

CT | Climate **Tribune**



THERE IS NO TIME TO WASTE



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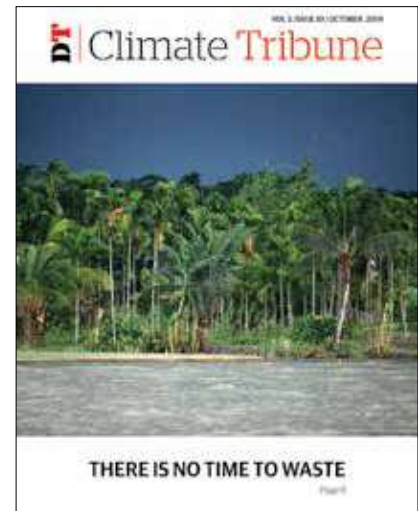
Dear Readers

Climate emergency is well on the way and it is up to diligent citizens of the world to force the authorities to take action.

As the public take cognizance of the impending destruction of the planet, it is more important than ever to bring to you the stories of resilience, of innovations and report the ground realities of climate change impact.

This issue continues to report on a broad range of topics that shed more light on climate emergency and the challenges.

From the story of a brave woman in a Dhaka slum fighting pollution, to story with a piercing look at the UN Climate Negotiations, this issue covers the most pertinent matters related to climate emergency in Bangladesh and beyond. ■



COVER: SYED ZAKIR HOSSAIN

GLOBAL WARMING EFFECTS ON CARBON SINKS

AN INVESTIGATION

Ashrafal Haque

Carbon completes its life cycle passing through the oceans, soils, vegetation and atmosphere. In these pathways, carbon is absorbed, stored and released in different processes. This pathway is known as the carbon cycle. The balance of the carbon cycle has made our life possible on earth as we are now. But if the balance of carbon from soil to the atmosphere is disturbed by more emissions, then the carbon cycle becomes imbalanced and affects the whole ecosystem which is not expected for human welfare as the ecosystem, services and living systems will be partially disturbed or lost.

Nearly 30% of carbon increased from the year 1850 to 1998, contributing more than 176 GtC in the atmosphere. The increasing trend has a strong relationship with the industrial revolution. Rapid industrialization (carbon emissions from those industries) and land-use change (deforestation, urbanization, agricultural practices) increase the carbon concentration in the atmosphere in the meantime, they also destroy the significant carbon sinks in soil and forest. Now, the annual emission of carbon in the atmosphere is about 7.9 Gt. The net emission (more than 40%) from the terrestrial ecosystems is much higher than the absorption (slightly more than 30%).

The focus of the study

The carbon storage and release is a fundamental dynamic for living organisms and biodiversity, which is profoundly affected by climate change. This paper will focus on how climate change can change the carbon balance in global major carbon storages.

Scoping of the study

This writing considered only the temperature increasing component of climate change. So mostly how global warming would destroy the present carbon sinks.

Background of the study

Changes of an ecosystem and land use planning change the capacity of carbon capturing and emission from the sinks. An ecosystem can be a sink or source, which depends mostly on the chemical and biological processes of that ecosystem. Those chemicals and biological processes are very temperature-dependent. Global warming is changing

those processes and making ecosystems from carbon sinks into sources. The vulnerability of those ecosystems to carbon balance is a serious concern for future transformation and management perspectives to mitigate global warming.

Area	Amount of carbon in Gt
Land	2100-2200
Atmosphere	720-800
Ocean	38000-40000

Distribution of Global Carbon (Source: IPCC 1996:63)

Global warming is affecting the carbon sequestration and storage mechanism. Exploring how vulnerable we are to global warming led me to this investigation.

Soil carbon pool

Soil stores many times more carbon than plants. The soil organic carbon has a long residence time. Still, global warming could decrease the residence time by increasing microbial decomposition of soil organic matter which will release more CO₂ or CH₄ into the atmosphere, which has a positive feedback loop to increase temperature again.

Carbon budget in soil depends on the balance between photosynthesis and respiration, specifically autotrophic root respiration and heterotrophic soil microbial respiration (RD Bardgett et al, 2008).

Type	Amount of carbon in Gt
Soil	951-1555
Vegetation	262-880

Soil vs vegetation (Source: IGBP)

Soil respiration is sensitive to various factors including complex interactions and feedbacks between climate, plants, herbivores, symbionts and microbes (RD Bardgett et al, 2008). Even soil respiration is more temperature-sensitive than primary production (Schimel et al, 1994) Release of CO₂ to the atmosphere and exports of dissolved organic carbon by hydrologic leaching will increase (RD Bardgett et al, 2008).



ANDREW COELHO

Warming could affect this process in two ways; firstly, the plants' production, the diversity which alters soil physicochemical conditions, the supply of carbon to the soil. Secondly, the structure and activity of microbial communities involved in decomposition processes and carbon release to the atmosphere.

Ecosystem	Amount of carbon in Gt
Agroecosystem	263-487
Grassland	412-820
Forests	487-956
Other	51-170

Carbon distribution in terrestrial ecosystem (Source: IPCC 1996:639)

The issue becomes much more complicated when microbes are treated as important determinants of plant community diversity and productivity and the quality and quantity of carbon input to soil. (RD Bardgett et al, 2008)

Oceanic carbon pool

Due to global warming, the oceanic thermohaline circulation could be weakened or collapsed, which will reduce the uptake of carbon from the atmosphere excluded biological processes (Jorge L et al, 1996). As the stratification is temperature-dependent and due to global warming, more precipitation could occur in high latitude, which will decrease the salinity.

Warm water holds less dissolved gases. Due to warming,

the holding capacity of carbon dioxide by marine water will also decrease. The biological cycle could compensate for this decrease by the downward mixing of carbon, except when thermohaline circulation collapses (Fortunat Joos et al, 1996).

The ocean can remove CO₂ from the atmosphere, which is dependent on the atmospheric carbon dioxide pressure, mixing of oceanic water. These two are very much temperature-dependent. So global warming could reduce the carbon uptake at a significant level. Thus, atmospheric carbon will increase and give positive feedback to warming. These changing behaviours of the ocean could change the phytoplankton growth (significant sinks of carbon in marine water) as well as carbon storage capacity as biomass. If the ocean absorbs more carbon, then the pH will decrease which is very corrosive to the calcium carbonate shell which will ultimately affect the oceanic food web.

Conclusion

Temperature is a critical component of the climate which depends on many biotic and abiotic factors, and it has direct and indirect effects on biogeochemical cycles as well as ecosystem functioning. Global warming could trigger some feedback loops of carbon storage in such a way which could imbalance the total ecosystem in a way for which we are still not prepared. ■

Ashrafal Haque is a system analyst. He started working as a research officer at ICCCAD in October 2018. He has earned several Masters, including in Environmental Sciences; Disaster Management; Sustainable Development. He also holds an MPhil in System Dynamics at the University of Bergen, Norway.

CASE STUDY



STRENGTH DESPITE AND BECAUSE OF ADVERSITY

'IT WAS ONLY WHEN I LOST EVERYTHING THAT I UNDERSTOOD I HAD TO FIGHT, SO THAT NO ONE WOULD HAVE EVER HAD TO GO [THROUGH] THE SAME PAIN AS ME'

Catherine Fogli

It is no news that Bangladesh is prone to flooding due to its geographical location and conformation, being one of the biggest deltas in the world. Climate change, however, is magnifying the factors causing floods, increasing the intensity and the surface of areas that are inundated as a result of these floods, as well as the number of people affected by them. Here is the story of one of those people.

K is a woman in her 70s, one of the many residents of Dha-ka's slums. Her story is not only one of the tragedies, but also one of strength and resilience.

When she was in her early teens, the place where she was living with her parents got flooded and when the floodwaters

receded, not only was her family house destroyed and their land devastated, but her mom and her six year old sister were missing as well. The little girl had been rescued by another family in the village, who returned her home safely two days later, but K's mom was never to be found again. The flood had left the family emotionally and financially drained, and K's father had no other choice but to get her married just a few weeks after the catastrophe.

By the time she was 18, she had become a mother for the third time, but her third child did not survive his first week, probably also due to a waterborne disease she caught in her late pregnancy. She and her husband were devastated by the loss, but in grief, they found the strength to keep going. Just a few months later, another flood hit the area where they were

living and destroyed everything they owned. K's husband decided that the family were to move to a nearby area, where his parents and his sister's family were also moving. The family settled in the area, they built a new home for themselves, started cultivating the land and selling excess produce to the local market, made friends with the neighbours and helped to create a new and strong local community. Almost a decade went by until another flood hit the region. This flood did not spare her family, nor her house or her land, taking everything she held most dear away from her. She was left alone, with no one to look after or looking after her, in profound grief and deep sorrow, helpless, powerless, lost.

Days later, she decided to join some migrant workers from the area and moved to Dhaka, looking for a place to live. She found herself a shanty in one of Dhaka's slums, and that is where she has been living for the past forty years. With the help of her new neighbour, she learned how to read and write, practising using the homework of her friend's children, and has since never stopped studying.

Ever since she moved to Dhaka, she has been very active in her community, aiming at recreating the strong neighbourhood ties and the sense of community she had experienced in the last place she lived in, and that she felt were missing in her new home. She became an example for the people living nearby, especially for the women in her section of the slum, who fully supported her when she decided to start a self-help group. Involving new dwellers and helping them to adjust to

“ This flood did not spare her family, nor her house or her land, taking everything she held most dear away from her ”

the slum life and overcome the adversities that came with working and moving around in the capital. When I asked her why she decided to dedicate so much of her time and resources to her community and even to strangers, she looked at me as if I had asked the most stupid question and proceeded saying that when you move to Dhaka from rural Bangladesh, everything is already so complicated. There is no reason why you should make it more difficult. “I wanted [the now] me when I came here, I give me now because I can”, she stated, explaining that she is trying to be the person she would have needed forty years ago.

Eighteen years ago, she started collaborating with some local NGOs to bring WASH facilities to the area, a cause that is still very dear to her and which she still working on, always trying to improve the living conditions of the slum. In the past few years, with many more people moving into the area, garbage started piling up all over the narrow streets. With the support of some of her friends, K has organized a system for waste collection and management. Even though she now has some back problems that do not allow her to carry a lot of weight, nor move around comfortably, she is still running her shifts, because she believes in leading by example.

One thing K made very clear both during her interview, and during the focus group discussion she was part of, is that she is not a victim and she does not want to be portrayed as one, and I sincerely hope I gave her justice in that. She is a strong woman, and I saw that. She is making a difference, and I believe that. ■

Catherine Fogli is a Master Student at Sant'Anna School of Advanced Studies and at the University of Trento, studying environmental security, climate change and development.



PHOTOS: SYED ZAKIR HOSSAIN

IT'S TIME FOR THE UN CLIMATE NEGOTIATIONS TO START TAKING CLIMATE CHANGE SERIOUSLY

THERE IS NO TIME TO WASTE

Danielle Falzon

From 2 to 13 December, the United Nations Framework Convention on Climate Change will hold its 25th annual Conference of the Parties meeting, more commonly known as the UN climate negotiations. That means that every year, for 25 years, countries have been meeting to figure out what to do about climate change. 25 years. Last March, this anniversary was being celebrated and congratulated on Twitter. But should we be celebrating or are we panicking?

25 years of international negotiations have not stopped changes in the climate. They have not eliminated greenhouse-gas emissions contributing to climate change. They have not produced a practical and comprehensive mechanism to adapt vulnerable populations to the impacts of climate change,

or even to compensate them for the losses and damages they incur. So, the Paris Agreement may be a remarkable achievement in international diplomacy, but on addressing climate change, it leaves much to be desired.

Each year the climate is changing at a rate that consistently exceeds scientific projections. Coastal communities already experience more intense storms, farmers lose their crops as seasons become more irregular, and massive heat waves and droughts affect even the world's wealthiest countries. With changes in the weather also come residual changes. Climatic changes are projected to increase the spread of vector-borne diseases, such as the rise in dengue cases in Bangladesh earlier this year. As communities around the world deal with the costs of these impacts, we have also learned from scientists that our window for addressing climate change is



rapidly coming to a close.

Fortunately, the future does not have to be so dismal. People around the world are rising to demand action. Just last month, on September 20 and 27, over 7 million people took part in climate strikes in 117 countries, including in Bangladesh. Inspired by 16-year-old Greta Thunberg's "Fridays for Future" school strikes, these massive actions have made clear that people are done waiting for solutions. The time for talk is over. We need climate action now.

For many of the activists taking to the streets recently, action on climate change will very literally determine their future. Whether they will have to move from their homelands, whether they will have children, and whether they will face constant risk and uncertainty. As food and water insecurity grows, natural disasters are becoming more frequent, and diseases spread. It is not a coincidence that schoolchildren are changing the demands and approach of the climate movement. They call out international inaction directly and refuse to soften their message. They do not have time to listen to excuses about costs, bureaucracy, and global governance.

So, the UN climate negotiations must begin taking the issue of climate change seriously, as young generations have no choice but to do, this is not an easy task. I have attended the negotiations many times, and they are not structured to produce substantive action. Several colleagues of mine have eagerly come to the climate negotiations in recent years, only to leave disappointed and disillusioned by the process. As obstructionist countries, including my own, exercise their disproportionate leverage in the negotiating room, the world's most vulnerable countries struggle to make their voices heard. And the standards of diplomacy and consensus ultimately mean that the end products of these negotiations

“The impacts of climate change are no longer abstract or years away”



PHOTOS: REUTERS

are vague and watered-down decision texts.

In the climate negotiations, the task-driven professionalism of the bureaucratic arena inevitably overtakes the reality of experienced loss, fear, and uncertainty that characterizes our present. The climate negotiations have become less about climate change and more about producing documents that will advise the production of later documents that may suggest how countries should consider taking action. It is easy to get caught up in the debates over wording, parentheses, and punctuation that arises in each set of meetings. When you are sucked into the complex world of UN negotiations, these debates become exciting, and it is easy to forget the enormity of the unprecedented issue at hand.

It is time for countries at the UN climate negotiations to step back and see the forest, instead of focusing on the individual leaves on the trees. Maybe then they will see that the forest is burning down, and its inhabitants are dying, as their delegates jet around the world each year to yet another meeting about what should be done. Changing our global approach to climate change is a huge challenge, but not one that should be accepted as insurmountable. We need to raise the bar for success so that we're not congratulating the institution on yet another year of negotiating our future. Instead, we must hold them accountable for generating real action.

In December, countries at the UN climate negotiations will have the chance to shift their approach to work with the urgency that our rapidly changing climate demands. The impacts of climate change are no longer abstract or years away. Climate change is here, and it is nearly too late for global leaders to start doing something about it. ■

Danielle Falzon is a PhD Candidate, Brown University, USA.

LOCKED AWAY

THE HIDDEN POTENTIAL OF PEATLANDS FOR GLOBAL CLIMATE MITIGATION

Sate Ahmad and Laura Bahlman

People across the globe are calling for the protection of the planet's forests, creating hashtags such as #PrayForAmazonas as news of the recent fires were trending on Twitter. While it is true that our forests are an essential resource for carbon sequestration, our world's peatlands are the less known and often forgotten global carbon sinks.

Peatlands are terrestrial wetland ecosystems in which the production of organic matter is faster than its decomposition. This process results in the net accumulation of peat - a type of soil with very high organic matter content (often more than 30% by weight) as opposed to mineral soils which have a very low quantity of organic matter.

Peatlands exist in almost all countries and are a long disregarded ecosystem in the fight against climate change. Peatlands are the most widespread version of wetlands, representing roughly 50 to 70% of the global wetlands. They are invaluable ecosystems as they are the world's largest natural terrestrial carbon store. Worldwide, peatlands only account for around 3% of the land surface but may store up to 644 gigatonnes of carbon which represents approximately 21% of the total global soil organic carbon stock. Despite being an essential resource for carbon sequestration, human activities such as artificial drainage for agricultural use, are degrading global peatlands - turning this helpful ecosystem service provider into the opposite - a carbon source, contributing further to climate change!

Peatland types

Temperate and boreal peatlands can be categorized in several ways. One of the most widespread ways to categorize them is - according to the source of water on which these ecosystems depend. The term "Fens" refer to peatlands which rely both on rainfall and groundwater while "Bogs" refer to peatlands which depend solely on rainfall. As a result of the vegetation which grows in such ecosystems, these ecosystems differ from one type to another. However, tropical peatlands lack much attention and have not been studied as well as non-tropical peatlands have been, and as a result, they have not been systematically categorised. As recent as 2017, the world's largest tropical peatland was discovered in the Congo Basin, meaning large areas that have been storing carbon for millennia may still be undiscovered.

“As recent as 2017, the world's largest tropical peatland was discovered in the Congo Basin, meaning large areas that have been storing carbon for millennia may still be undiscovered”

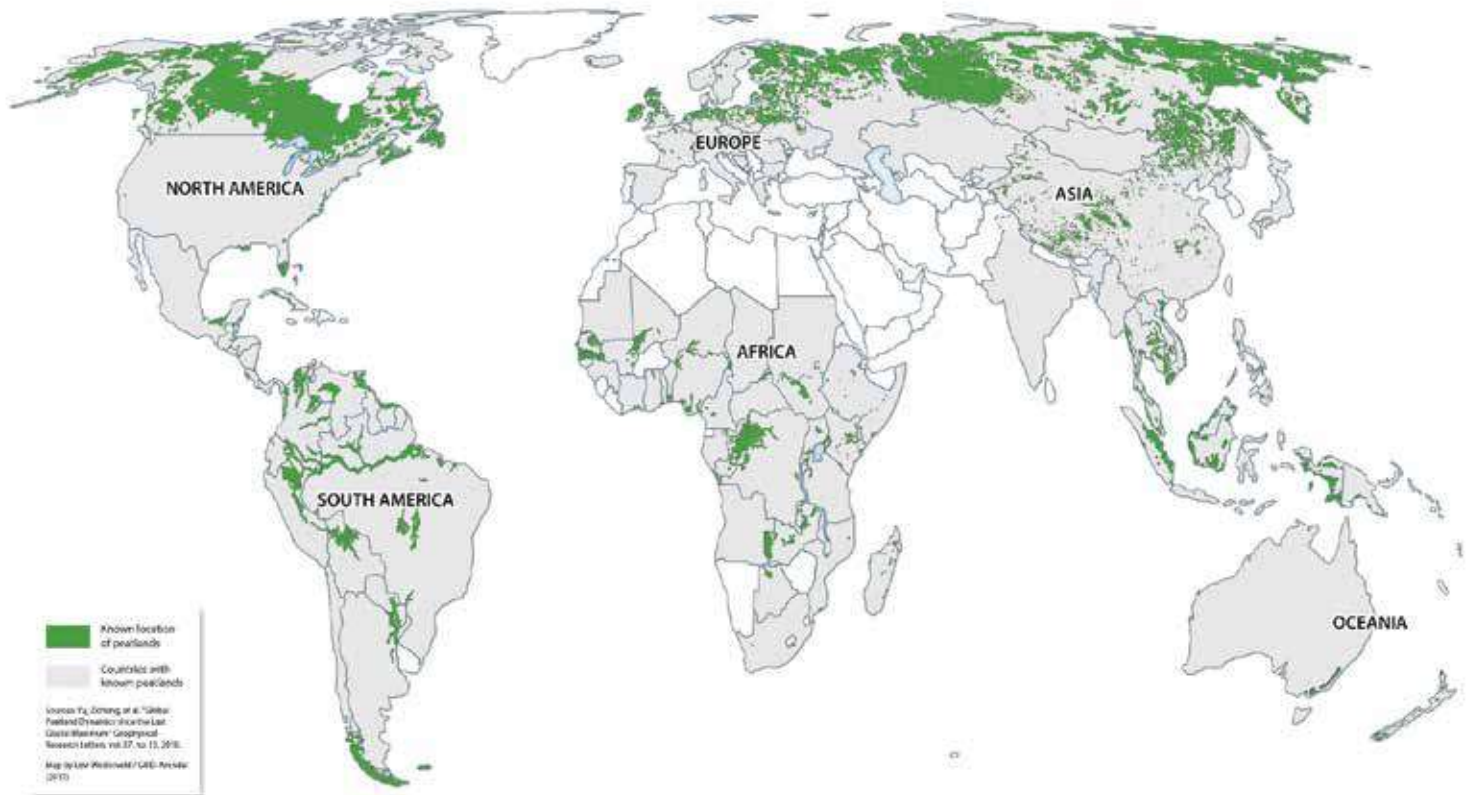
How do peatlands lock away carbon?

Peatlands are formed in areas where year-round waterlogged conditions exist. This waterlogging slows the natural process of plant decomposition, and the organic matter they are composed of do not fully degrade due to lack of oxygen and "pile-up", thereby locking away carbon. This process, over millennia, builds up to form layers of peat several metres in depth. Generally, 1 meter of peat takes 1000 years to accumulate.

What other "ecosystem services" do they provide?

Peatlands provide environmental services of economic and social importance including carbon storage, protection against erosion, biodiversity, nutrient cycling and water management. Peat blankets often protect underlying soils from erosion. Peatlands host a broad diversity of species of

Global distribution of peatlands



Global distribution of peatlands

SOURCE: [HTTP://WWW.GRIDA.NO/RESOURCES/12546](http://www.grida.no/resources/12546)

plants and animals. Plants provide the structural foundation and are the source of organic compounds derived from photosynthesis, required for the sustenance of animals and microorganisms. Peatlands host plant species of high nature conservation value. Other life forms include an associated diverse range of fungi species, microorganisms, protozoan and algae. Furthermore, peatlands serve as migratory resting grounds for a wide range of bird species.

Peatlands provide safe drinking water. It is estimated that ten% of the planet's freshwater is stored in peatlands. Highlighting the need for both protecting and maintaining the health of this ecosystem is crucial for water security at present and in the future. Water that is derived from healthy peatlands is generally of high quality - having few pollutants and low nutrient levels, meaning it only requires simple treatment once it reaches a water treatment plant.

Near-natural peatlands can store large amount of water due to the spongy nature of peat. Heavy rainfall is initially absorbed and gradually released over a period of several days, the peatlands thereby act as a form of natural flood management infrastructure often minimising the risk of flood

damage downstream. Coastal peatlands may additionally act as a buffer against salinity intrusion. Thus, peatlands are essential in the management of water catchments and when degraded can exacerbate flooding, which in many areas is likely to increase as climate change impacts increase.

The protection and restoration of previously degraded peatlands can help to address climate change. Degraded peatlands often contribute significantly as a source of greenhouse gas emissions responsible for climate change. A recent estimate of the monetary value of inland peatlands stands at around 11 trillion international dollars. Although peatlands are among the most valuable ecosystems on Earth, little is known about tropical peatlands. However, what we do know is that peat in the tropics occurs mostly in sub-coastal lowlands and forms from rainforest trees and other higher plants, but may also occur in swamp forests. As of 2008, tropical peatlands are estimated to be around 182 million ha, spanning South America, Asia and Africa, and account for almost half of global peatlands. These peatlands store about 40 to 90 gigatonnes of carbon and are becoming more responsive to global climate change and human influences.

CLIMATE MITIGATION

Peatlands in Bangladesh?

Peatlands can be found in Bangladesh as well, although they are not usually classified as such since other wetland categories are more prominently used in Bangladesh. According to the Food and Agricultural Organization (FAO) peat occupy around 60,000 ha in Bangladesh, while others have estimated this figure to range from 130,000 ha to 224,700 ha (1.6% of the total area). These peatlands can be found between the Ganges river floodplain and the Ganges tidal floodplain in Gopalganj, Bagerhat, and the adjoining parts of Khulna, Barisa, and Jessore districts, in deep depressions in the Sylhet Basin and the Northern and Eastern Hills of Bangladesh.

Peatlands as threatened ecosystems?

Throughout Europe, over the last decades, peatlands throughout Europe and North America have been drained for agricultural use or forestry land reclamation or degraded through peat extraction. In the tropics degradation of peatlands not only caused by agrarian expansion but also result from infrastructure development, such as the construction of roads and highways for better transport networks. Mineral, oil, and gas extraction may also cause substantial loss or degradation to peatlands in the tropics. In Bangladesh, peatlands are mostly converted to agricultural land for cultivating Boro rice, shrimp, and vegetables where there is little scope for soil carbon storage.

As peatlands are degraded, they become a significant source of greenhouse gas emissions. For example, in 2015, Indonesian peat swamp forests had seriously damaging fires, that emitted nearly 16 million tonnes of CO₂ a day as they burned. This level of emissions contributed more than the daily emissions from the entire US economy. Emissions from drained peatlands are estimated at 1.3 gigatonnes of carbon annually, equivalent to 6% of global anthropogenic CO₂ emissions. Peatland restoration can bring significant emission reduction and have been recognized by leading peatland scientists of the world as an effective, comprehensive climate change mitigation strategy.

Conservation and restoration: Not one solution for all

Restoration measures of drained and degraded Northern Peatlands usually include rewetting and ditch blocking along with several other methods depending on the level of degradation, vegetation type and peatland type. Many near-natural peatlands are also conserved as protected

A rewetted coastal peatland in North Eastern Germany. Restoration of peatlands is an effective climate change mitigation strategy.

ERWIN DON RACASA

areas, without much human interference. However, we must acknowledge that what works or has been working for high-income countries may not always work for countries of the global south. Cultural perception and societal priorities differ vastly from one country to another, from one continent to the next, while differences in economic growth, population density, dependence on ecosystems for livelihood further complicates the matter; a “copy and paste” approach, therefore, is not the way forward. What could be a possible way forward though, is for Governments to realize the importance of peatlands, beyond its monetary value and take necessary steps to understand peatlands as not exclusively as ecosystems but as social-ecological systems, thereby acknowledging the importance of humans as part of nature.

For Bangladesh, the national and local governments must act together with non-governmental organizations (NGOs), as well as relevant research institutes to develop policies to



protect and restore peatlands in Bangladesh. Such policies should not only be based on sound “natural” science but should also be based on a sound understanding of local communities. Bangladesh, being an agricultural economy and a country with very high population density, is a country where it is quite challenging to preserve vast areas of peat-forming ecosystems, without incorporating humans into the picture. Several models of community-based management have been tried and tested in the country, especially for wetlands and forests, which could be further developed for peatland management. However, given the lack of research on peatlands in Bangladesh, the first step would be to identify and locate peatlands all over the country, followed by different but inclusive restoration and management measures.

Under the Paris Agreement countries are encouraged to include peatland restoration in their commitments to global international agreements. The inclusion of peatland emissions

from degraded peatlands and on the flip side carbon saving from peatland restoration are both eligible for consideration within Nationally Determined Contributions under the UN Framework Convention on Climate Change. Therefore countries must begin to include peatland restoration and re-wetting in their national climate action plans. ■

Sate Ahmad is a Research Associate and a PhD Candidate in Peatland Hydrology at the Faculty of Agricultural and Environmental Sciences, University of Rostock, Germany. He has a background in Applied Ecology and Natural Resource Management, along with research experience in ecosystem services and human well-being in the Bengal Delta and in ecosystem process quantification in German Peatlands.

Laura Bahlman is completing a masters in International Development, with a background in climate change, policy, and soil ecology research. She is also a visiting researcher at the International Center for Climate Change and Development.



CASE STUDY

GREENING THE BLUE TOURISM: A CASE STUDY FROM ST MARTIN'S ISLAND, BANGLADESH

WHY SUSTAINABLE TOURISM SHOULD MATTER TO YOU



Farah Anzum

Blue tourism refers to the shoreline-based tourism and recreational activities alongside with other amenities taking place by the beach. Beach and marine tourism have been considered among the oldest and most significant segments of the tourism industry. Currently, several nations have developed their economies that are based on the tourism industry, such as; the Maldives; Aruba; Seychelles; or Bahamas etc. (Worldatlas, 2017). According to the World Travel and Tourism Council (WTTC), the global tourism

sector grew at 3.9% to contribute a record of \$8.8 trillion and 319 million jobs to the world economy in 2018. On the other hand, the UN World Tourism Organization (UNWTO) mentioned that international tourist arrivals are expected to increase worldwide by 65% from 2010 and reach a number of 1.8 billion per year by 2030. The growth will be even faster for emerging and developing regions compared to the developed areas. This mass tourism will have a substantial impact on the natural ecosystem and biodiversity. The cost of depleting these natural resources would often remain high than the benefit it offers. However, it would also lead to exaggerating climate change phenomenon through higher carbon emission, waste, and plastic production, water, and air pollution, land-use change, transportation, resource extraction, and fragile infrastructure etc. This article would represent a case study of St. Martin's Island, a popular tourist spot based on the southern tip of Bangladesh which has been facing severe threats from the uncontrolled tourism and unsustainable resource depletion.

St. Martin's Island is the only island in Bangladesh that is supporting coral reef ecosystem and associated flora and fauna networks. Due to its fragile ecosystem, the Government of Bangladesh declared it as an Ecologically Critical Area (ECA) in 1999. It is also known as a biodiversity "hot spot" area as it provides a home for 66 species of corals, 234 species of fishes, 12 species of crabs, 154 species of marine algae, 85 species of birds and 19 species of mammals (Thompson and Islam, 2010). However, according to the Department of Environment, every year around 10,000 to 20,000 tourists visit this island during peak season and exploit the island's natural resources. The groundwater level has been sinking fast, and the entrance of saline water is destroying the existing coral patches. A considerable amount of human waste and as a result ten times higher bacterial levels have been recorded than ever before in the area (Prothom Alo, 2018). The regular movement of cruise ships has resulted in oil spills in the adjacent shoreline alongside heavy sound pollution that disturbs marine species. However, scientists assumed that St. Martin's island is getting smaller every year instead of growing geologically as it should. The increasing cyclones and erosion affect the coral shores causing severe damage. Also, human activities are partially responsible for damage to the coral. It is because most corals occur in the shallow water near beaches where human impacts are most significant (IUCN, 2010).

On the other hand, climate change has also been severely affecting this coral island. The oceans have been the most significant buffer for human kind's dangerous greenhouse-gas emissions. But as the planet has warmed from mounting emissions, the oceans warmed first and fastest, absorbing 90% of excess heat that can bring irreversible damage to the marine ecology (Warren, 2019). It also indicates that the destruction of these delicate coral reefs around the world may lead to a collapse of the ocean ecosystem.



TAHMID IMRAN EMON

CASE STUDY



MINHAS KAMAL

“The IPCC concluded that “almost all warm-water coral reefs are projected to suffer significant losses of the area and local extinctions”

Even if global warming is limited to the 1.5 degree Celsius as per 2016 Paris Agreement, at the current rate of emissions -- the IPCC concluded that “almost all warm-water coral reefs are projected to suffer significant losses of the area and local extinctions.” As a consequence, it will leave nearby coastlines even more vulnerable to erosion and storms, as well as from accelerating sea-level rise, which could go up by as much as two feet this century as a result of glacier melt.

Hence, it is time to foster greening blue tourism to save the coastal ecosystem while protecting the vulnerable. In this regard, policy formulation is required from global to the local level. At the global level, it is essential to promote stakeholder collaboration and ensure cooperation to improve sustainable tourism policies. Coastal tourism practices should also integrate ecosystem-based approach. A comprehensive monitoring and evaluation mechanism should be in place to supervise the overall environment and to penalize entities

if required. Local knowledge should also be encouraged to promote green skills and business plans. Moreover, efforts need to make to decarbonize the tourism sector through financing sustainable business and also by raising awareness of different stakeholders and tourists to protect these biodiversity-rich areas.

In the national and local level, it is also essential to provide sustainable certification and eco-labelling to the hotels and resorts; promote sustainable tourism planning and increase investments in energy efficiency, water treatment, and waste recycling schemes. Regulations and technical support also need to provide to the cruise owners and ports through incentivizing green ports and cruises. A quota system can also be introduced to monitor, manage, and regulate passengers and cruise flows.

Finally, emphasis should be given to promote sustainable blue tourism for the shorelines. It is essential to develop an integrated monitoring, evaluation planning, and at the same time, blue-tourism strategies and networking platforms. Economic and social benefits should be maximized for the local communities through community-based business and alternative livelihood opportunities. However, tourism production and consumption patterns over the long term also need to be analyzed. Lastly, the resiliency of the local communities should also be developed to absorb natural, social or economic shocks in future. ■

Farah Anzum is currently working as a Junior Research Associate at ICCCAD. Her work involvement mainly includes climate change and gender and climate finance.



INTERNATIONAL LAW FOR A NEW APPROACH TOWARDS CLIMATE MOBILITY

THE IMPACT OF CLIMATE CHANGE ON HUMAN MOBILITY

■ Anne-Laure Pilat

As far back as 1990, the IPCC predicted that one of the gravest effects of climate change would be on human mobility. Yet, while there is a growing body of research focused on “climate migration”, we are still behind in terms of concrete international engagements and laws to protect those affected the most by climate change impacts and forced to move and look for new livelihoods.



SYED ZAKIR HOSSAIN

It is an issue of semantics around “climate migration” or “climate refugees” are of secondary importance until the first three intertwined contention points remain unresolved. Mainly they concern the scope (who will be concerned, what impacts of climate change will be covered etc) and scale of displacement as well as traceability of the displacement to climate change as it causes. Indeed, estimations of the number of possibly displaced people attributable to climate change are varying due to the complex multi-causal nature of the decision to move. Moreover, despite that, we have today the intuition and conviction that climate change work as a mul-

“ Estimations of the number of possibly displaced people attributable to climate change are varying due to the complex multi-causal nature of the decision to move ”

tipling and intensifying force of the factors influencing the human decision to move, there are still gaps in understanding the mechanism behind it and in quantifying specific effects of climate change impacts.

However, considering the importance of the question and the impossibility to ignore longer the effects that climate changes impose on human mobility, scholars have so far examined two main legal pathways towards the recognition or at least consideration of trans-border “climate migrants” rights. The first pathways aim at identifying “climate migration” as a distinct category in the current global dynamic of human mobility. Indeed, it would call for the adoption of instruments to cover all the stages of human movement induced by climate (pre-displacement, displacement and resettlement) or at least the adoption of a particular provision under the current climate change legal framework of the UNFCCC. Still, this pathway is mainly depending on today’s lacking international political will of states to limit their sovereign power in terms of protecting their national borders and regulating the entry into their national space.

Thus, as second pathways have been put forward which aims at considering “climate migration” as a part of the global migration dynamic, therefore calls for protection of trans-border “climate migrants” under the currently available international migration legal framework. However, this pathway contains several flaws. Firstly, this proposal implies

a broadening of the scope of the now strictly accepted definition of migrants and refugees. But, those strict definitions and the rigid scope of application of the international conventions are the reason in the first place for their broad adoption on the international arena. Indeed, as we already mentioned, states are not willing to easily constraint their sovereign powers over their borders. Therefore, just like in the first pathway, the idea of redefining existing categories in the current political context seems hardly feasible.

Secondly, those international conventions were created to address a specific case of displacement. Therefore, even if we could identify potential “climate migrants”, their situation would call for requalification of facts to make sure they enter the scope of the definition provided by the convention on refugee, for example. Thus, they must be “refugee” first and “climate refugee” secondly, which limits heavily the number of potential populations protected under the convention.

According to Article 1 of the Refugee Convention from 1951, a refugee is considered, a person that has the proof of a well-founded fear of persecution based on his or her race, religion, nationality or belonging to a particular social group or political opinion. The convention further explains “persecution” as the infliction of harm and suffering resulting in severe deprivation of fundamentals rights and targeting a particular group of people (as mentioned above), and either resulting from direct governmental action or other entity the government is not able or willing to control. As such, there is no mention of climate change. Furthermore, the element of discrimination that is essential in qualifying an act of persecution is also missing when considering climate change as its impacts are not discriminatory per se in nature. The only protected cases by the convention that could involve an element of climate change would be the situation in which climate impacts allow the states to take discriminatory actions against a group of people under their jurisdiction. For example; by restricting help after a natural disaster that they should experience. However, what is being condemned is the state action in response to climate change impacts.

Considering the ill-fitted use of international convention to protect trans-border “climate migrants” by trying to fit them in the existing definition of refugee or migrant, perhaps another angle of approach for the second pathway could be adopted by examining if climate change impacts could per se be considered as a form of persecution. Therefore, shifting attention towards the qualification of climate impacts, instead of their observed consequence in the form of population displacement.

As such, climate change is not discriminatory in its impact as some regions - due to their geographical position - are more exposed and vulnerable to it. Still, the lack of mitigation actions from the most polluting states could be seen as discriminatory towards the developing and vulnerable nations which often have much smaller emissions. This approach

“ The lack of mitigation actions from the most polluting states could be seen as discriminatory towards the developing and vulnerable nations ”



would call of course for some adjustment of the “persecution” definition, mainly by broadening it to actions by a state causing situations of persecution suffered by population in another state. It could also result in a stronger obligation for global mitigation actions and reinforce the emerging doctrine of “responsibility to protect”. Even though the doctrine did not emerge in the context of climate change at first, it could find a broad scope of application in the context of climate displacement for its prevention and provision of permanent and sustainable solutions for those forced to be on the move. As such the doctrine entails the obligation for states to protect their citizens from avoidable disaster and shifting this obligation, in the case when the primary state can’t or don’t want to protect its population, toward the broader community of states. By allowing trans-border migrants to claim protection against climate impacts from their countries or the international community more effectively. ■

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SOUTHERN AFRICA, RAVAGED BY MULTI-CLIMATIC HAZARDS

CLIMATE CHANGE IS AFFECTING SOUTHERN AFRICA



CATERINA SANDERS

Sherpard Zvigadza

As African leaders finished their business during the recent Climate Action Summit held in New York, leaders returned home to face the reality of climate change. Climate change has had a devastating impact on the most vulnerable developing nations in Africa.

Agriculture is the most important economic sector in most Southern African countries. It represents approximately 30% of Africa's GDP and contributes about 50% of total export value of the Southern African Development Community (SADC) region collectively contributing less than 1.3% of the total global emissions. Africa as a whole has contributed about 3.4% CO₂ of the total global average, yet it is the most affected continent. The African continent is particularly vulnerable

to the impacts of climate change and Southern Africa has not been spared the effects of climate change. This vulnerability is due to a large number of contributing factors; including widespread poverty; recurrent droughts; inequitable land distribution; and overdependence on rain-fed agriculture.

IPCC reports predict reduced precipitation in Southern Africa in the next 100 years. The scientific basis of climate change concludes that globally average surface temperatures have increased by 0.6 +/- 0.2C during the last 100 years. Although adaptation options, including traditional coping strategies, theoretically are available, in practice the human, infrastructural, and economic response capacity to engage timely response actions may well be beyond the financial means of some countries. This vulnerability is because a large share of its economies depend on climate-sensitive sectors,

mainly rain-fed agriculture, which is then compounded by widespread poverty, poor infrastructure, high illiteracy rates, over-exploitation of natural resources and tribal conflicts (Shah et al 2008). All these factors, in addition to limited institutional and technological capabilities, have contributed to Africa's low adaptive capacity.

The continent's high physical sensitivity to climate change is expected to result in increased average temperatures and more rainfall variability, both of which are going to severely impact people's livelihoods. Southern Africa is currently experiencing the impact of climate change, manifesting itself through drought and, to some extent, flooding. Again, just like other African regions, the challenge with Southern Africa is that it relies on rain-fed agriculture and does not have the adaptive capacity to cope with such severe and compounded climate impacts. Severe drought has continued into 2019, as multiple regions in Southern Africa have seen significantly reduced levels of rainfall.

Southern Africa is a predominantly semi-arid region with high rainfall variability, characterised by frequent droughts and floods. The region has suffered from occasional droughts which often leave the affected areas without adequate food, and in need of external assistance. The period between 1985 and 1995 was disastrous for many rural communities, especially in Zimbabwe, Mozambique, southern Zambia and northern South Africa. Boreholes dried up, making it impossible to grow crops or maintain livestock herds, forcing women and children to walk further and further to collect water to meet their families' needs. The 1991/1992 drought-hit particularly hard, putting more than 18 million people in 10 countries at risk of starvation. Urban dwellers were also affected.

Food production per capita has been falling in most SADC countries. Various factors, including the lack of appropriate inputs, intensified the further utilization of already largely marginal land and the decrease in the area available for crop production and the increasing frequency of extreme climate variability have affected this pattern.

The World Food Programme (WFP), recently reported that in late 2018 and early 2019 many western and central areas experienced the driest growing season in a generation, causing widespread crop failure in Zimbabwe, northern Namibia and southern parts of Angola, Botswana and Zambia. There are 9.2 million people now experiencing "crisis" or "emergency" levels of food insecurity in eight Southern African countries. The number is projected to rise to 13 million early next year, unless timely assistance is provided.

The WFP further reported that a record 45 million people in the 16 SADC nations face severe food insecurity in the next six months. Persistent drought, back-to-back cyclones and flooding have wreaked havoc on harvests in a region overly dependent on rain-fed, smallholder agriculture.

“The continent's high physical sensitivity to climate change is expected to result in increased average temperatures and more rainfall variability”



HANNA MORRIS

At a glance: Country specific impacts

Botswana

Botswana has always been experiencing water challenges due to its desert-like conditions. Water has always been a challenge, but the current dryness had reigned havoc on its wildlife. In Botswana wildlife such as elephants has been reported dead due to lack of water.

Eswatini

Eswatini's hunger crisis is deepening, fuelled by drought, a poor harvest and other socio-economic factors.

Lesotho

Two drought-stricken harvests in succession - cereal production dropped by 36% in 2018 and by 70% this year - have contributed to an alarming surge in severe hunger in Lesotho.

Madagascar

With 25% of families in Madagascar's drought-prone south are now suffering crisis and emergency levels of food insecurity, up from 20% in July, with acute malnutrition rates still stubbornly high.

Mozambique

In Mozambique, 2 million people have experienced crisis and emergency levels of hunger due to the effects of cyclones and flooding in the centre and north of the country and drought in the south.

Namibia

Large parts of Namibia have been experiencing severe drought conditions since as far back as 2013. Animals dying in large numbers, leaving many farmers skirting financial ruin, as all reserve grazing grounds have been decimated. More than 40% of its 2.5 million people are now characterized as severely food insecure.

More than 41 000 cattle have died over ten months, while severe livestock losses are currently being experienced across the country due to the severe drought. More than 60 000 livestock, including 41 949 cattle, 10 377 sheep, 25 651 goats and 584 donkeys have perished due to drought between October 2018 and July this year. About 312 horses have also died.

Drought in Namibia has also led to the rise in stock theft

incidences as a result of low water levels in the river. The drought in the Zambezi Region has affected communities, particularly people who own livestock such as cattle and goats. The low water levels in the Zambezi River, has gone down and made it easy for the herders to steal and transport cattle and goats across the river from Katima Mulilo in Namibia, all the way to Zambia.

South Africa

The Northern Cape Province is currently experiencing persistent drought in all of its five districts. Now below-average vegetation condition is being experienced over most areas, whereby almost 15 500 farms with a carrying capacity of about 613 447 large stock units.

Zimbabwe

Zimbabwe experienced hostile weather conditions during the 2018/19 cropping season (October-June), including extreme rainfall deficits and the impact of Cyclone Idai. The combined effect of these events caused a steep decline in the area harvested and lowered yields. Consequently, there has been a drop of 40% below the previous five-year average of maize output. With Zimbabwe enduring its worst hunger emergency in a decade because of drought, flooding and economic crisis.

As of July 2019, Zimbabwe government declared a food emergency at the national scale. The floods caused by hurricane Idai during March 2019 damaged harvests in Zimbabwe, Mozambique and neighbouring regions, enhancing the risks for food security, especially in those areas already affected by drought.

In so many areas, urban areas like Harare, most boreholes have run dry, and this has seen many residents scrounging and queuing for water at any available source. This lack of water access has created conflicts like fighting as women try to fetch their water first before the water dries up. Time taken by women to look for water is now longer than before 20 minutes to 3 hours, impacting time they are able to give to other tasks.

Moving forward, there is a desperate need to develop effective and appropriate adaptation and mitigation strategies, it is crucial to understand the impact of climate change on different livestock and crops. Therefore, there is a need for the southern African countries to work together and prioritize issues affecting all its citizens beyond sectarian interests. ■

Sherpard Zvigadza is a seasoned environment and development expert, with special experience in climate change Adaptation, renewable energy technology development policy and acting as advisory to civil society and government in Zimbabwe in the areas of climate diplomacy and advocacy. He is also a Visiting Researcher at the International Center for Climate Change and Development

THE NEED FOR ADAPTATION TECHNOLOGY IN THE FACE OF NATURAL DISASTERS

AS CLIMATE CHANGE MAKES NATURAL DISASTERS MORE COMMON, BETTER TECHNOLOGY IS NEEDED TO ADAPT



COLIN BEHRENS

Mahmuda Mity and Tania Ahmed

Sobulen Sarder of Mongla village was leading a happy life with his wife, daughter and son. Besides his house, he had two ponds which were full of various freshwater fish. Surrounding his home were a lot of fruit and vegetable trees. He would sell these fruits and vegetables after meeting the family demands. His wife raised chickens, ducks, goats and cows. From all of these, he could make enough to fulfil his family's needs.

In 2007, Sidr hit the area and destroyed Sobulen's house and trees. All the livestock, including the fish, were washed away. Several NGOs provided relief, but he was too shy to take it as he belonged to a middle-income family. During this time, he had no other way to make money except as a day labourer. Therefore he started to work in different places as a day labourer and his wife began cultivating vegetables and raising chickens. They began to manage their family needs, but in 2009, cyclone Aila hit the area and destroyed everything again.

Currently, Sobulen works as a day labourer and his wife tries to cultivate vegetables, although salinity intrusion makes it challenging. They are also trying to cultivate fish, but it is not working well. Now Sobulen is unable to feed his

family three times a day after paying his children's educational fees.

This story is of a man who lives in an excessively saline region. Though Bangladesh has made remarkable progress in domestic food production over the past three decades, many people like Sobulen are not able to manage proper meals three times a day. According to the IPCC, Bangladesh will lose 17% of its land and 30% of its food production by 2025, which will, in turn, increase poverty. As agriculture in Bangladesh is heavily dependent on the weather, a little change of climate or weather patterns can have a massive impact. One cyclone or flash flood can destroy a large number of seasonal harvests.

Furthermore, 30% of cultivable land is found in coastal areas where soil salinity is increasing due to sea-level rise, cyclones, and tidal flooding. It is estimated that 27,000 tons of rice would be lost due to high salinity in 2030 (Rahman et al, 2018). Each year almost 2.6 million ha crops are affected by severe floods, and about 2.7 million ha of land are vulnerable to severe drought in Bangladesh (Rahman et al, 2018). In order to ensure food security, agricultural adaptation must be prioritised.

To adapt better technology and farming processes, the government of Bangladesh has already established policies and programs. The National Adaptation Program of Action (NAPA) and Bangladesh Strategy and Action Plan (BCCSAP) are two of these endeavours. Besides these government actions, agricultural research institutes, including the Bangladesh Agricultural Research Centre (BARC), have scientists working on innovative adaptation technology. The Bangladesh Rice Research Institute (BRRI) has developed drought and flood-tolerant rice varieties, and the Bangladesh Institute of Nuclear Agriculture (BINA) and the Bangladesh Agricultural Research Institute (BARI) have invented crop varieties which can resist the adverse effects of natural calamities.

Continuing this vital research and implementing adaptation policies are crucial in ensuring food security for Bangladesh. ■

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