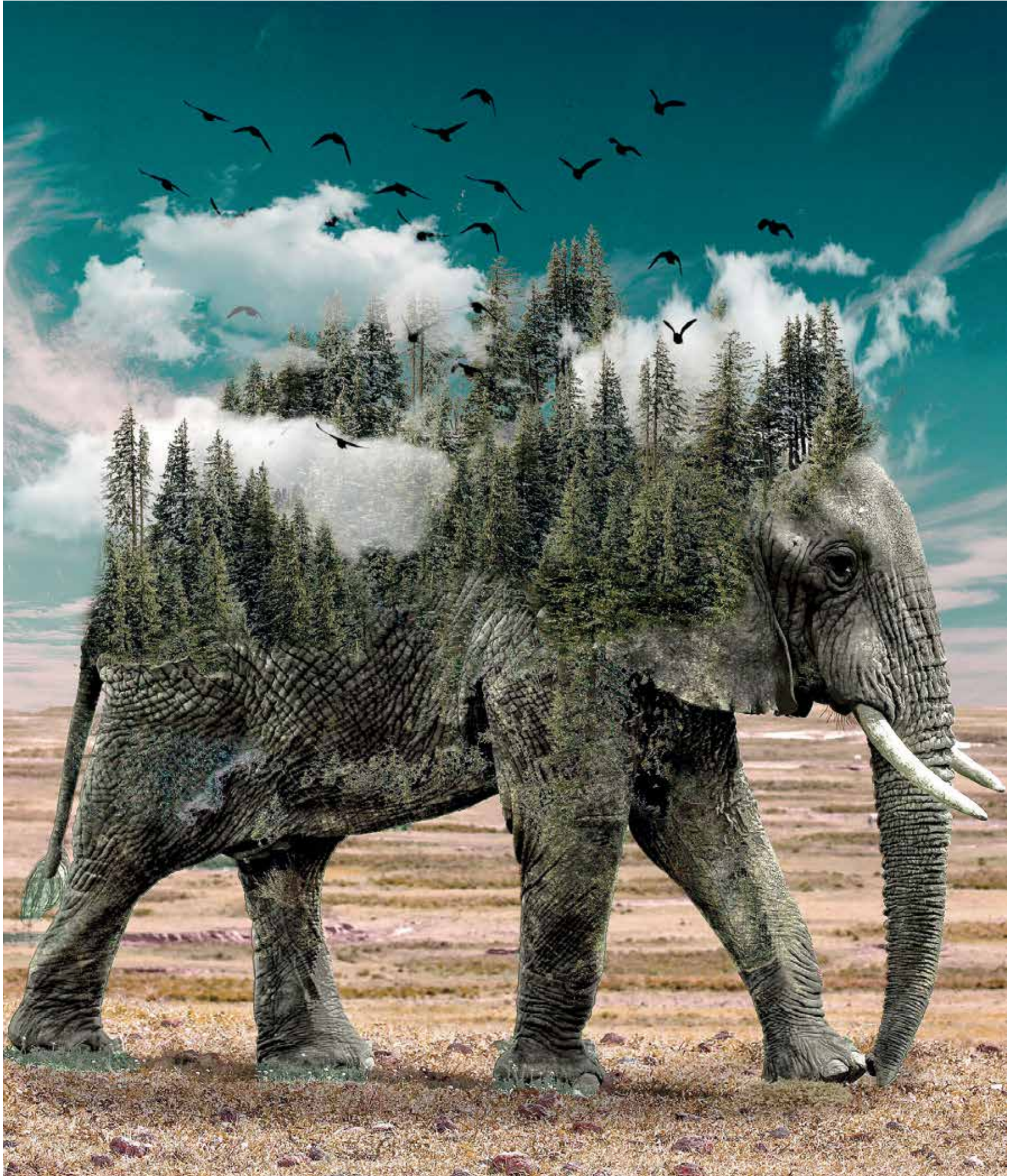


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Climate Tribune



Nature-based solutions should be an integral part of locally-led adaptation

Even though the term nature-based solutions is relatively young, its philosophy is being practiced globally for decades, if not centuries

Haseeb Md Irfanullah

To keep global temperature rise below 2 °C, countries around the world are promising to cut carbon emissions, though quite slowly. But, despite such climate mitigation measures, the effects of climate change will continue over the decades to come. And, we will need to continue adapting to changing climate and be resilient.

We often say, with subtle romanticism, whether governments act judiciously or not, people facing climate change will continue to adjust to its effects in their own ways. Climate vulnerable peoples' knowledge, their bravery, their improvisation – from Peru to the Philippines, from Sub-Saharan Africa to Small Island Developing States (SIDS) – have been widely praised on countless occasions over the past two decades.

While we appreciate individuals' triumphs, facing a crisis like climate change is too much for individuals, families, neighbourhoods, or even for a country. We need collective global actions. But, we have to play our individual roles so that our collective efforts can join together at appropriate levels of our social, administrative, and global structures.

But, which lowest level would make our adaptation action effective? We see, feel, and experience climate change impacts in a specific geographical area we live in, grow our food, collect our water, earn our living. It is, therefore, logical to plan for adaptation keeping in mind the local surroundings.

We often see our surroundings as administrative units – a village, a municipality, or a district. But, climate change

operates in a much bigger geographical area beyond artificially defined units. The floodwater, for example, we see in Belkuchi of Sirajganj district of Bangladesh enters from the Brahmaputra River flowing down from China through India. Bangladesh is only 8% of the Ganges-Brahmaputra-Meghna Basin. What happens in 92% of the catchment in Bhutan, China, India, and Nepal influence Bangladesh's waters significantly under changing climate.

In recent years, the importance of

Locally-led Adaptation (LLA) has been extensively discussed, especially how to make it effective and impactful. LLA is when communities, community-based organizations, federations, local governments, and others working at the local level identify, prioritize, plan, implement, monitor, evaluate, and learn from adaptation actions. Such actions are supported by national governments, development partners, civil society organizations (CSOs), and private sector agencies by closely working with

local-level entities.

LLA actions include a wide range of ingenious solutions addressing diverse climate-related challenges. These solutions are effective at different scales offering direct and indirect social, economic, and environmental benefits to the communities. But, if we look into the world's climate-vulnerable peoples, almost all directly depend on nature for their lives, livelihoods, and well-being. It is, therefore, natural to find adaptation solutions in nature. That brings



Figure 1: Nature-based Solutions (NbS) is an umbrella concept of ecosystem-based approaches to address societal challenges, such as climate change mitigation and adaptation, disaster risk reduction, economic and social development, human health, food, and water insecurity, and environmental degradation and biodiversity loss, giving both human wellbeing and biodiversity benefits. Source: IUCN Global Standard for NbS (2020)



Bangladesh is only 8% of the Ganges-Brahmaputra-Meghna Basin. What happens in 92% of the catchment in Bhutan, China, India, and Nepal influence Bangladesh's waters significantly under changing climate

us to the concept called Nature-based Solutions (NbS).

As a term, NbS is relatively young. But its philosophy is being practiced globally for decades, if not centuries. We are troubled by many societal challenges, such as climate emergency, biodiversity loss, and water and food insecurity (Figure 1). When we protect our ecosystems, like wetlands, hills, or forests, restore the degraded ones, manage their resources sustainably, or create new ecosystems, in such a way that they help us to tackle our societal problems effectively and adaptively – we practice NbS.

The beauty of NbS is, while overcoming our problems by using nature, we not only ensure our well-being but also contribute to the benefits of biodiversity and ecosystems. These dual benefits separate NbS from pure conservation actions (that only give biodiversity benefits) and community development actions (that only give socio-economic benefits to people from using natural resources).

NbS is an umbrella concept; it brings together many ecosystem-based interventions, actions, and approaches. From a climate change point of view, sister approaches such as ecosystem-based adaptation (EbA), ecosystem-based mitigation (EbM), and ecosystem-based disaster risk reduction (Eco-DRR) are all

examples of NbS since ecosystems and biodiversity are used in them to adapt to climate change, mitigate it, and reduce disaster risks, respectively.

Like LLA, our understanding of NbS is still taking its shape. It is therefore important to know which issues are critical to defining NbS. Without that, there is a possibility of misunderstanding, misinterpreting, and misusing NbS, which may have a negative impact on our society and environment.

In February 2020, 20 leading environmental organizations proposed four guiding principles for successful NbS (nbsguidelines.info). They noted that NbS should not be considered as an alternative to the rapid shift to clean energy that we so badly need to keep the world cooler; NbS should ensure that our ecosystems continue capturing carbon, rather than releasing carbon; and NbS should enhance biodiversity and avoid, for example, large-scale tree plantations with single, non-native species.

But most importantly, NbS should be implemented with full involvement and approval of indigenous peoples and local communities, apply strong social protection mechanisms, build human capacity for adaptation, and recognize, respect, and uphold livelihoods and human rights during implementation.

These points, especially the last one, are echoed in IUCN's Global Standard for NbS. In July 2020, pulling together its two-year effort involving 800 experts from 100 countries, IUCN proposed this standard for designing and practising NbS. This standard has eight criteria and 28 indicators (Figure 2). The criteria remind us what issues make an NbS effective. Let me explain it with an example.

Imagine a hilly catchment of a river that got heavily degraded due to rampant tree cutting. As a result, we see high soil erosion, landslide, silted up rivers, much bigger floods, high human sufferings, asset loss, and infrastructure destruction. Climate change is also making things worse. So, we want to restore the catchment with a plantation program – an NbS.

Addressing one or more societal challenges is the first criterion of IUCN NbS Standard – here we want to address three: environmental degradation, disaster risks, and climate change adaptation. To meet the second criterion, we need to estimate the scale of the problem, so that we can design an effective plantation program. We also need to check if our plantation program will increase biodiversity and improve ecosystem integrity (third criterion) and is economically feasible (fourth criterion).

The fifth criterion addresses the social

and governance aspect of the NbS. It is crucial that an NbS is designed and implemented by involving local and indigenous people of the locality. It should have a proper grievance resolution mechanism for the affected people. Participation of all stakeholders should also be based on mutual respect and equity.

When we implement a catchment restoration program, although it enhances certain ecosystem benefits, it may reduce some other ecosystem benefits. So, we should ensure that such trade-offs are estimated, agreed upon, and maintained (sixth criterion). The restoration program should have monitoring, evaluation, and learning system so that new evidence can continue supporting management decisions (seventh criterion). The eighth criterion of the standard expects that an NbS, like catchment restoration, should not be confined in the area where it is implemented. It should be widely practised in similar conditions and should be mainstreamed through a change in policies and regulations.

So, we now have sufficient guidelines in hand to effectively design, implement, monitor, and scale-up NbS to fight climate change. We also have a large number of research and analyses to understand what works and what does not work naturebasedsolutionsinitiative.org). We do need to remember a wide range of issues while implementing NbS, but among them, local peoples' and institutions' participation is very critical.

Global initiatives and processes, such as the Global Commission on Adapta-

tion (gca.org) and the COP26 (ukcop26.org), are showing increasing interest both in LLA and NbS. As we continue to develop principles for LLA, to find ways to fund it effectively, and to identify indicators to monitor and evaluate it, it is high time to make LLA stronger by integrating NbS into it.

Bangladesh has long experience in community-based natural resource management, community-based adaptation (CBA), and ecosystem-based adaptation. The country can therefore lead the way on how LLA can adopt and implement NbS effectively. The Bangladesh Climate Change Trust Fund (\$443 million invested in 789 projects); the Bangladesh Delta Plan 2100; the Mujib Climate Prosperity Plan (2021–2030) (due in March 2021); an updated Nationally Determined Contributions (NDC) 2020; an updated Bangladesh Climate Change Strategy and Action Plan (BCCSAP); and the National Adaptation Plan (NAP) (due in May 2021) are creating real opportunities for Bangladesh to prioritize NbS as a core adaptation option in LLA.

Since nature is crucial for climate-vulnerable people, the landscape they live in should be part of their local adaptation solutions – nature-based solutions have to be an integral part of locally-led adaptation. Can it be a New Year resolution of Bangladesh in 2021? ●

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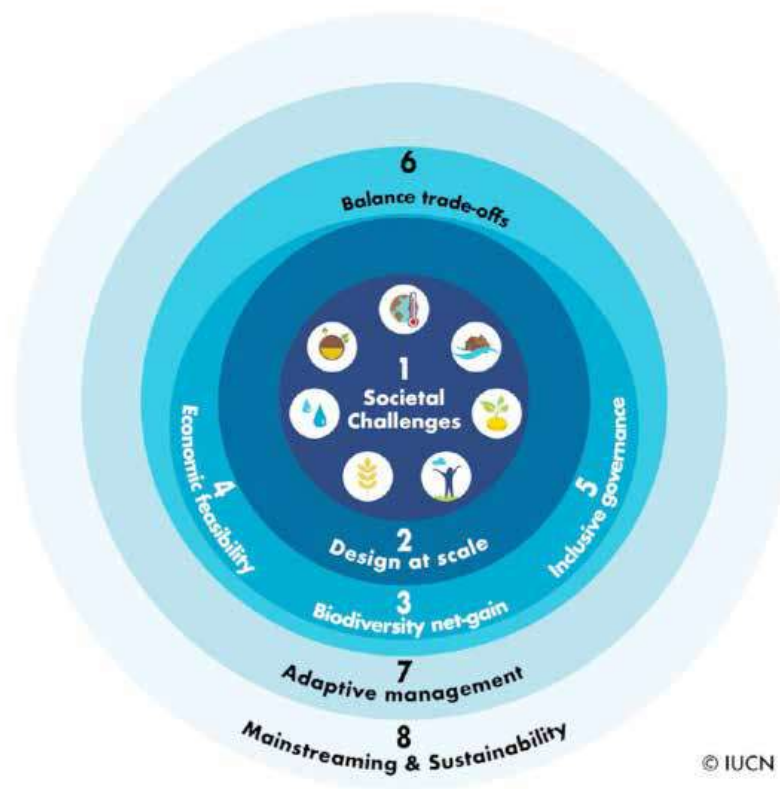


Figure 2: The eight criteria comprising the IUCN Global Standard for NbS. Source: IUCN Global Standard for NbS (2020)



Karail Slum Mohakhali

SYED ZAKIR HOSSAIN

Imagining a pristine Dhaka by adopting NbS

Protecting, restoring and conserving the wetlands for enhancing urban resilience

Tasfia Tasnim and Saleemul Huq

Over the past few years, news items have been added on the list of things severely degrading the condition of Dhaka city's natural landscape. The megacity housing almost 20 million people is enduring high population growth and rapid unplanned urbanization. We are putting a lot of stress on our water resources (lakes, rivers, canals, wetlands, floodplains) by trying to meet the increasing demand for a larger group of population, discharging untreated waste from industries and municipal sewage, disposing solid wastes, unplanned development and encroach-

ment, and pollution.

Dhaka -- established on the bank of Buriganga River about 400 years ago, encircled by the four rivers Buriganga, Turag, Balu and Tongi Khal -- city had the potential to grow like Venice, having networks of over 65 lakes and canals crisscrossing the metropolis. But we have destroyed the natural drainage system by heading towards a wrong development pathway. Hence, the question is, can we imagine a new Dhaka, which develops in an environmentally friendly and sustainable manner?

Lots of policies and planning with little implementation

The Bangladesh government is recog-

nizing the importance of restoration and sustainable management of water-bodies. The Dhaka Structure Plan (2016 - 2035) suggests that the city would need to conserve its water retention area, canals and rivers and flood flow zones. Some other notable policy measures by government include declaring the four surrounded rivers (Buriganga, Turag, Balu and Shitalakhya) of Dhaka city as Ecologically Critical Area (ECA) in 2009 to halt the rivers' degrading water quality, forming National River Conservation Commission (NRCC) in 2013 to recover the water-bodies from illegal encroachment, prioritizing the revitalization of waterbodies in the Seventh Five Year Plan.



Dhaka is now rapidly expanding eastward in an unplanned manner, but the eastern part of the city still has wetlands and croplands

The Eighth Five Year Plan is also aiming to ensure balance between the country's economic development and natural resource conservation, and hence considering to include components like recharging groundwater tables and restoring the water-bodies. The Investment Plan of the visionary Bangladesh Delta Plan (BDP100) also proposes substantial investment up to 2030 on rivers around Dhaka city along with other natural resources. Recently, we are also hoping that the upcoming Detailed Area Plan (DAP) 2016-35 will transform Dhaka into a liveable city as it aims for building a resilient city along with recovering the degraded ecosystem and conserving them.

Despite all these policy measures and efforts from the government, we have not been able to restore the water-bodies and protect our ponds, canals, rivers and flood flow zones. But why? Because in all these years, we have only been thinking about development first, growing our economy and business, at the cost of destroying our nature. It is, however, possible to find solutions in nature itself.

Embracing Nature-based Solutions (NbS) through protecting urban water-bodies

In recent years, we have been talking about an umbrella concept called Nature-based Solutions (NbS) which covers a wide range of ecosystem-based approaches and people-centric activities, and addresses different societal challenges and providing biodiversity benefits. In most cases, these solutions are cost-effective and easier to maintain than conventional infrastructure. Now, let us see how adopting NbS can help in enhancing urban resilience, disaster risk reduction and climate change adaptation:

As we all know, Dhaka is now rapid-

ly expanding eastward in an unplanned manner, but the eastern part of the city still has wetlands and croplands. However, development of structures can be observed in the floodplain zone in the name of protecting people from flood or increasing agricultural production, which is impacting the fishermen or farmers living adjacent to the floodplains. This type of haphazard development is also impacting the fish biodiversity on the floodplain ecosystem as these areas act as the breeding and nutrition ground for the fisheries, making the fishing communities vulnerable with the loss of fish production. Thus, we can observe a shift in these communities from their traditional occupation to other economic activities.

However, protecting those wetlands will help us not only environmentally, but also economically, by protecting us from urban climate risks, like flooding during heavy rainfall. Let us see how. By adopting NbS through conserving the remaining wetlands, flood flow zones along with floodplains; reclaiming the already grabbed canals and water-bodies; restoring degraded wetlands creating water retention ponds will enhance the ecosystem and enrich biodiversity in these areas. Also, all these peri-urban areas are home to many fishermen and farmers, who are basically dependent on the nature-based livelihood options in these floodplains and wetlands. They have their own indigenous practices to build their houses in the floodplain lands and practice traditional agriculture and fishing. By protecting and conserving these wetlands, it will help secure their rights over these areas, and prevent eviction from their homes and occupation, which also allows them to have socio-economic rights and freedom. In addition to all these benefits towards biodiversity and local people, protection of these wetlands and floodplains will help dealing with ur-

ban flooding and waterlogging. Thus, we can think about development in a nature-friendly way, which should not encourage destroying the natural wetlands and floodplains.

Missing puzzles in urban policy and planning documents

The DAP is considering the revival and restoration of the wetlands in their first draft through identifying the water-bodies, and demarcating rivers, canals, water bodies, water retention and catchment areas according to the mouza map. It also proposes an approach called "Urban Lifeline" which would design 566 kilometres of water-bodies and canals to enhance communication instead of only having them as drainage channels which will regulate the microclimate, connect human and nature, and enrich biodiversity. However, there has been some criticism going on around the upcoming DAP, because of delays in the the process of finalizing the plan, proposing modification to flood flow zones, not considering the "blue network" proposed in the Dhaka Structure Plan, not giving enough importance to conserve water-bodies, or not considering housing options for poor and low-income local communities, and so on. And this is the case for many urban development related policies and planning documents, with a crying need to have critical evaluation of these documents by all stakeholders.

Acknowledging and implementing NbS to envision a new Dhaka

A detailed analysis and evaluation in policy design, guideline and monitoring would help bridge the gaps, apply best local practices and promote NbS for protection, conservation and restoration of water-bodies, and nature-friendly development of Dhaka city. Therefore, what must be developed is a robust and evidence-based framework for the economic, social and environmental benefits of NbS, which can be used by local, regional and national level policymakers to enhance urban climate resilience for promoting inclusive urban regeneration. Our plans need to be adaptive, with the changing climate and changing ecosystems, to enhance the urban ecosystem services. Now is the time to acknowledge NbS as one of the most prudent responses to the numerous challenges posed by climate change. For the realization of liveable cities, we need to bring change in the mindset of policymakers, decision-making bodies, planners, engineers, architects, on the ground implementers, businessmen, economists and citizens.

Through protecting or restoring water-bodies, and or blending green-grey infrastructures for water-resource management, many countries have set examples on how to utilise NbS for an environment friendly development as well as natural resource management. China's 'Sponge cities' utilise a number of green-solutions approaches with pervious pavements and wetlands restoration through recycling rainwater to improve the water availability in urban neighbourhoods, while protecting three watersheds in New York City since 1990 has been providing the largest unfiltered water supply in New York City since 1990, saving up to more than \$300 million. Therefore, can we reimagine the future of Dhaka City by adopting NbS to protect, restore and conserve our urban wetlands to enhance our cities resilience for disaster risk reduction and climate change adaptation? The answer should be a resounding 'yes.' ●

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China's 'Sponge cities' utilise a number of green-solutions approaches with pervious pavements and wetlands restoration through recycling rainwater to improve the water availability in urban neighbourhoods



A plinth built under Friendship project

Climate-induced displacement can be prevented through NbS

Environmental shocks are already a leading source of forced displacement worldwide having caused 25 million displacements globally in 2019 alone

Kazi Amdadul Hoque and Towrin Zaman

During one of my work travels, I had met Mintu sitting under the shade of a tree, at a juncture between Dhaka and Chandra. When enquired about it, he shared about having been forced to migrate to Dhaka after losing his home in Jamalpur to floods. He still visits his hometown every year in hopes of one day rebuilding his habitat there. Mintu is among the thousands who were forced to migrate to the capital to start over after being displaced due to natural disasters. Not only does the city get overburdened, but more often than not, the displaced people too, do not achieve what they had set out for.



FRIENDSHIP.NGO

Human displacement, forced or otherwise, is a climacteric consequence of environmental degradation and was identified as the greatest impact of climate change by the first Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). In fact, environmental shocks are already a leading source of forced displacement worldwide having caused 25 million displacements globally in 2019 only (HDR 2020) with estimates suggesting a total of 1.2 billion people at risk of being displaced by 2050 (Kulp and Strauss, 2019).

According to the Internal Displacement Monitoring Centre (IDMC), Natural disasters in Bangladesh triggered new displacements of 4 million people in 2019 and 2.5 million people within only the first half of 2020. A 2014 report by the government of Bangla-

desh acknowledged that by 2050, 1 in every 7 people in the country could be displaced due to climate change. The settlement of these environmental refugees will pose a serious problem for an already overpopulated Bangladesh (BCCSAP 2009). People from the northern and coastal areas are the most vulnerable to the soaring risk of internal displacement due to climate change. As a result of forced displacements, these people usually encounter livelihood challenges and are consequently propelled to migrate to the major cities to start over. This not only overburdens the cities but also more often than not results in failure for the displaced people in achieving their goals. Needless to say, there is no winner in this scenario.

Climate change is evidently the major cause of the increasing frequency of disasters affecting Bangladesh in recent years. Firstly, a global-warming-induced rise in sea surface temperatures in the Bay of Bengal is causing tropical cyclones at a higher frequency. Furthermore, due to global warming, a decrease in precipitation in the dry seasons causes more intense droughts in the Northwestern region, while increased rainfalls in monsoon lead to prolonged and intense floods in other regions. Friendship, a Bangladeshi Social Purpose Organization (SPO) conducted a study in 2014 as part of its initiative called Community Initiated Disaster Risk Reduction (CIDRR) aiming to strengthen locally-led adaptations and reduce the vulnerability of people from remote areas. The project which was implemented in 53 communities in 9 sub-districts from northern districts of Gaibandha and Kurigram, and southern districts Patuakhali, Barguna, and Satkhira of coastal Bangladesh, helped gain an understanding of trends related to risk, displacement, and adaptation solutions. It found that 56% of displacements in northern regions were due to riverbank erosion while 6.6% were due to flooding, and 5.3% displacements in the southern regions were due to flooding. Later, a 2017 end-line study in the same areas projected an increased displacement rate with 85% of the displacements occurring because of riverbank erosion, 56% from flooding, and 3% due to cyclones.

As an aftermath of that study, Friendship introduced a Nature-based Solution (NbS) called 'Green Infrastructure' involving the construction of plinths or raised platforms for accommodating the displaced people. Made from the soil of dredged river slits, these plinths also work as makeshift flood relief-shelters. They are constructed above projected flood levels and have oval shapes so

as to break the flow of water and slow it down to prevent erosion. Normally housing 25-30 displaced families, each of these plinths can accommodate 100-150 families during adversities. Moreover, through easily raising cattle sheds in these plinths, cattle can also be saved instead of being washed away by floods as is usually the case. Moreover, the construction of these plinths creates jobs for the local people. A perfect example of an eco-infrastructure and NbS to the displacement problem, these plinths last for about 15 years and function as cluster villages, having been implemented across 18 locations in the northern region of the country.

Nevertheless, these plinths are insufficient in solving another major effect of displacement - the lack of food and nutrition, particularly for the children alongside pregnant and lactating women, due to floods damaging their vegetable gardens, among other reasons. A possible solution for this was found to be the practice of growing vegetables in hanging tubs. Food production is another challenge for flood-prone area residents. Only in 2020, floods recurred five times in the coastal region of Bangladesh. The wary farmers waited for the first onset of the flood to recede before planting their seedlings but a second onset of flood caught them unaware and destroyed all their newly planted seedlings. Fortunately, the government provided them with preserved seeds to prevent food insecurity, although it was feared that many of the farmers from the remote areas were deprived of this aid. To avoid further such loss, Friendship collaborated with the government and came up with a NbS in the form of floating seedbeds. It entailed preparing seedlings on a floating raft made of bamboo or banana tree stems. These methods of seed preservation and floating seedlings provide nature-based-solutions to problems of food production caused by disasters and displacement.

Based on how NbS helped provide eco-solutions to seemingly insurmountable challenges like climate-change-induced displacement, it is proved that even the biggest of challenges can be overcome, if only manpower trained in green energy joined hands with the community. We believe that the combination of indigenous knowledge and the expertise of local level development agencies would create an invaluable synergy where nature along with human civilization can be benefited in many ways. With processes like Eco Disaster Risk Reduction solutions under the wider umbrella of sustainable development, no Mintu will ever have to



Made from the soil of dredged river slits, these plinths also work as makeshift flood relief-shelters. They are constructed above projected flood levels and have oval shapes so as to break the flow of water and slow it down to prevent erosion

be homeless again, and many yet, may find their way back. ●

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How environmental restoration and refugee protection are connected



Water reservoir-2 in camp-4 established in 2019

Adopting a nature-based solution approach to rejuvenate degraded ecosystems of the Ukhiya refugee camps

Mokhlesur Rahman

The Teknaf Peninsula of south-eastern Bangladesh possesses diverse ecosystems - mixed evergreen hill-forests, networks of forest-fed hill streams providing sources of freshwater, tidal river and the Bay of Bengal - supporting livelihoods of local communities, especially the poor.

However, living in this peninsular land also poses challenges such as over-use, encroachment, conversions of forest and riparian ecosystems, declining natural resources, water pollution, and

exclusion of the poor underpinned by weak governance. Climate change also manifests extreme events like cyclones, droughts, high temperature, erratic rains, flooding, erosion, landslides, crop loss. Furthermore, accommodating about a million Rohingya refugees in 2017-18 further exacerbated these challenges. The refugees living in such cramped camps have to face these challenges too.

To address these problems, UNHCR launched a project aiming at restoring the 8km long-degraded Madhur-Chhara stream basin in Kutupalong Mega Camp (KMC), Ukhiya in 2019. Originating from

the Ukhiya hill-forests, this stream flows down through forests, cropland, settlements, growth centers and finally merges with the Naf River on the southeastern part of the county bordering Myanmar. CNRS and UNHCR jointly designed the action plan adopting a nature-based solution (NBS) approach aiming to build socio-ecological resilience by creating an environment to enable strengthened refugee protection.

Madhur Chhara Restoration

Participatory planning with host and refugee communities prioritized urgent addressing of issues such as forest-cov-

er loss, water pollution, and consequent diseases, water-scarcity of dry-season, food insecurity. Accordingly, NbS intervention packages were developed with the focus on four areas viz. i) stream restoration, ii) water pollution management, iii) stream-bank stabilization, and iv) greening denuded camp areas. Among NbS interventions (reservoir creation, riparian vegetation) relates to ecosystem restoration (ER), some are (stream rehabilitation) ecosystem-based adaptation (EbA) and some (stream bank stabilization) relate to ecosystem-based disaster risk reduction (Eco-DRR).

Water-related interventions: Include stream widening, to increase carrying capacity, creating water reservoirs to store water year-round (Figure 1) for socio-ecological purposes. 4 water-reservoir and 1 slit-trap were built and 7 streams were rehabilitated over the period of 2019-2020.

Water pollution management: Three systems were piloted to reduce water pollution. These systems included a bacteria-based wastewater treatment plant for treating undrinkable water to use them for household and commercial purposes; constructing wetlands to make polluted stream-water cleaner, and planting Kolaboti (This plant has the ability to absorb /suck up excess pollutants /organic nutrients from wastewater)plants on streambeds to absorb the pollutants from the wastewater.

Stream-bank stabilization: Green approach was adopted along with the restored streams to protect and stabilize banks by maintaining adequate slopes, terracing, compacting, and planting vetivers and other local grasses on banks and slopes supported by bamboo poles.

Forest related actions: The re-greening principle was applied to the entire Madhur chhara basin through the riparian, block, institutional, homestead, and street plantations.

Interim results

Recently conducted third-party planting assessment reports revealed 80-90% survival of planted trees in 2019 within KMC areas bank protection and greening reduced flooding and erosion damages by increasing the carrying capacity of rain-based flood water, availing surface-water for longer periods than before (Figure 2). Wastewater treatment facilities and water reservoirs helped to reduce water-pollution and ensure year-round water security for the usage of the residents for various purposes. They also helped wildlife by enabling maintenance of groundwater aquifer levels

The biodiversity monitoring reports

revealed increased re-colonization of wildlife biodiversity in stream basin restored sites compared to campsites having no ecosystem restoration focus. 134% of higher wildlife diversity and a total of 76 wildlife species were recorded in the Kalam-Chhara restoration site in 2020, with only 34 species being recorded in the other non-restoration campsites. The restoration site not only witnessed increased numbers of species of Amphibians (10) and mammals (6), but it also had the most number of reptile species (15) when compared to other sites. These results give testimony of the effectiveness of NbS approach in rejuvenating degraded ecosystems, recolonizing biodiversity and increasing ecosystem services.

After the Rohingyas initially settled in the hill-settlements with no prior human settlements in 2017, they used the water from Kalam-chara basin for all purposes. Over-use of its water leads

to water pollution and scarcity. It leads to diarrhea, typhoid, and other skin diseases for the refugees too. (Akhter et al, 2020). They then had to rely on

water from unprotected dug wells for household purposes. While access to supplied-water mitigated their drinking-water crisis, water pollution and en-



To address these problems, UNHCR launched a project aiming at restoring the 8km long-degraded Madhur-Chhara stream basin in Kutupalong Mega Camp (KMC), Ukhiya in 2019



Figure 2: Positive changes of stream restoration and bank greening (camp-4). The images show the original condition and the aftermath of the restoration and greening initiative. The image on the left was taken in 2019 and the image on the right was take a year later in 2020

FIGURE 3: RIPARIAN ECOSYSTEM RESTORATION AND SOCIAL-ECOLOGICAL AND REFUGEE PROTECTION OUTCOMES

| Refugee protection outcomes | Refugees feel better protected. Ambient air quality, improved microclimate within camp areas Improved livelihood and reduced disaster risks Greater water security and dietary diversity | | | |
|--|---|--|--|--|
| Aesthetics, natural and mental peace | Water reservoirs, increased stream-water flows, fishing opportunities | Cleaner water - No bad odor and mosquito infestation | Green bank, walkways, fruits, vegetables, trees | Green landscapes, wildlife, low dust, soothing air, shelter from the sun |
| CC and DRR (adaptation and mitigation) | Microclimate regulation; Carbon sink, crop diversity / farming systems; Reduced flooding, landslides, and drought effects, | Reduced water-borne diseases; Stream bottom ecology; reduced degradation | House and soil protection, land fertility, stream productivity, water availability | Micro-climate regulation, carbon sink, Reduced drought effects; fewer floods |
| Food and livelihood security | Food security, nutrition and dietary diversity | Fish and nutrition, better health | Conservation agriculture, soil-protection | Plant-based food diverse systems, livelihoods |
| Biodiversity | Fisheries & aquatic diversity; Agricultural diversity | Fish and Aquatic biodiversity | Grass & bush-based diversity | Forest and wildlife diversity |
| Outputs of actions | Water availability | Cleaner water | Green & stable stream bank | Green cover in denuded land |
| NbS Actions | Water security (stream / reservoir restoration) | Wastewater treatment | Bank protection and greening | Planting/ Forest restoration |



134% of higher wildlife diversity and a total of 76 wildlife species were recorded in the Kalam-Chhara restoration site in 2020

environmental degradation still continued to pose problems. Najir Majhi, a refugee from camp 4 said:

“Camp houses are at the risk of collapse from monsoon floods due to hill-cutting and forest clearing which lead to soil and bank erosion and reduced carrying capacity of streams.”

The refugees reflected on water security issues by acknowledging an increase of water quality and availability due to ecosystem restoration with

stream-water now being used for household purposes. Unlike before, refugees now acknowledge that the presence of varieties of aquatic insects, frogs, and snakes in streams are indicators of water quality improvement (biological indicators).

Regarding water security and food production, Najir Ahmed, Refugee Majhi of camp 4 said:

“We get rice, pulses, oil, eggs as food assistance but not fish, meat, vegetables nor we get cash assistance - many refugees now cultivate vegetables in available land adjacent their homes and open spaces in the basin using water from streams most of which they consume and distribute among fellow refugees and rest sale for cash.”

Yasin, a refugee in Camp-4/Block-B, earned Tk5,900 from selling his self-cultivated vegetables in 2020. Stream restoration also has aesthetic values creating a soothing environment and leading to improved mental health and positive thinking. Najir Ahmed said:

“When in crisis, we are mentally disturbed and often physically torture our wives. We got wages from working in restoration and planting activities. We produce vegetables using stream water and earn cash and now we live in a better physical environment leading to a better mental condition keeping us from abusing our wives.”

The water reservoirs were appreciated by refugees for supplying the

camp with low-lying areas to retain year-round water and increasing water security.

Riparian ecosystem restoration also gives heat-protection through producing cool air. Furthermore, re-greening, stream restoration and reservoir creation collectively contributed to climate mitigation actions by storing atmospheric carbons. (Figure 3).

NbS as a way forward

The NbS interventions piloted in refugee camps demonstrated positive social-ecological outcomes in terms of increased water and food security, reduced climate-disaster risks, facilitating re-colonized biodiversity in restored sites. Interim observations confirm restoration schemes providing services for provisioning (food, water), regulating (carbon sink), cultural (aesthetics), and supporting (wildlife habitats).

It is now urgent to replicate the approach in other locations. UNHCR seems keen to expand the approach and a recent partnership between SMEP - engineering unit (formed by WFP-UNHCR-IOM) at Cox's Bazar has recently with CNRS to integrate NbS in engineering schemes, is an indication of adoption of NbS at wider refugee-impacted landscapes in Cox's Bazar. ●

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Trap that carbon



Mangroves in the south-western coastal Bangladesh

The REDD+ initiative as a Nature-based Solution can facilitate powerful climate change mitigation

Joy Bhowmik

Over the past four decades, forests have played an integral role in not only combating climate change but also in adapting to it. Forests absorb about one-quarter of the carbon emitted by human activities such as the burning of fossil fuels and also provide diverse ecosystem services that contribute to human well-being and reducing social

vulnerability. Despite our dependence on forests, humans are still widely allowing deforestation and forest degradation. Deforestation occurs due to forest destruction for accommodating non-forest uses such as agriculture and road construction. Forests face degradation when forest ecosystems lose their capacity to provide important goods and services to people and nature. These result in a higher concentration of Greenhouse Gases (GHG) in our

atmosphere and a consequent increase in global climate change.

Forest degradation in developing countries accounts for 25% of total emissions from deforestation and forest degradation. Annually 2.2 billion hectares of forest degradation causes 2.1 billion tons of carbon emission with 53% of it being derived from timber harvest, 30% from wood fuel harvest and 17% from forest fire (Pearson et al, 2017).

Tropical deforestation accounts for about 20% of anthropogenic carbon emissions equivalent to annual burning of fossil fuels burned in the USA, and higher than emission by the world's transportation sector (Gullison, 2007). Deforestation and forest degradation is also a common phenomenon in Bangladesh where 17% of the landmass is designated as forest but the actual tree-cover is estimated at around 10% (Reza and Hasan, 2019). The forests are mainly decreasing due to illegal logging, higher population growth, poverty, demand for fuel wood, fodder and timber, shortage of cultivable land, industrialization, development interventions, and natural disasters.



Tropical deforestation accounts for about 20% of anthropogenic carbon emissions equivalent to annual burning of fossil fuels burned in the USA, and higher than emission by the world's transportation sector



Wetland reforestation at Bangladesh's south-eastern wetland



The United Nations Framework Convention on Climate Change (UNFCCC) launched an initiative called 'Reducing Emissions from Deforestation and Degradation' (REDD) at the 11th sessions of the Conference of Parties in 2005 to guide activities in the forest sector that reduces emissions from deforestation and forest degradation

Deforestation and forest degradation declines the soil fertility, reduces the amount of fresh water sources and emits carbon dioxide in the atmosphere. So, it is crucial to take necessary actions to reduce the negative impacts due to deforestation and forest degradation. In this context, the United Nations Framework Convention on Climate Change (UNFCCC) launched an initiative called 'Reducing Emissions from Deforestation and Degradation' (REDD) at the 11th sessions of the Conference of Parties in 2005 to guide activities in the forest sector that reduces emissions from deforestation and forest degradation.

Eventually, the addition of the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries modified the initiative to REDD+, which is commonly referred to the Warsaw Framework for REDD+ (WFR). It was adopted at COP 19 in Warsaw, December 2013 with its rulebook finalized in 2015.

It is also recognized in Article 5 of the Paris Agreement where parties are encouraged to implement REDD+ activities. As the REDD+ framework is specially designed for removing carbon dioxide from the atmosphere through the build-up of biomass, and making forest lands a sink of greenhouse gases. To sum up, REDD+ activities include carbon emission reduction from deforestation and degradation, conserve forests, sustainably manage forests and enhance forest carbon stocks. If deforestation is stopped and degraded forests are restored, they can accelerate carbon

reduction in the atmosphere. So, forests are a pre-eminent Nature-based Solutions (Nbs) to the climate emergency.

If a country takes a carbon reduction initiative under the REDD+ framework, it needs to have the following elements - Forest Reference Emission Level (FREL), National Forest Monitoring Systems (NFMS), national strategies/action plans, and Safeguards Information System (SIS).

The FREL serves as a baseline for measuring the success of the program in reducing and removing greenhouse gas emissions in CO₂-equivalents (CO₂e) amount per year. Secondly, NFMS manages the program information and its reporting which requires following the guidance of IPCC and covers emissions and removals of greenhouse gases resulting from Land Use, Land-Use Change and Forestry activities (LULUCF).

Thirdly, National Action Plans focus on drivers of deforestation and forest degradation such as illegal felling, fuel wood collection, agricultural expansion, encroachment and poor governance. Finally, SIS indicates a list of safeguards such as respect for knowledge and rights of indigenous people, relevant stakeholders-participation, and consistency in natural forest conservation and biological diversity that countries need to address, promote and support in order to guarantee the correct and lasting results from the REDD+ mechanism.

Replanting in degraded, deforested, and newly accreted lands or regeneration of forests through proper maintenance,

helps carbon dioxide from the atmosphere. It assists in not only climate mitigation but also in promoting climate adaptation and boosting climate resilience and coastline-protection from storm-surges and sea-level rise through restoration of wetlands and mangroves.

Additionally, emission reductions by stopping deforestation is a low-cost solution with it costing less than \$100 a year to reduce a ton of carbon dioxide emissions. In this context, reforestation, sustainable forest management, improved plantations, and alternatives to wood fuel are some potential Nature based Solutions (Nbs) for climate change mitigation at forests under the REDD+ initiative. In fact, 42 percent of the total emissions reductions could be achieved from reforestation by reducing pasture lands, and reforesting all grazing land in forested eco-regions (Minemeyer et al, 2017).

Nearly 251.8 million megagrams of carbon are stored in the three forest ecosystems of Bangladesh. (Mukul et al, 2014). To address this, Bangladesh started preparing a mechanism to reduce deforestation and forest degradation for maintaining its carbon stock under UNFCCC since 2011 and officially launched the UN-REDD national program in 2016. The national program established a National Forest Monitoring Systems (NFMS) for Measurement, Reporting and Verification (MRV) to register reduction of GHG emission or enhancement of carbon stock over time, a Forest Reference Emission level (FREL), and a national REDD+ strategy.

In spite of all these actions, the real challenge against successful REDD+ program implementation in Bangladesh lies in finding out the nature and degree of forest dependence of the local peoples living in the forests and determining the tradeoffs between forest use and REDD+.

Adding to it are failure to build a strong forest governance structure and institutional linkages, lack of bottom-up approaches and limited participation of relevant stakeholders - particularly women in addition to local and indigenous communities. Bangladesh needs to implement strategies addressing these shortcomings and prioritize plantation and collaborative conservation impacts for forest-based climate change mitigation as REDD+ program policies. ●

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How science can align with indigenous knowledge to forecast weather

Not all old ways of predicting the weather are obsolete, and integrating some of them in nature-based disaster management can be very beneficial

*Savio Rousseau Rozario,
Mahmuda Akter, and Ali
Mohammad Rezaie*

From ancient Greek to medieval India, from Aristotle to Khona, the application of weather forecasting involved nature; through observing celestial objects, animal behaviours, floral response to changing atmosphere and other natural entities over time.

Early civilizations observed nature closely, and the recurrence of astrological and meteorological events helped them to monitor seasonal changes in weather. Around 650 BC, the Babylo-

ans tried to predict short term weather changes based on the appearance of clouds and optical phenomena such as haloes. The Chinese astronomers developed a calendar observing the changes in nature, which segregated a year into festivals, each representing different types of weather around 300 BC.

In India, during the early 9th to 12th century AD astrologer Khona's rhythmic words for weather forecasting based on natural entities became prominent and well-practiced among the farmers. One of her sayings predicted rainfall over the year if the wind flows from the North-Eastern direction at the beginning of the year, helping the farmers to

cultivate crops accordingly.

Moreover, in 'Meteorologica', Greek philosopher Aristotle mentioned the occurrences of various natural phenomena and made remarkable observations of weather. However, many of his ideas were overthrown around the 17th century during the Renaissance when it became evident that speculations of the natural theories were inadequate to understand and predict the changing atmosphere more accurately, leading to the necessity of innovating sophisticated instruments to measure the properties of atmosphere such as moisture, temperature, and pressure.





The UN General Assembly declared 2021-2030 as the UN Decade on Ecosystem Restoration, emphasizing a roadmap for renewed global action by both Indigenous knowledge and modern science

Nowadays, advanced technology and instruments help us observe and predict the weather system more precisely. However, nature dependent weather forecasting practices still prevail and to some extent are considered to be effective. For instance, many sailors in the deep sea yet navigate depending on their past observation which relates to nature based weather forecasting like 'Red sky at night, sailors delight. In the morning, sailors take warning' where a red sky refers to an increase of moisture in the air, indicating potential rainfall. If it is at sunset, it generally means the storm is moving away and if seen in the morning, the storm tends to head in. Similarly, 'Circle around the moon, rain or snow soon' refers to a predicted rainfall within a couple of days as the haze around the moon is caused by the air moisture.

Just like the sailors, indigenous communities in different parts of the world, such as African pastoral communities, predict weather through observing the natural entities, as they share a deep bonding with nature. While these communities do not have access to modern equipment, they heavily rely on nature to predict changing weather and seasons over time for a better harvest and perform their rituals.

Scientific studies show that indigenous communities tend to predict weather based on animal and floral behaviour as well. Some of their observations include daisies and pine cones

remaining close during the day ahead of the rain. Similarly, birds, bees and other flying insects are observed to fly low and head home right before foul weather as low pressure and dam condition makes their aviation uncomfortable.

A recent study (Zeng, 2016) also found that bees spent more time working outside their respective hives 24 hours before it rained than on a day preceding clear skies. The deer and elks are also found to make their way down from their mountain homes several days before a rainstorm.

All these natural entities help the indigenous and local communities to predict the weather, and they develop certain techniques to forecast the weather by involving nature to make important decisions that enable them to address certain challenges, most importantly climate-induced extreme weather variations. These practices of weather forecasting flow from generation to generation throughout their traditional knowledge and practices, helping to protect their landscapes from potential natural disasters, for better agricultural yield and boost their economy.

Scientists have been acknowledging and embracing indigenous wisdom and traditional knowledge for many years to ensure a better world, as indigenous knowledge has succeeded in conserving and restoring biodiversity in different continents and climate zones. However, many of these rich indigenous and traditional knowledge that ensures

sustainable living of millions of people around the world, are yet to be revealed and recognized.

In this regard, scientific and indigenous knowledge can go hand in hand, where scientific explanation can enhance the indigenous practices to be mainstreamed and to be recognized. Earlier this year, an indigenous organization in western Alaska named 'Kawerak' released a call for the indigenization of science, which included the sovereignty of indigenous knowledge. Besides, the UN General Assembly declared 2021-2030 as the UN Decade on Ecosystem Restoration, emphasizing a roadmap for renewed global action by both Indigenous knowledge and modern science, which would be financially and ecologically beneficial.

Indigenous knowledge and practices contribute to the sustainable use of natural resources. Currently in Bangladesh, more than 45 indigenous communities exist who live by and with nature for centuries. These communities depend on nature and developed practices to predict the weather for their survival, which are yet to be recognized. For instance, some indigenous communities in Chittagong Hill Tracts believe that ants climb up high during a hailstorm and cross roads prior to a cyclone, while they do both in case of heavy rainfall (Irfanullah & Motaleb, 2011).

Recognition, preservation, and dissemination of these traditional knowledge can enhance harmony between nature and humans, and ensure sustainability across the world. Many local and national governments, NGOs, academics and experts are working to preserve indigenous knowledge of weather

forecasting. For example: In Australia, the government runs the Indigenous Weather Knowledge Website Project; the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), a government agency in the Philippines, has also recognized the traditional weather forecasting knowledge.

Many countries ignore indigenous practices and knowledge and these systems and traditions are now on the verge of extinction. Thus, it is crucial to advocate for these practices as well as capacitating the indigenous communities to ensure the sustainable preservation of their knowledge.

Finally, actors such as government and non-government entities, academia and think tanks can contribute in discovering these forecasting practices, evaluate their efficacy and integrate them for nature based disaster management practices. ●

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Some indigenous communities in Chittagong Hill Tracts believe that ants climb up high during a hailstorm and cross roads prior to a cyclone, while they do both in case of heavy rainfall



PIXABAY

The perks of forming coalition and financial mechanisms in mitigation and adaptation

Coalition formation and financial mechanisms driving the uptake of Nature-based Solutions and increasing recognition of indigenous peoples

Afsara Binte Mirza, Anika Binte Razzaque, and Ali Mohammad Rezaie

Indigenous people and local communities (IPLCs) share a strong bond with their landscapes and seascapes. At least a quarter of the global land area is owned and sustainably managed by indigenous peoples. IPLCs conservation efforts can, thus, play a significant role in climate change mitigation. They also apply their traditional and local knowledge to adapt to change in climate and apply nature-based solutions (NbS) to ensure their livelihood and protect their communities from natural disasters.

However, indigenous peoples' rights, governance, and roles in tackling climate change are being undermined. The recent IUCN guideline for NbS promotes inclusive, transparent, and having an empowering governance process

in natural lands and its gaining traction in global climate change policy and advocacy discourse. Thus, It is crucial to acknowledge the synergy between IPLCs traditional knowledge, conservation efforts and NbS to tackle climate change.

This can be the impetus to form a coalition to enhance the rights of indigenous peoples to implement NbS persistently for halting climate change. The coalition can include a diverse range of actors such as non-governmental organizations (NGOs), international non-governmental organizations (INGOs), private sectors, and government. The potential coalitions can focus on the capacity building of indigenous peoples to enhance their rights, participation, and governance. This will aid to influence action-oriented capacity-building through knowledge generation by incorporating indigenous traditional and local knowledge for preservation.

The future coalition can also emphasize research, to consolidate disaggregated data on indigenous peoples and gather evidence-based approaches of IPLC-led NbS approaches. Moreover, the coalition can advocate for inclusive policy-making related to climate change and the environment.

Coalitions can assist to merge the resources and skills of diverse actors and leverage their comparative advantages. For instance, the current global coalition for NbS; NBS Manifesto comprises more than 70 governments, the private sector, civil society, and international organizations supplemented by nearly 200 best practices from around the world (UNEP, 2020). Similarly, the Rights and Resource Initiative (RRI) is a global Coalition of more than 150 organizations devoted to improving the forestland and resource rights of Indigenous Peoples, local communities, and rural women.

It is evident that indigenous peoples have mastered sustainability and prospered in ecosystems for millennia amid natural habitats and assisted in climate change adaptation and mitigation. To reimagine the world in the post-COVID-19 era, we need to recognize, acquire from indigenous peoples and their knowledge on how humans harmoniously live with the natural environment.

A Norwegian diplomat, Erik Solheim, who was involved in the establishment of the United Nations collaborative initiative on Reducing Emissions from Deforestation and Forest Degradation (REDD) shared several strategic factors for building efficient coalitions. Based on the REDD experience, he emphasized strong leadership, by country led and country-specific, application of right actions and sustenance of a clear focus on the expected outcome. Leadership is the scarcest natural resource on the planet, yet the most influential one. For instance, the charismatic leadership of former president Lula da Silva of Brazil along with determined ministers Marina Silva and Isabella Teixeira helped decrease deforestation by 80%. While international corporate companies like Unilever, Nestlé, McDonalds, and giant agricultural companies like Wilmar, April, Cargill, and Archer Daniels Midland, are dedicated to eradicating deforestation from their entire supply chain by 2020. National governments are in the utmost positions to identify their countries' necessities and must take bold actions for successful outcomes and implementations.

Measuring the accomplishments and failures of coalitions can also be an effective technique to scale-up actions for coalitions. It is imperative to have shared strategies, bonds of trust, and ideas of each other's resources to maintain collective action in spite of the misunderstandings that exist between the diverse ranges of actors. Coalitions can also be instrumental to secure funds for enhancing indigenous peoples rights and implement IPLC led NbS. Over the next decade, an estimated \$180 billion will be required, annually, to cover the cost of adaptation for climate change (Buchner et al., 2019).

Recently, the finance mechanism is being utilized to tackle uncertainties in the face of climate change. Financial mechanism denotes the way in which an organization or program receives the funding essential for it to remain functional. A range of innovative and large-scale financing sources exist to promote and implement NbS around the world. Nonetheless, increasing evi-

dence is needed to ensure if these funds ultimately help in achieving conservation of nature. Global funds dedicated to low-emission and climate-resilient development include the Green Climate Fund (UNFCCC, 2016) and the Global Environment Facility (UNDP, 2011).

Similarly, European Regional Development Fund is focused on accelerating nature-based solutions, preserving biodiversity as one of its key investment themes (European Commission, 2019). Likewise, Croatian Bank for Reconstruction and Development is dedicated to promote nature-based solutions and safeguard Croatia's rich biodiversity. The European Commission's LIFE Programme, Nature+ Accelerator Fund, Latin American Water Funds Partnership are also some key funds to drive nature-based solutions.

The Nature+ Accelerator Fund combines the expertise of public and private institutions and to address the conservation gap by attracting private finance to conservation. Latin American Water Funds is utilized to implement nature-based solutions to diminish the water security of Brazil, Peru, Ecuador, and Colombia. The funding also supports nature-based solutions such as agroforestry, cover crops, river habitat restoration, reforestation, etc.

Currently, the necessity to acknowledge the unsung heroes of nature, the indigenous peoples, has become crucial. These indigenous peoples around the world are inevitably tackling climate change by preserving biodiversity in their territories, and sustainably managing natural resources. In order to improve the rights, governance, culture, and economies of indigenous peoples, some funding mechanism exists. These funds are the Onaway Trust, International Fund for Agricultural Development, Global Green grants Fund, Seventh Generation Fund, etc. Additionally, the UN financial mechanism

for indigenous opportunities includes the UN Voluntary Fund for Indigenous Peoples, The Convention on Biological Diversity (CBD), The World Intellectual Property Organization, etc.

Future research can further investigate the relationship between coalitions of diverse scale (national, regional, state-level) within the same policy system as well as without and look for developing innovative financial mechanisms to support NbS by IPLCs. Last year, the World Wildlife Fund established the People Protecting Landscapes and Seascapes (PPLS) initiative with an aim for an inclusive conservation approach, which seeks to achieve systems change in the way nature conservation has been traditionally approached and expand rights, governance, and economies of indigenous peoples and local communities.

The World Wildlife Fund for Nature (WWF) and International Centre for Climate Change (ICCCAD) is currently working collectively to identify the influential actors to form a coalition and identify the funding mechanisms; for uplifting the living standards of indigenous peoples and accelerating nature-based solutions through indigenous peoples. ●

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PIXABAY

Capacity building and communication to scale-up indigenous conservation efforts

Collaborative efforts between government, diplomats, policy makers and the indigenous or local leaders can lead to effective and sustainable policies, capacity building of the IPLC

*Mahmuda Akter and Ali
Mohammad Rezaie*

Studies have suggested that capacitating indigenous people and communities to devise and undertake Nature-based Solutions (NbS) in their landscapes can play an effective role in natural resources management, conservation, and climate change mitigation. Through the promotion of sustainable forestry to support the global goal of the Paris Agreement and to limit global temperatures below 2 degrees Celsius, indigenous people and local communities

(IPLCs) can play a vital role in reducing 30% carbon emissions by 2030 (Seddon et al, 2019). The IPLCs also apply their traditional knowledge and work with nature to address societal challenges, wellbeing, and conservation. While these traditional practices often meet the criteria of NbS (IUCN Guidelines for NbS, 2020), these communities are still struggling to protect their rights to govern their land and seascapes, preserve their cultural heritage and pursue their conservation efforts.

In 2019 at the Climate Action Summit identified four priority areas for members of the NbS coalition. Co-led by Chi-

na and New Zealand, the NbS coalition has been launched with the support of more than 70 governments, the private sector, civil society and international organizations. The priority areas are 1) increasing and mainstreaming NbS in national governance, climate action, and policy; 2) enhancing regional and international cooperation; 3) creating the necessary shifts in domestic and international governance and funding to assess the potential of NbS, and 4) scaling-up NbS to ensure livelihoods in the face of climatic threats.

These guidelines can facilitate the IPLCs NbS activities in different parts of

the world, however, there are challenges in the implementation of NbS with indigenous people due to; political uncertainty; knowledge and research gaps; lack of policy instrumentation; and financing mechanisms etc. (Townsend et al, 2020).

NDC to build their IPLCs capacity to involve in the policy-making process. Countries such as Nepal, St Vincent and Grenadines, are working to build educational capacity for local farmers through implementation of farmer schools, and including traditional techniques to their educational curriculum.

However, there is still a need to enhance the capacity of IPLCs in national policy processes and to implement them at the local level. IPLCs have a strong connection with their landscapes and seascapes, and their culture and traditions are closely tied and rooted with nature. Thus, when working with NbS indigenous and traditional knowledge has to be prioritized to develop and strengthen these nature-based practices.

Collaboration, coalition and involvement with different actors are also part and parcel for effective management and implementation of NbS. It is essential to realize that many grassroots partners in developing countries require the skills to write and negotiate to ensure their rights through knowledge and advocacy. This would allow them to raise their concerns and involve in developing relevant policy, proposals, and actions at the local, national, and international levels.

Collaborative efforts between government, diplomats, policy makers and the indigenous or local leaders can lead to effective and sustainable policies, capacity building of the IPLC. Thus, establishing a common platform and strengthening existing networks for effective local and global networking and collaboration with relevant actors at various fronts can foster knowledge exchange and enhance sustainable NbS

initiatives. Besides, mapping and linking stakeholders can support synergic actions and avoid misunderstanding.

In addition, an effective communication system with global experts can be used to define a proper framework for NbS implementation by the IPLCs. Global networks of researchers and practitioners often provide expert guidance on effective biodiversity conservation and natural resources management for sustainable development.

However, the importance of systematic communication and multi-stakeholder involvement in NbS policies requires further actions (Cohen-Shacham et al, 2019). Thus, IPLCs capacity building to design and implement NbS can be strengthened by ensuring systematic communication with multi-actor partnerships including scientists, planners, government, private sector, NGO, and development entities.

Finally, the capacity building, collaboration and communication initiatives can be fortified with evidence-based research, technological innovation, advocacy, and sustainable financing to scale up NbS, IPLCs rights, and conservation efforts. The active participation of indigenous representatives from all over the world will also help in the development of global policy, as they have a strong connection with nature. ●

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Indigenous people and local communities (IPLCs) can play a vital role in reducing 30% carbon emissions by 2030

It is of utmost importance to build the capacity of the indigenous people for ensuring NbS related development, with emphasis on science-based education and technological innovations. Moreover, empowering these communities can help them to raise their voice and can directly involve them to create policies, proposals, and actions at the local, national, and international levels for protecting indigenous rights.

According to Nationally Determined Contributions (NDCs) in most of the developing countries, capacity building needs are combined with its key elements including education, training, institutional capacity, public awareness, research and technology development (Khan et al, 2020). Various development partners, research institutions, governments and NGOs are also working on different capacity building programs (especially related to climate change adaptation) including training, short courses, graduate programmes, workshops, conferences, and building research hubs.

However, there has been no capacity-building program for indigenous people on NbS. The Mexican government has already committed in their



IPLCs capacity building to design and implement NbS can be strengthened by ensuring systematic communication with multi-actor partnerships

Nature + Accelerator Fund is a novel financial mechanism to bring the private sector into conservation actions

It will create evidence of a suite of nature-based solutions (NbS) aligned with the IUCN Global Standard for Nature-based Solutions

Farah Anzum and Khalid Hossain

The natural world is facing profound challenges. Human exploitation places intense stress on the capacity of habitats to support biodiversity and to provide ecosystem services. In the name of short-term financial gain, mankind consumes 'natural capital,' consigning future generations to a planet that is greatly degraded due to the destruc-

tion of biodiversity. Despite the fact that most states are a party to the Convention on Biological Diversity (CBD) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), efforts by governments, NGOs and donor agencies to reverse these trends have been falling short to match the global demand for food, timber, energy and other commodities, and the needs of growing populations.

The contribution of nature to the global economy is worth more than

\$125 trillion annually, according to the European Union, and building conservation and nature-based solutions into projects present a massive opportunity: from reducing operational costs to unlocking new revenue streams, increasing customer engagement and provisioning of public environmental goods. Several attempts have been made to quantify this gap between the available conservation funding and the required environmental protection and restoration finance.



The financial gap for nature's conservation is estimated to be \$600-800 billion per year, according to the International Union for Conservation of Nature (IUCN). A recent report from The Paulson Institute, The Nature Conservancy, and the Cornell Atkinson Center for Sustainability estimated that the current annual conservation spending is \$598 billion to \$824 billion short of what is required. Bridging this gap will require help from the private sector and investors.

Since the majority of the nature-related projects had long lead times, offered limited early cash flows, and posed risks and uncertainties to the new investment community, it has often been difficult for investors who are interested to find financing options as

address the conservation gap. This is a blended finance mechanism that aims to address a critical gap in early-stage venture support for regenerative businesses that need to scale.

The fund is a collaboration between IUCN, Mirova Natural Capital and the Coalition of Private Investment in Conservation (CPIC). The Global Environment Facility (GEF) is the fund's anchor investor, providing \$8 million for the first loss investor, while Mirova aims to raise additional investment to create a \$200 million portfolio of projects ranging from the seed investment phase through to the sustainable growth phase.

Stewart Maginnis, Global Director of the Nature-based Solutions Group at IUCN, told at the launching of Nature+ Accelerator Fund that the trio of crises that have commanded the world's attention in 2020 show how critical it is for mankind to heal its relationship with nature. "We see the convergence of three crises that, in one shape or form, have had some links to the environment—some explicitly, some less. The most immediate one is the public health crisis and the aftermath of the crisis, and there is the climate crisis, and finally, there is the biodiversity crisis. Environmental damage is no longer just about undermining a species or making endangered species disappear. It is actually eating away at the fabric of our societies, our culture, and our wealth creation."

This Fund is scheduled to be launched in early 2021 and invests in nature-based solutions including the following areas: Marine conservation and coastal resilience; smallholder production systems and sustainable agriculture; ecosystem conservation and restoration; and innovation in services, finance, and technology. The Accelerator will offer investment in three complementary investment windows: Seed, Early Venture (together defined as the incubation period) and, Venture windows. It will support the early stage pilots and project ideas, impact enterprises with high potential for scalability, complemented by technical assistance and capacity building. This Fund will also offer investors a 30% "first loss" protection to mitigate early-stage risk. The Fund will deploy grants, debt and equity through three windows:

Seed: \$5 million (approx. \$100,000 per 50 projects) in repayable grants or convertible notes

Early venture: debt and equity of \$15

million (approximately \$1 million per 15 projects)

Venture: debt and equity of \$20 million (approx. \$5 million in 4 projects).

The expected outcomes of the Fund, which will be commercially operated, are ambitious. A portfolio of up to 70 successful investment deals will be developed, attracting co-investment of up to \$160 million beyond the financing of the Nature+ Accelerator Fund.

It will create evidence of a suite of nature-based solutions (NbS) aligned with the IUCN Global Standard for Nature-based Solutions while creating significant impact on biodiversity and ecosystem conservation, reducing the risk of extinction of species as per the IUCN Red List and contributing to national and global objectives including the CBD post-2020 Global Biodiversity Framework, Sustainable Development Goals (SDGs), the UN Decade on Ecosystem Restoration and the UNFCCC Paris Agreement.

With more than half of the world's GDP generated by industries that are dependent on nature and its services, the private sector is increasingly realizing that this is not just an ecological crisis we need to tackle, but also an economic one. Since IUCN Nature-based Solutions Criterion 4 emphasizes considering a portfolio of market-based resourcing options, the next step is thus for forward-thinking private sector leaders to support this novel financial mechanism of Nature+ Accelerator Fund and contribute in meeting the gap of conservation finance in protecting, sustainably using, managing and restoring natural or modified ecosystems to address societal challenges as well as to provide human well-being and biodiversity benefits. ●

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The contribution of nature to the global economy is worth more than \$125 trillion annually, according to the European Union

there is no pipeline of vetted projects for the private sector to step in. Therefore, there has been a pressing need for an innovative fund to widen the opportunity for the private sector to finance nature's conservation.

The Nature+ Accelerator Fund is a first-of-its-kind private sector-focused financing mechanism, which provides measurable conservation and social benefits while providing investors with financial returns. It combines an unique set of expertise and platforms of leading public and private institutions to