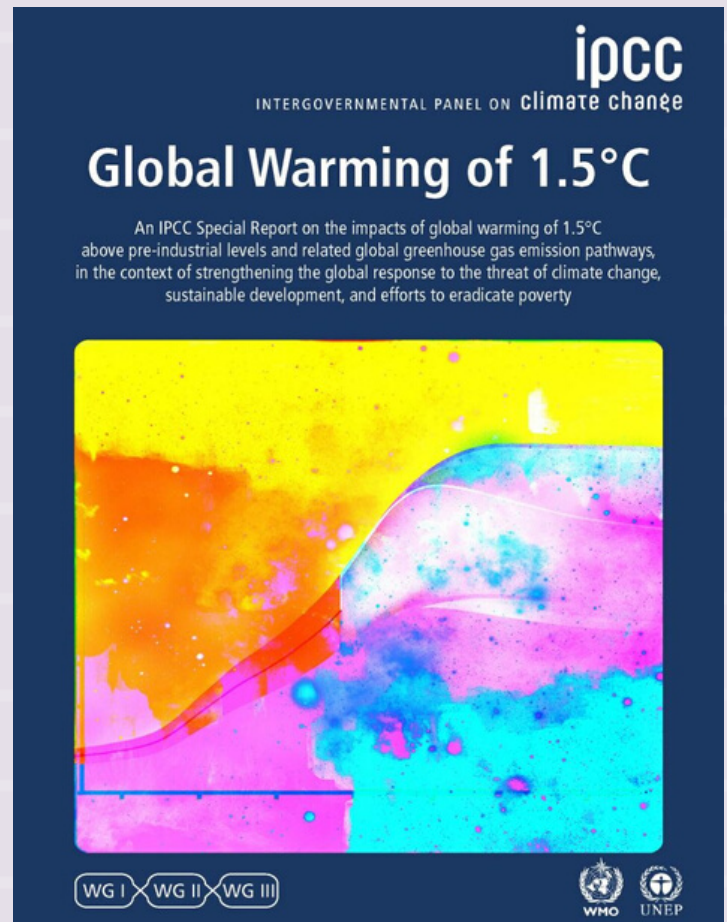
Alleged Errors

The IPCC has a rigorous and detailed protocol for addressing any alleged errors. The **Error Protocol** is used to correct errors in facts or accuracy that could have been avoided in terms of the information available at the time of writing the report. The Error Protocol cannot be used to make changes to reflect any new knowledge or scientific information that has been published since the report was written.

Global Warming of 1.5 °C Special Report - Major Takeaways

In 2015, at the 21st Conference of Parties of the United Nations Framework Convention on Climate Change (UNFCCC) held in Paris, the 195 Member Countries adopted the **Paris Agreement** – a global agreement on the reduction of climate change – in order to meet a long-term temperature goal of “holding the increase in the global average temperature to well below 2°C above preindustrial levels and pursuing efforts to limit the temperature increase to 1.5°C above preindustrial levels, recognizing that this would significantly reduce the risks and impacts of climate change”. The UNFCCC invited the IPCC “... to provide a Special Report in 2018 on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways”. Consequently, IPCC published the Global Warming of 1.5°C Special Report (SR15) on October 8, 2018. Authored by 91 leading scientists from 40 countries, and helped by another 133 Contributing Authors, the report contains over 6,000 scientific citations. The complete title of the report reads:

An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty



Cover Page of the IPCC Special Report SR15
Source: <https://www.ipcc.ch>

The report assesses three main themes:

- What would be required to limit warming to 1.5°C (mitigation pathways)
- The impacts of 1.5°C of warming, compared to 2°C and higher
- Strengthening the global response to climate change; mitigation and adaptation options

Risks and Implications

A mere 1°C (1.8°F) of global warming in the past decade has resulted in more severe and record-breaking storms, coral bleaching, wildfires, droughts, and floods around the world. Under the 2015 Paris Agreement, every country in the world pledged to limit the global temperature rise to within 2°C. The SR15 found that even an increase of 1.5°C above the pre-industrial levels would have far greater impacts than previously estimated. Effects of 2°C increase in global temperatures, as adopted under the 2015 Paris Agreement, would be significantly worse.

According to the report, an increase of 1.5°C could be reached between 2030 and 2052, if the current rate of CO₂ emissions continued. Even if the cuts proposed in the 2015 Paris Agreement were made immediately, it would only delay, but not prevent the 1.5°C of global warming! Warming caused by anthropogenic emissions of CO₂ from the pre-industrial period to the present will persist and continue to trap heat in the atmosphere for centuries or even millennia, causing further long-term changes in the climate system such as sea-level rise.

However, carbon emissions alone are not the only cause of the 1.5°C warming. Impacts on biodiversity and ecosystems, including species loss and extinction, are the other major drivers.

Pre-Industrial Levels

The reference period from 1850–1900 is often used to approximate pre-industrial global mean surface temperature. Earlier temperature records exist but they are fewer and less reliable.

Different climate project models found robust differences between the impacts caused by a 1.5°C of global warming against warming of 2°C. While a 0.5°C increase in the room temperature may not feel even noticeable, an increase by that same “small” amount of the entire planet has far reaching consequences. An increase of 2°C compared to 1.5°C in global temperatures would result in higher mean temperatures in most regions – both on land and ocean – hot extremes in most inhabited regions, heavy precipitation, and an increased probability of drought in certain regions. Reduction in biodiversity of both flora and fauna would be much greater. Terrestrial, freshwater, and coastal regions would retain more of their services to humans with a 1.5°C rise as against 2°C. A greater increase in global temperatures implies increase in ocean temperature as well as associated increases in ocean acidity and decreases in ocean oxygen levels. Consequently, there would be a greater reduction in marine ecosystem services to humans with a greater increase of global temperatures. By 2100, the global mean sea level rise is projected to be around 0.1 meter lower with global warming of 1.5°C compared to 2°C. But the sea-levels would still continue to rise and the magnitude and rate of the rise would only depend on future pathways of limiting emissions.

For us, the risks due to such climate change include health, food security, water supply, human security, and economic growth including eradication of poverty and reducing inequalities. Such risks are projected to increase with global warming of 1.5°C and increase further with 2°C.

While an increase of 1.5°C as compared to 2°C only delays the impacts, a slower rate allows more time for the ecosystem to adapt to the changes. Even then, there are limits to adaptations and the adaptive capacity of some human and natural systems.

Response Options

The IPCC Special Report lays out pathways to stabilizing global warming to 1.5°C. The solutions call for massive efforts in cutting fossil-fuel usage in half within 15 years, and eliminate their use almost entirely in 30 years. Achieving such reductions would require reducing emissions in all sectors and substantial upscaling of investment in mitigation options. In addition to the proposed cuts in emissions, the report makes suggestions to convert between 0.4 to 2.7 million square miles of land into growing bioenergy crops and upto 3.86 million square miles of forests added by 2050.

In order to limit global warming to within 2°C, CO₂ emissions must decline by 25% from 2010 levels by 2030, and reach a net zero by 2070. [Paris Agreement defined net zero emissions as "a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century".] Model pathways for limiting global warming to 1.5°C call for reducing the global net anthropogenic CO₂ emissions by 45% from the 2010 levels by 2030, and achieving a net zero by 2050. In addition to reducing CO₂ emissions to maintain global warming to below 1.5°C, significant Carbon Dioxide Removal (CDR) efforts are advised in order to prevent any overshoots above the 1.5°C limit. **Carbon Dioxide Removal** or **CDR** refers to a group of technologies aimed at the large-scale removal of carbon dioxide from the atmosphere. CDR uses three different approaches:

Natural Capturing the atmospheric carbon in trees through afforestation and reforestation, or in the soil with better land management and agricultural practices, and restoration of high carbon density ecosystems such as wetlands.

Technological Using natural minerals that react with CO₂ and bind them in new minerals (**enhanced weathering**); **Carbon Capture and Storage (CCS)**, which refers to the process of capturing CO₂ produced from point sources such as industries and sequestering below the ground; **Direct Air Capture (DAC)** which removes the CO₂ from ambient air through chemical processes followed by sequestering and storing; and enhancing ocean alkalinity to enhance the drawdown of the atmospheric carbon without increasing the ocean acidity.

Combined **Bioenergy with Carbon Capture and Storage (BECCS)**, which is the process of extracting energy from the biomass and capturing and storing the carbon.

The report lays great significance on the positive outcomes of human action to reduce global temperatures in terms of shared prosperity and economic stability. The report also states that **poverty and inequality contribute to global warming** and the connection between the two is discussed throughout the report as well as in a dedicated chapter in the report. Strengthening fundamental societal systems and sustainable development helps in limiting the warming and climate change.

Natural Pathways

Forests play an important role in our ecosystem. They remove almost 25% of CO₂ from the atmosphere. Scientists believe reforestation and improving forest management together could remove CO₂ from the atmosphere, amounting to 18 percent of the reductions needed by 2030. Tropical forests cool the air and are key in creating regional rainfall that helps with growing food. Tropical forests of the world store 375 billion tons of carbon. Boreal forests of the world store 703 billion tons of carbon. The boreal forests of Canada alone hold 307 billion tons of carbon, making over 12% of the world's terrestrial carbon stock!

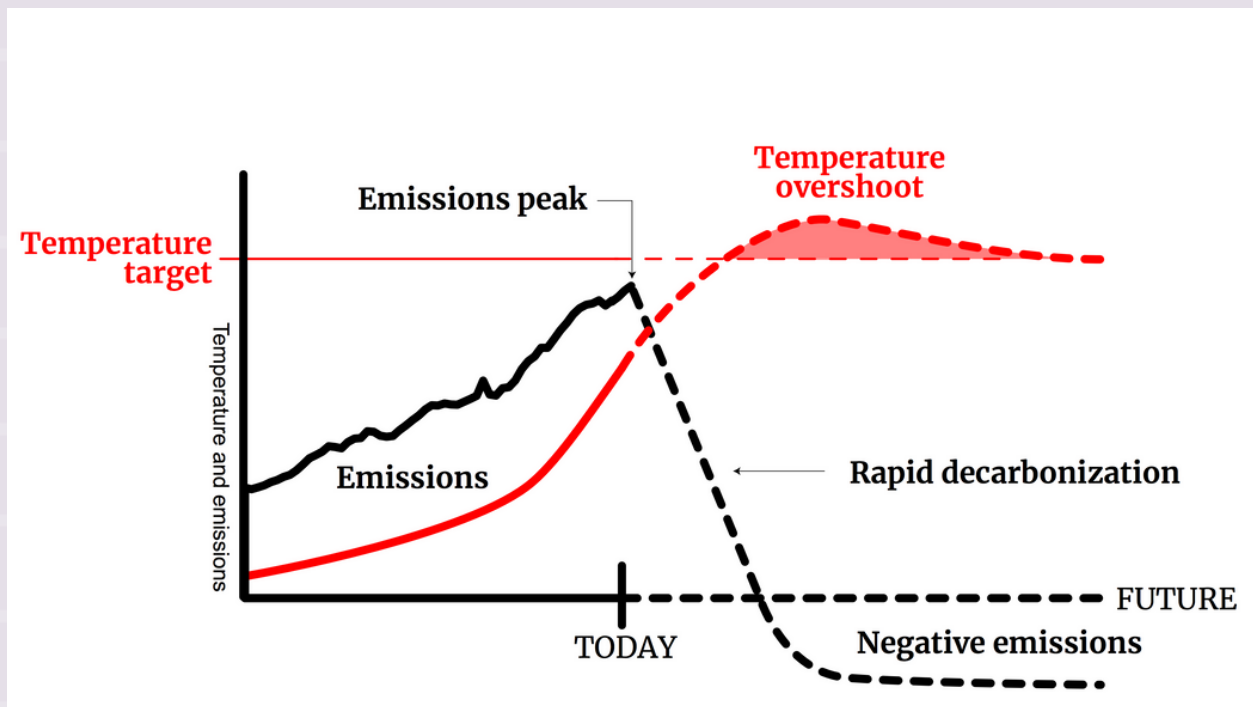


Illustration of temperature overshoot
Source: <https://public.wmo.int/>

Temperature Overshoot

Temperature overshoot is the temporary exceedance of a specified level of global warming, returning to that level before 2100 through CDR and/or reductions in emissions of other greenhouse gases.

Soil captures and sequesters large amounts of terrestrial carbon. Soil sequesters 3 times more carbon than all the living plants and trees. Poor management of soil can release the trapped carbon back into the atmosphere. Hence, responsible land use and sustainable agricultural practices are extremely important to reducing global warming.

Wetlands are some of the largest carbon reservoirs on earth, and are estimated to store more than a third of the world's terrestrial carbon. Wetlands act as water filtration plants, support a rich biodiversity, and help reduce floods as well as droughts.

The importance of such natural carbon sinks in regulating the climate and mitigating global warming cannot be overstated. Enhancing our natural resources and protecting them from destruction must be paramount.

While the technology-based options of capturing and sequestering large-scale CO₂ from the atmosphere are, for the most part, still in research phase and scientists are still trying to understand their full implications and effectiveness, the natural solutions are well-understood and are closest to deployment compared to any other CDR options. From the standpoint of economics, natural pathways of CDR are much cheaper than technology-based solutions!

Carbon Budget

CO₂ remains in the atmosphere for centuries and its natural degradation due to uptake by land and ocean is slow. This means that CO₂ accumulates in the atmosphere, leading to a corresponding temperature rise.

Each year since 2005, a community of researchers for the Global Carbon Project produce and report a global carbon budget, which quantifies CO₂ emissions of the previous year, and then apportions that carbon to the atmosphere, the ocean and the land. The budget is a careful accounting of human disturbance of the natural carbon cycle, accompanied by quantification of uncertainties in the carbon sources as well as sinks. This annual carbon budget helps researchers to better understand and monitor the major components and processes in the global carbon cycle. By providing a definitive record of recent trends, the budget is a valuable resource within a climate policy framework. 'Net emissions' refers to emissions by sources, minus removals by sinks. An increase in global average temperature of e.g. 1.5°C corresponds to a limited net amount of CO₂ being emitted. This amount of CO₂ is usually referred to as the carbon budget for 1.5°C.

Paris Agreement

Following the 21st UNFCCC summit held in Paris in 2015, an agreement between 195 member countries was adopted on the greenhouse-gas-emissions mitigation, adaptation, and finance. This was called the Paris Agreement, and was signed and ratified in 2016. The long-term goals of the Paris Agreement are:

- to limit the global average temperature rise to below 2°C from pre-industrial levels, and make efforts to try and keep it below 1.5°C;
- increase the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
- make finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development

Under the agreement, each country must set a target and report on the contribution it makes to mitigate global warming. The Paris Agreement introduced a new term – **Nationally Determined Contribution (NDC)**. NDCs are the intended targets each country should set to reduce national emissions and adapt to the impacts of climate change. Article 3 of the agreement requires the member countries to be “ambitious” in their intended NDCs, “represent a progression over time”, and set the NDCs “with the view to achieving the purpose of this Agreement”. The contributions should be reported every five years and are to be submitted to the UNFCCC Secretariat.

Reality Check!

While the Paris Agreement received a great many accolades and was a good first step towards fighting climate change globally, the agreement has absolutely no mechanism to enforce the pledges or the intended NDCs of member countries. There are no deadlines for reaching the set target. A few studies published in the journal *Nature*, found that as of 2017 there were no major industrialized nations that had implemented the policies for meeting their pledges for reducing CO₂ emissions. According to UNEP as well as an MIT study, even if the current pledges made in the Paris Agreement for limiting CO₂ emissions were kept, it would still push the global warming to 3°C by 2100, which could be a natural tipping point, risking thawing of large areas of *permafrost* - an event that could drive global temperatures uncontrollably higher.

Soon after the Paris Agreement was signed, the new US administration announced in 2017 that the US – the second largest emitter of CO₂ in the world – will withdraw from the agreement. Under the agreement, the earliest effective withdrawal date for the US was November 2020. The formal notice of withdrawal could not be submitted until the agreement was in force for 3 years for the US, which was November 4, 2019. The US government submitted the withdrawal notification with the Secretary General of the United Nations on November 4, 2019.

Critics of the Paris Agreement argue that the most effective way to ensure emission cuts is to impose tax on CO₂ emissions. The question is if the governments of the world would have the will to implement it!

Permafrost

Permafrost is defined as any ground that remains frozen (temperature below 0°C or 32°F) for at least two years straight. The ground doesn't necessarily need to be covered in snow. Permafrost is made of a combination of soil, rocks and sand that are held together by ice. Permafrost is mostly found at higher latitudes in the Northern Hemisphere, also known as the boreal region. Vast amounts of greenhouse gases have been naturally stored for several thousand years within the permafrost of the boreal regions.

Epilogue!

As grim as the report and the predictions might sound, we need to keep hope. Life is just not worth living without hope! But there needs to be a reason, a source, a basis for hope. And that source of hope comes with taking action. Even in the face of utter despair, we must ask ourselves, 'how could inaction be any better than taking some form of action!' And we cannot just expect our governments to take all of the actions. As citizens, we can do our part and the collective strength of our small individual efforts has a much greater impact and yields far-reaching and successful results than any climate-friendly policy effected by a government. Because the long-term success of all such policies and efforts ultimately depends on public support.

Citizen Science is one such pathway for each and every one of us to be able to take a significant and meaningful action. As pointed out in the IPCC report, factors causing global warming are not just emissions. Habitat loss, and consequently loss of species of both flora and fauna, affecting the ecosystems is a significant contributor. Climate change and global warming are a result of not only increasing the sources of carbon emissions, but also depleting our natural carbon sinks. We may require policies from governments to enact restrictions on emissions for big industries, but we can do so much to help with the battle on the other front – **restoration and conservation efforts to preserve and enhance the natural sinks that capture carbon.** [To learn about citizen science, read the *January 2019 issue of Project Nature newsletter* or *Project Nature Lecture on Citizen Science.*]

We can and must take responsibility for the individual carbon footprint we leave behind. Even if we cannot get actively engaged in conservation and restoration efforts, we can all make sure to be responsible citizens and good stewards of nature in our everyday lives. And that in itself is a very substantial action!



To subscribe to the newsletter or for any questions/comments/feedback, please email

Rajat Saksena

Ohio Certified Volunteer Naturalist
saksena.6@osu.edu

Project Nature logo designed by Sushil Narsian, Indus Design
indusdesign@gmail.com
<http://indusdesign.com/>