THE HIMALAYAN

A Naturenomics™ Publication

EASTERN HIMALAYAN NATURENOMICS™ FORUM

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BALIPARA FOUNDATION
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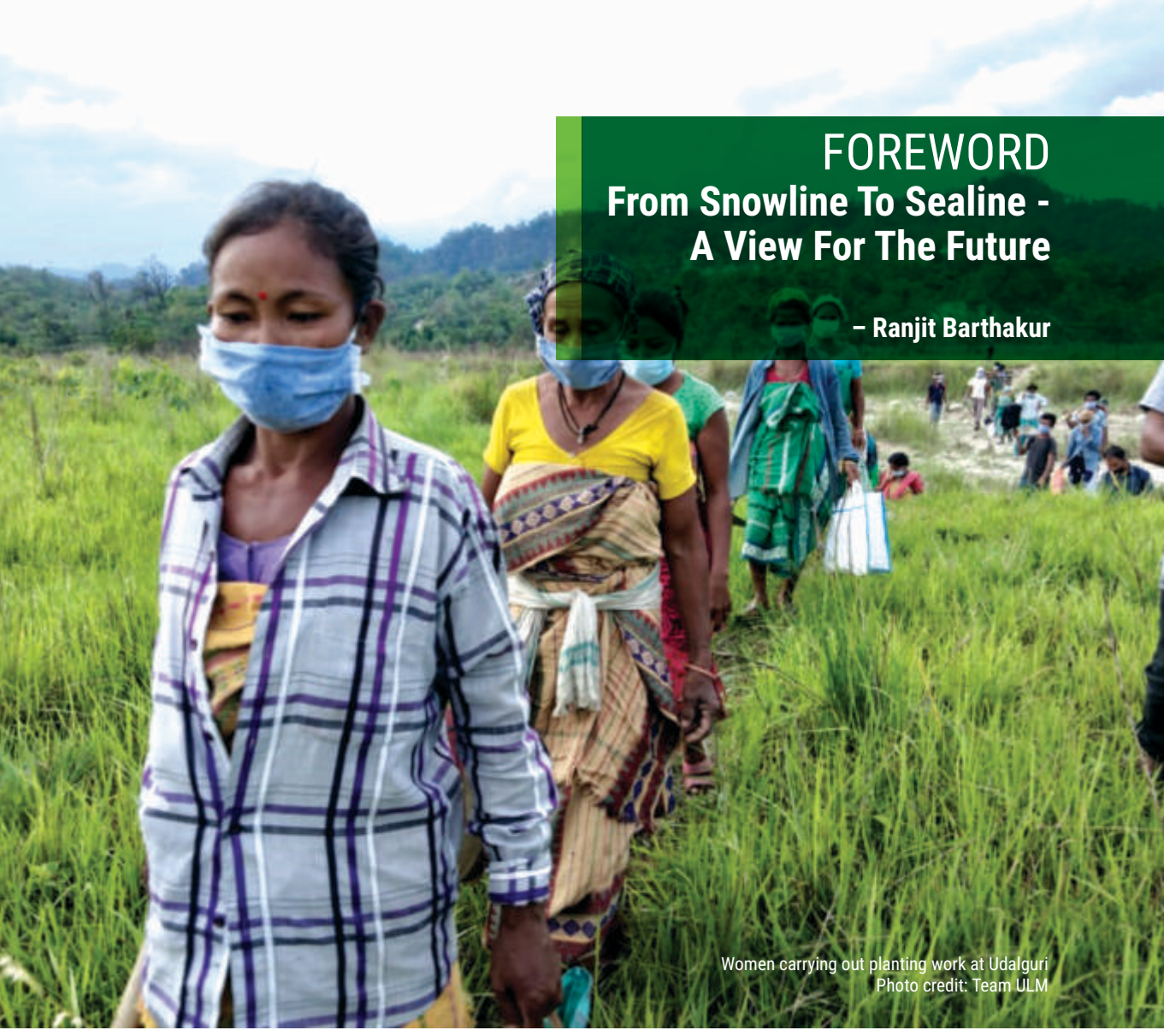

FOREWORD
From Snowline To Sealine - A View For The Future

– Ranjit Barthakur

Women carrying out planting work at Udalguri
Photo credit: Team ULM

From snowline to sealine, the Eastern Himalayas is one of the most diverse corners of the world today. Home to over 12,000 species of flora and fauna and over 400 indigenous communities, the region is a unique melting pot of culture and biodiversity. The region spans three biodiversity hotspots and extends across a vast range of ecoregions and habitats: coniferous forests in Bhutan, grasslands in Nepal, Meghalaya's dense cloud forests, the world's largest mangrove forest in the Sunderbans, freshwater habitats along the Brahmaputra river, rainforests in Myanmar and alpine meadows in the mountains of Arunachal Pradesh. 246 million people inhabit these diverse landscapes, speaking over 40 different languages and practicing faiths ranging from all the major world religions to indigenous faiths specific to this biosphere.

In this region, nature and cultures have been intimately interwoven for decades, through sacred landscapes and traditional practices, growing and thriving interdependently. Indigenous practices have even played a critical role in preserving the region's biodiversity - through sacred groves, community conserved areas, traditional forest and watershed management practices and even kitchen gardens. Though its total area is a fraction of constituent countries like India, China, Bangladesh and Myanmar, it holds some of their densest stock of natural assets and natural capital. It is a testament to the possibilities of co-existence and mutually assured development.

This interdependence is threatened today by myriad development pressures: energy access, infrastructure, agricultural land expansion, industry and livelihood needs. The use and overuse of natural capital has driven economic growth globally, but also brought the world to the point of crisis. In the Eastern Himalayas, destructive growth threatens the lives and livelihoods of billions. Today, the region is at its own tipping point, threatened by rampant habitat destruction, biodiversity loss and rapidly rising temperatures that are spilling over into other life-threatening effects: destructive floods, desertification of once fertile soil, shrinking crop yields, spread of diseases, food and water insecurity and climate-driven mass displacement.

In this past year, we have seen the region

face unprecedented ecological challenges. Cyclone Amphan destroyed nearly a third of the Sunderbans and the full scale of this damage to communities and wildlife is yet to be understood and assessed. The expansion of hydroelectric power threatens the future of the Idu Mishmi community and a tiger reserve in Dibang Valley in Arunachal Pradesh, and the Lepcha of Dzongu in Sikkim. An oil blowout at Baghjan near Dibhru-Saikowa National Park and deforestation in the tropical rainforest of Dehing-Patkai for coal in Assam revealed the shortfall of impact assessments and the fragile limitations of existing environmental protections and systems in halting environmental degradation.

The cumulative effects of natural impacts and anthropogenic changes are expected to be amplified over the next decade. But if we can transform the way we drive growth, by building on our rich natural capital, we can mitigate the worst of these risks and adapt greater resiliency for people, biodiversity and businesses.

The Eastern Himalayan region is the perfect place to launch the experiment for **ecology is**

economy. Stretching from Eastern Nepal to Yunnan province in China, the region is natural capital rich, home to a young and ambitious population and equipped with a strong cultural attachment to nature. Through careful investment, enhancement and optimization of natural capital the Eastern Himalayas could achieve landmark transformation across **five key drivers for ecological growth:**

1. **Rewilding -** $4.3 billion investment to create 6 billion natural assets across 6 million hectares to generate $93.4 billion in natural capital over the next three decades
2. **Employment -** A rewilding economy which builds jobs for over 3 million households through natural asset creation
3. **Net Zero by 2030 -** An estimated 19.5 billion tonnes of carbon can be sequestered through natural asset creation and enhancement
4. **A Naturenomics™ Economy -** Reinvesting these natural capital values in delivering universal basic assets such as education and healthcare to 3 million households
5. **Mitigating animal-human diseases -** the Eastern Himalayas on average face high risks for new zoonotic disease emergence, which investing in protecting existing forests & further rewilding can reduce up to 40%

This volume of *The Himalayan* explores the needs for the future: the success stories of the region that need to be built on, the traditional knowledge and community practices that could transform how we manage our natural assets, the threats and the risks that lie ahead and the most critical needs for policy, people and biodiversity in the coming decade.

Business as usual is a dying proposition. The world urgently needs a new alternative. The Eastern Himalayas can and must show the way. We must seize this opportunity to demonstrate that ecology is economy - and rewrite the rulebook on growth for a Naturenomics™ future of plenty for people, planet and profit.

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ASSAM
Critical Policy Needs for Biodiversity

– Rituraj Phukan,
Secretary General, Green Guard Nature Organization

Plantation at Dhanseri
Photo credit: Robin Eastment

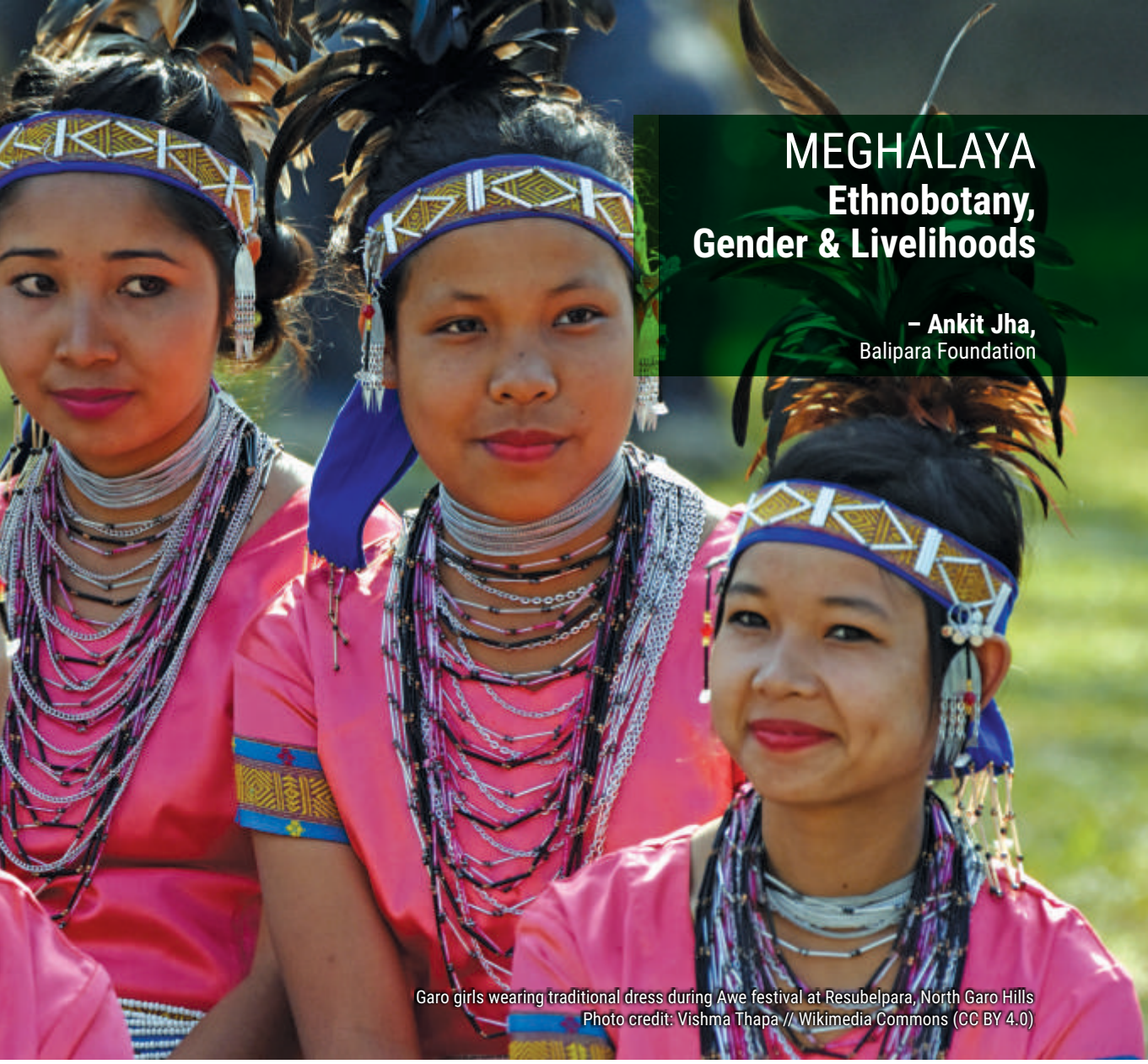
The northeast is blessed with natural largesse, but the region is vulnerable to natural disasters and sits on the cusp of an impending climate crisis. Despite the obvious risks, big dams are planned across the Eastern Himalayas; the draft Environmental Impact Assessment (EIA) 2020 proposals will facilitate projects being commissioned without the public consultative process. The proposal to legitimize post-facto clearance will have a profound impact in the region with rampant encroachment and illegal extraction. There are other factors, including the impacts of climate change that will require vast mitigation efforts comprising of nature-based solutions.

Several investigative reports have uncovered proliferation of illegal coal mining and point out loopholes in the regulatory system. Reports of water scarcity near the mining areas close to the rainforests of Dehing Patkai is an indictment of the industry. The predicament of residents at Baghjan has exposed the inadequacy of existing safeguards to protect the rights and livelihoods of indigenous communities. The exposure to known hazards is a critical violation of the fundamental rights of the native populations.

In December 2018, Assam and Mizoram were named as most vulnerable to climate change among 12 Himalayan states. Other recent studies also indicate potentially catastrophic environmental hazards for the northeastern region from climate change. The predicted loss of over a third of extant glaciers in the Eastern Himalayan region by 2100 will have implications on the overall water, energy, and food security. The perennial issues of influx of displaced people, floods, river-bank erosion, and human-wildlife conflicts are likely to aggravate further in a warming planet. It is imperative that policy makers recognize the need to conserve natural resources for mitigation, and resilience of indigenous communities.

India is a signatory to the Convention on Biological Diversity and the 'Zero draft of post-2020 global biodiversity framework' calls for protection of at least 30% of all land and sea areas to stop catastrophic loss of biodiversity by 2030. Further, our commitments under the Paris Agreement include creation of a cumulative carbon sink of 2.5 to 3 billion tonnes of carbon dioxide by 2030, with the stated goal to bring at least 33 percent of land areas under green cover, up from the current 24.5 percent. India's National Forest Policy 2018 also aspires for one-third of total land area under forest and tree cover to achieve the national goal for eco-security. These declarations will require creation and regeneration of new protected areas, prioritizing areas of abundant biodiversity and in northeast India, we have the defined landscape to adhere to these global commitments and state goals.

The proposal to exempt several categories of projects from public consultation, and taking away the rights of local communities and other stakeholders to seek recourse against violations will have widespread ramifications in the region with collective ownership of resources and prevalence of ancient community consultative traditions among tribal communities. I believe that we need to build up consensus for a separate EIA protocol for protection of biodiversity and the intertwined heritage of the region.



MEGHALAYA
Ethnobotany, Gender & Livelihoods

– Ankit Jha,
Balipara Foundation

Garo girls wearing traditional dress during Awe festival at Resubelpara, North Garo Hills
Photo credit: Vishma Thapa // Wikimedia Commons (CC BY 4.0)

Popularly known as the "Abode of Clouds", the Indian state of Meghalaya is primarily known for its pristine forests, beautiful landscapes and distinct culture. Unlike other States, forests in Meghalaya are largely under the community ownership as the Sixth Schedule of the Indian Constitution allows this autonomy to various districts of the state. Since the state is predominant in tribal population, rural communities significantly depend on forests for their socio-economic and socio-cultural needs. According to the Indian State Forest Report (ISFR) 2019, Meghalaya's forest cover stood at 76.33%, fifth highest in terms of forest cover in India.

But there is a catch to this number. Only 2.18% of the total forest cover is under the Very Dense Forest[1] cover while 41.32% is Moderately Dense[2] and Open Forests[3] account for 32.82%. The numbers clearly suggest that while the forest cover is high, mature old growth forests are actually struggling to survive. Most of this loss can be attributed to factors like rapid deforestation and fragmentation of forests for unregulated, unscientific, and often illegal logging, mining and agricultural expansion. The practice of short cycles of *Jhum* cultivation which is a traditional form of slash and burn agriculture in the region is another issue contributing to soil degradation and loss of biodiversity. Instability of the top soil causes landslides, contamination and silting of water bodies. This leads to habitat degradation for a variety of biodiversity living in the region.

Meghalaya's richness in natural resources, traditional knowledge and a unique social system can be a potent instrument in protecting its old-growth forests and turn the tide towards conserving its pristine forests and landscapes. In recent years, one of the major areas of research and knowledge dissemination with respect to Meghalaya's forests has been the documentation of the ethno-botanical knowledge that the communities hold. Due to the vast expanse of forests Meghalaya is home to, the state is endowed with abundant number of medicinal plants and herbs that have been historically used in the traditional system of medicine. More than 800 medicinal plant species have been listed and still many more are yet untapped (Meghalaya). Ethno-medicinal plants have traditionally played an important role in meeting the nutrient requirements of the communities and this knowledge needs to be tapped into.

The Khasi, Garo and Jainitia are the major tribes inhabiting the state. While each tribe has their own culture, tradition and language, all of them uniquely follow a matrilineal system where lineage and inheritance are traced through women. In most of the rural/tribal communities, women are at the forefront of using forest resources for subsistence needs like procuring food, fodder and meet other household needs. They interact with the forests and the natural environment around them in order to sustain the economy of their households. Since women are the token authority for decision making within the social system of Meghalaya, this gives them an opportunity to be a proactive stakeholder in conserving the natural environment. Several studies over the years have submitted that indigenous women in many parts of the world play a crucial role in agro-biodiversity management, conservation, and use. Women comprise an average of almost 50% of the agricultural labour force in Eastern and South-Eastern Asia and are responsible for the

1. All Lands with tree cover (Including mangrove cover) of canopy density of 70% and above;
2. All lands with tree cover (Including mangrove cover) of canopy density between 40% and 70% above
3. All lands with tree cover (Including mangrove cover) of canopy density between 10% and 40%

production of around 60 and 80% of the food in most developing countries (Food and Agriculture Organization of the United Nations, 2015) (Ellena & Nongkynrih, 2017).

But despite Meghalaya being a matrilineal society and holding lands in their name, the management and revenues from the land are overlooked by men contributing to a gendered distribution of wealth. For instance- a woman is central to the family in Khasi ideology and they are free from social norms as they move freely in the market place, participate in trade and business, festivals, dances and other such activities. They are supposed to take care of the household and are not allowed to make their voices heard at public hearings/sabhas because of the prevalent gendered stereotypes. It is largely the men who take care of all the administration, management and decision making. Loss of forests in the state has also led to women losing out on income opportunities as men tend to move longer distances to sell the forest produce. This has led to the marginalization of rural women in Meghalaya and they have to resort to daily wage or other forms of local employment systems which usually do not give them the opportunity to earn the labour they put in.

This 'behind the scene' working could be counterbalanced and more power can be given in the hands of women by giving them the opportunity to take up economic tasks. As the majority of tribal societies are forest dependent, a gendered forestry approach will be a good way to actualise the goal of women empowerment in real sense. This will mean women undertaking economic activities based out of forest produce and in the process establishing their generation of knowledge used to protect these forests as a norm. Leveraging the power of Meghalaya's unique social system and the abundance of ethno-medicinal knowledge can be a potential tool for enhancing women's livelihood opportunities in the state. Skilling them with the technicalities of ethnobotany can help them take up entrepreneurial ventures which can have a ripple effect as more women handhold each other to work on these lines. They can be engaged in production, management and sale of ethno-medicinal plants. A very popular example of such entrepreneurship can be seen in the city of Shillong and on the Shillong-Guwahati highway where Khasi women are seen selling broomsticks made out of wild grown broom grass. They can also be seen selling mushrooms, pineapples, cinnamon, sandalwood and other fruits harvested from their forests.

With the onset of COVID-19 and the fear of more such pandemic outbreaks, ethnobotanical studies have become increasingly valuable in the development of health care and conservation programs in different parts of the world. One of the best examples can be of how COVID-19 prompted people to take care of their immunity by using natural products ranging from Tulsi (Ocimum tenuiflorum), Ginger (Zingiber officinale), Aswagandha (Withania somnifera) and different form of medicinal plant roots like and Turmeric

(Curcuma longa) and other such tubers. A pandemic like COVID-19 also brings with it the realisation to look back at our traditional knowledge systems and use it to answer the unknown which science doesn't readily answer. Women's involvement with the forests and the social roles they perform put them in the perfect place to develop and manage these unique knowledge systems. They can be leaders in the development of 'green pharmaceuticals' where medicines are derived from nature and they get the economic value for the knowledge dissemination that has happened over hundreds of years. Building on the rich culture and traditions can build resilience to deal with the anthropogenic issues threatening community livelihoods today.

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MIZORAM
Jhum & The Way Forward for Sustainable Agriculture

– Dr. John Zothanzama,
Mizoram University

Oil Palm plantation in Mizoram
Photo credit: T. R. Shankar Raman // Wikimedia Commons (CC BY 4.0)

Jhum has been linked to what many consider a spiraling cycle of deforestation, environmental degradation and rural poverty. A frequently-repeated claim is that population growth has led to shorter fallow cycles as more land has come under jhum cultivation. However, an important question is whether these claims are substantiated by reliable data. Do we really have clear cut evidence of the impact of jhum cultivation on such so called effects as claimed by many?

A collaborative research was conducted by Mizoram University and the University of Minnesota on shifting cultivation (*jhumming*) in Mizoram from 2013-15. We found that although the population in Mizoram has increased by ten-fold in a few generations, there is little reliable data to support the negative impacts of *jhum* cultivation.

Daman Singh (1996) conducted research in Mizoram 25 years ago, documenting fallow periods at six villages and reported the fallow cycle as 7-10 years. We re-visited these villages in 2015, in some cases interviewing the same respondents of Daman Singh. In addition, our research team interviewed over a 100 *jhum* cultivators between 2013 and 2015. We observed that where *jhum* is still practiced, fallow periods have remained the same on average from 7-10 years and in some areas they were even as long as up to 15 years. *Jhum* practice appears to be in decline and is being replaced by more intensive production systems. In many villages the majorities no longer practiced *jhum* cultivation and have adopted horticultural, agroforestry and other practices. *Jhum* cultivation has become just a side activity to harvest extra crops. In fact, many villages were unable to fill up the annual jhum plots offered by the Village Council committees for quite a number of years.

According to the Mizoram Statistical Abstracts of 2019: During the period 2008-09 to 2017-18 (10 years) there has been a steady decline in the area of fallow land such that the total decrease was from 170,000 Ha (in 2008-09) to 107,000 Ha (in 2017-18), i.e., a decrease of 63,000 Ha, which implies that the amount of jhumming has surely decreased. We also observed that the younger generations are not interested in *jhum* cultivation and opt to rather migrate to urban areas to seek jobs. This leaves a larger percentage of the farmers comprising the older generation in many villages. These observations imply that the situation may not be that alarming. But more research is needed.

The way forward is therefore to improve the traditional jhum farming. In this direction, a pilot project on improving the traditional jhum system called as the "MiSALT" (Mizoram Sloping Agriculture Land Technology) technique was undertaken with funding from the United Nations Development Programme (UNDP) and Food and Agriculture Organization of the United Nations (FAO) in 2016-17 in Lunglei and Aizawl District by a team of researchers of Mizoram University. Results of the project showed significance in terms of being farmer friendly (traditional method of *changkham*/logs was incorporated), effectiveness in controlling soil erosion on steep slopes, cost effective in terms of crop production vis a vis work input, good prospective for switching towards permanent farming, and maintenance of soil health.

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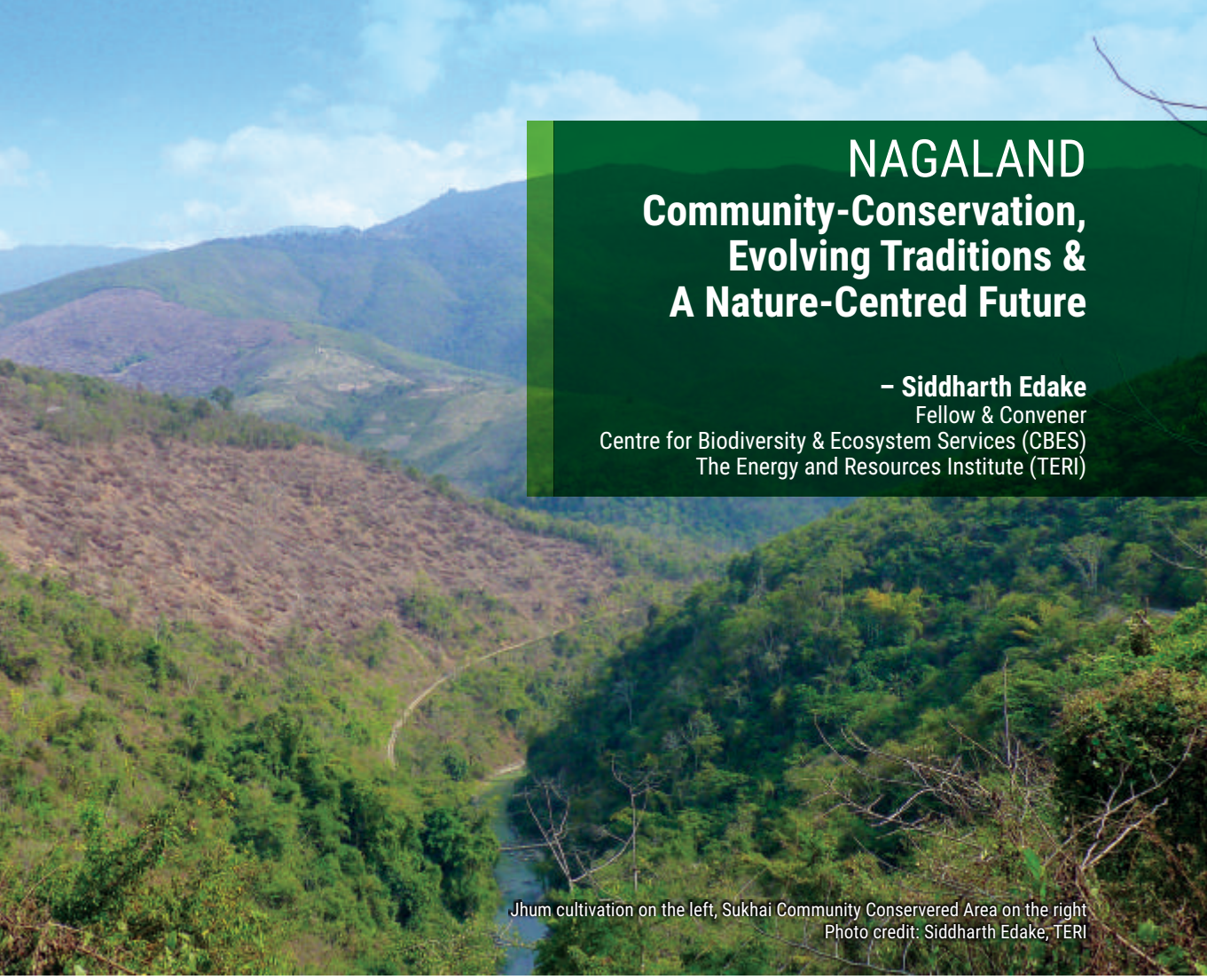


NAGALAND
Community-Conservation, Evolving Traditions & A Nature-Centred Future

– Siddharth Edake
Fellow & Convener
Centre for Biodiversity & Ecosystem Services (CBES)
The Energy and Resources Institute (TERI)

Jhum cultivation on the left, Sukhai Community Conservered Area on the right
Photo credit: Siddharth Edake, TERI

In Nagaland, located within the Indo-Burma and Eastern Himalaya biodiversity hotspots in India, customary rights are protected under Article 371A of the Indian Constitution, and the majority of natural habitats (88.3%) are owned and managed by individuals and clans overseen by village councils, district councils and other traditional institutions. These natural habitats comprise of a mosaic of different vegetation types and can be broadly categorized as primary forests, secondary forests, agricultural land (comprising mostly of shifting cultivation and to a small extent of terrace cultivation) and plantations. However, in the absence of alternative livelihood options, most of the economic activities in the villages are based upon utilization of natural resources. This has led to deforestation, degradation of forest resources, change in land-use patterns, uncontrolled hunting as well as aggressive fishing and an illegal trade of wild flora and fauna that pose as major challenges for the local fragile ecosystems.

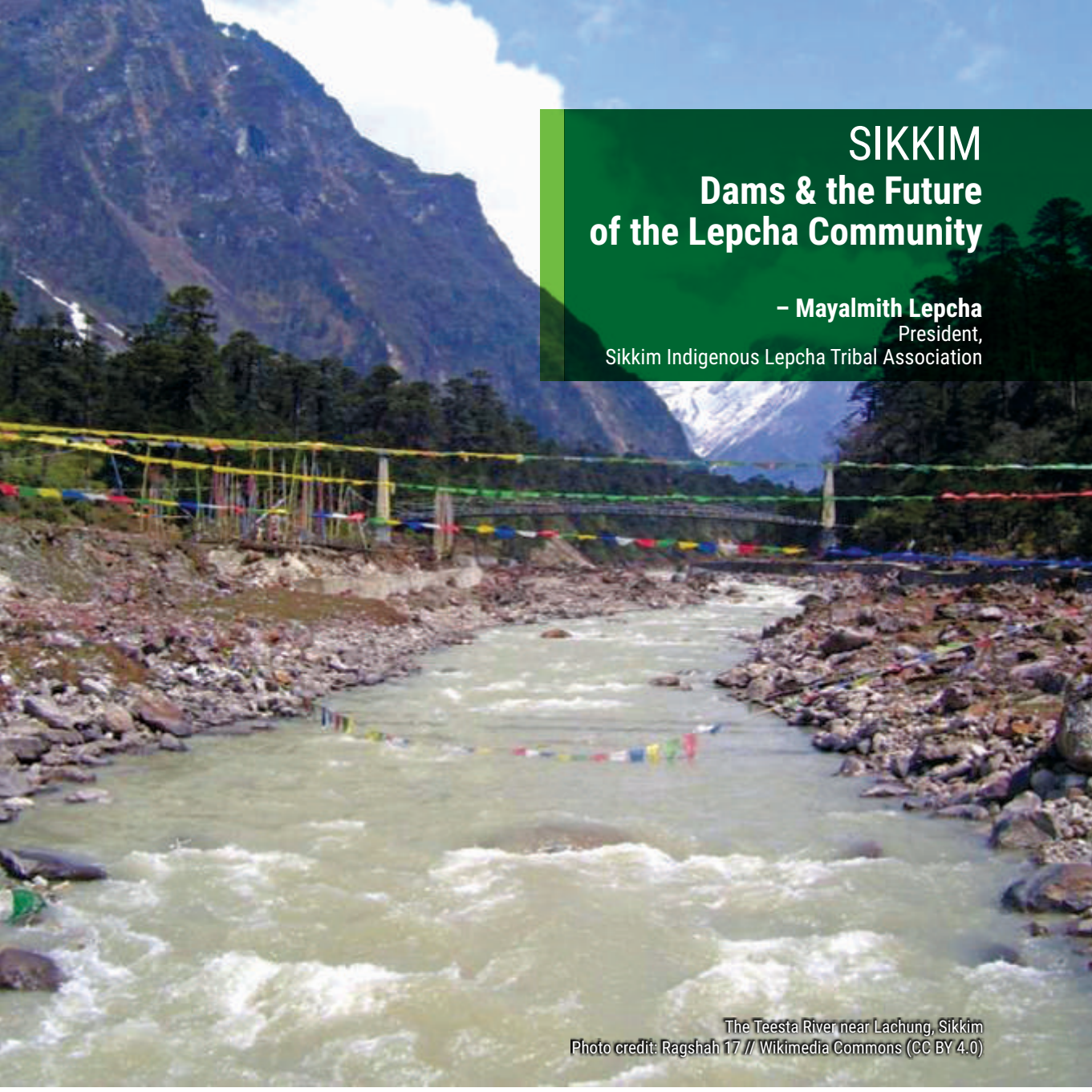
However in Nagaland, traditional conservation practices have helped protect biodiversity, and there are records of Community Conservation Areas (CCAs) being declared in the early 1800s, especially in response to forest degradation and loss of wildlife. Thus the revival of traditional conservation practices through the creation of CCAs, offer hope for conservation and ecosystem resilience, as communities set aside parcels of forests within productive, shifting cultivation landscapes. It has been documented that one-third of Nagaland's villages have constituted CCAs and as many as 82% of 407 CCAs have completely or partially banned tree felling and/or hunting, and enforce various regulations for conservation. These CCAs covering more than 1700 sq km, also contribute to carbon storage (an estimated 120.77 tonnes per ha), and are an important mitigation and adaptation strategy for climate change.

However, these CCAs face numerous challenges in their creation, effectiveness and sustainability and require sustained efforts for their conservation. The foremost challenge faced by 81% of CCAs is providing alternative livelihoods. Morever, these CCAs are isolated dense patches of forests and there is a need to ensure conservation of large contiguous forest areas by enabling the formation of jointly managed CCA. In response to this, a pilot project was initiated in three villages of Sukhai, Kivikhu and Ghukhuyi in Zunheboto district of Nagaland, which aimed at creating and linking Community-Conserved Areas across the landscape and supporting conservation through livelihood creation. The model adopted aimed at strengthening the resilience of these mountain communities and their forests by rejuvenating traditional conservation practices and providing supplementary livelihoods. Activities included compiling information on Indigenous Ecological Knowledge (IEK), developing long-term ecological monitoring mechanisms, motivation and sensitization on landscape conservation and capacity building of the community members in biodiversity identification, documentation and monitoring, as well as promoting ecotourism as a livelihood option.

Today, the project has yielded positive results in terms of sustainable use of biological resources by adopting long-term sustainability, enhanced governance and effective conservation of the landscape. Around 222 species of birds, 200 species of butterflies have been documented and protected by declaring 939 hectares as community conservation reserve and banning hunting and destructive fishing across the remaining landscape of forests and rivers (total area being 3751 hectares).

This project is just the start of what we hope will be a movement for conservation in the State of Nagaland. Long term sustainability, enhanced governance and effective conservation outcomes for wild fauna and flora, however, require sustained effort, motivation, awareness and capacity building. To ensure the future of Nagaland's CCAs and thereby its biodiversity, the Government of Nagaland

needs to pass a special policy to mainstream this model of biodiversity conservation within the governance mechanism and up-scaling it through a multi-pronged approach including financial support and legal recognition. Furthermore, local communities must be trained to monitor their resources, and to develop nature based tourism, which will help generate support for conservation. The network of CCAs in Nagaland, which is at par with India's Protected Area (PA) network, provides a wonderful example of a fledgling people's movement for conservation that deserves to be strengthened and supported.



SIKKIM
Dams & the Future of the Lepcha Community

– Mayalmith Lepcha
President,
Sikkim Indigenous Lepcha Tribal Association

The Teesta River near Lachung, Sikkim
Photo credit: Ragshah 17 // Wikimedia Commons (CC BY 4.0)

Dzongu was set up as a Reserve for indigenous Lepcha exclusively and administered directly by Sikkim's King Chogyal through private estates office of the Queen, the Notification issued in 1954 and Notification 3069 in 1958. These rights to the landscape and the reserve for indigenous Lepcha are still protected under Article 371F of the Indian constitution, as well as the Representation of People Act, 1980.

One of the most sought after destinations for tourists and research scholars, Dzongu is unique for its biodiversity - particularly birds and butterflies - and for the rich cultural and social heritage. Cocooned by mountain ranges all around and protected from winds, cold and heat, visits to Dzongu require an inner line permit. Dzongu is a holy land for indigenous Lepchas and only indigenous Lepchas are allowed to settle there. Entry into the Dzongu Reserve is prohibited to outsiders, even from within the state, except with special permission.

The main tributaries of river Teesta flows from this region and there are countless streams flowing down to the main Teesta river, adding a very rich biodiversity. It is a land and home to the rarest of the rare species of flora and fauna, and its sacred forest area is of great environmental and biodiversity importance. All the rivers and mountains, lakes are very sacred for the indigenous Lepchas as they worship and believe that river Rongyoung is the most sacred among the river in Dzongu and Sikkim as a whole.

Lepchas believe that after they die their soul travels back to the Poomzoo lyang through Rongyoung river which is at the hills of Mt. Kanchenzanga. There is no concept of heaven and hell in Lepcha culture. The Kanchenzanga National park on which millions of Rupees have been spent is located in the region and is a declared world heritage site.

The unplanned rampant construction of hydel dams in Sikkim has led to protests from We The Affected . The Lepcha community has been utterly devastated by the state government's plans to build several big dams in our sacred land, affecting the buffer zone in and around the Kanchenzanga National park. Rongyoung river, the most sacred river in Dzongu, is under threat today because of the Panang Hydel Project, which will cover the whole of Upper Dzongu area and Stage IV under NHPC which will wipe out the entire lower Dzongu. This move violates and dilutes existing laws and threatens our communities.

According to geological surveys, Sikkim, along with neighbouring Nepal and Bhutan, lie along a fault line, making the area - especially Dzongu - seismologically extremely vulnerable with any interference with the strata.The impact of dams has caused landslides, and as a result of these landslides, major tributaries of the Teesta and river Rongyoung in Dzongu have been blocked. Mantam Lake is an example of these disastrous landslides, where on the 13th of August 2016, a massive landslide took place blocking 12 villagers off from the rest of the world. Four years later, the village still remains cut off, with no road or bridge constructed to allow these villagers to move or travel. Similarly, Lhonark Lake in North Sikkim, already damaged by two earthquakes in 1991 and 2011, is perilously in danger of bursting if there is a future earthquake.

The history of this place begins with the Lepcha, not just Sikkim. The Lepcha community extends beyond the borders of Sikkim to present day Kalimpong and Darjeeling, with a rich history and unique relationship to the land. Nature worshipers, the Lepcha community is proud of its indigenous identity and

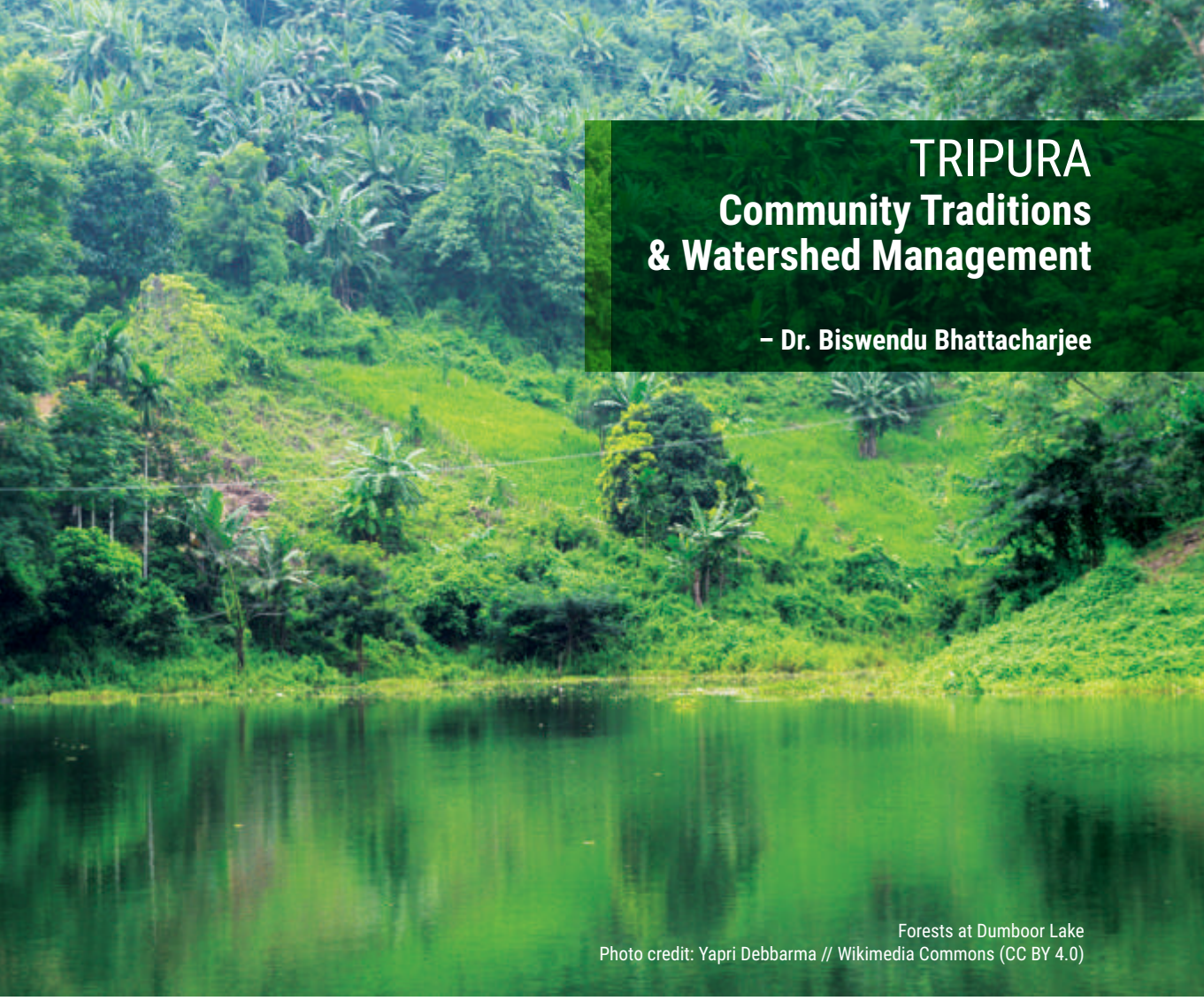
heritage today as leaders around the world talk about protecting nature or the environment. The protection they talk about today has been the ethos of the indigenous Lepcha for centuries, through their worship and celebration of their natural heritage.

The peace of the Lepcha community was threatened in the late seventies when the government began negotiating mega hydroelectric projects with outside companies. The hydel projects disrupted traditional landscapes, driving the Lepcha community to march for their land and stage hunger strikes for two and a half years.

The Lepcha community believes development in the truest sense is when one's people feels at peace, feels protected and feels at home. However, with the advent of the big hydel projects in Sikkim, the Lepcha community have become strangers in their own land: threatened, displaced and ousted from the landscape we call our own.

As streams and springs in the region continue to dry up, we are reaching a concerning tipping point for the environment. Seeing all of this, I discontinued my college and gave up my career for my land, my river, my mountains and of course, for my tribe - the Lepcha people. For Lepchas, nature's bounty is with us during life and after life. I joined the movement for our rivers and was arrested to protect my land because I learned you cannot have development in space, you cannot have identity without land, without identity you cannot make history.

Despite the threats and dangers facing the community today, the Lepcha remain highly spirited and fiercely determined. We have our creator, Itbu Debu, the water, the mountains, the sun, the moon - as long as we believe in them, they will all protect us.



TRIPURA
Community Traditions & Watershed Management

– Dr. Biswendu Bhattacharjee

Forests at Dumboor Lake
Photo credit: Yapri Debbarma // Wikimedia Commons (CC BY 4.0)

Tripura is a water rich state, endowed with abundant surface water resources as nearly 10 major rivers flows through Tripura benefitting adding quality to agriculture and the eco systems as a whole of the state. However, despite this abundance, the state Tripura is facing major environmental challenges with massive pollution in its rivers due to discharge of sewage, industrial and mining effluents, and dumping of bio chemical wastes in it. In a recent report, the Central Pollution Control Board reported that out of the 36 most polluted rivers in the country, four of them are identified in Tripura. The polluted stretches of river in the state are identified as Haora flowing through Agartala in West Tripura district, Manu in Dhalai district, Burima in Sepahijala district and Gomati river in Gomati district are reported to have a BOD level above 3 mg/litre, that makes the water unfit for drinking and bathing purpose.

In Tripura, these polluted stretches of river are resulting in a massive destruction of ecology resulting in the loss of habitat, disruption of ecosystems and are also causing death to aquatic lives. In addition it is also looming large as a major health hazard for people and wildlife in catchment areas after consuming the contaminated water. A few factors like encroachment of river banks, dumping of industrial and bio chemical waste into the rivers, discharge of human excreta directly into the river, chopping down of trees for jhum cultivation leading to soil erosion and ecology degradation are speculated by experts as the major cause of pollution in these rivers.

However, the traditions and practices of communities in Tripura offer a window into an alternative to the decimation of Tripura's water bodies.

The villagers of Dwar kai Kalai para hamlet of Jampuijala, about 40 kilometres southeast of Agartala have been preserving the water body spread over eight acres of land in foothills of Baramura as a common property for the Kalai community for last 70 years. In the 1950s when the habitation of Kalai tribe had started growing in the hillock, one of the elderly surviving citizens of the village, Gopal Kalai like people had noticed natural water streams from hills inundated the low lying areas and that created two big lakes. The water body was the main source of water in the village till the 90s. According to Kalai, it got attention after the then central government had launched Integrated Rural Development Program for improvised community development initiative and it became a lake. However, the management of which remained with the villagers.

The Jhumias (indigenous people involved in slash and burn method of agriculture) used to do shifting cultivation in the hills but the lake became their only source of water. The villagers have still been worshipping the water Goddess and they believe, Goddess omnipresent in the lake. Even the youngest generation today does not indulge any population in the water body or does anything they consider unholy. At least once in a year the villagers organised puja and prayer of the water Goddess seeking blessing for the whole community. There are many differences among the villagers on socio-economic and community issues but everybody remains united when the question of protection and conservation of the lake comes, as it is believed well being of the village largely depending on the purity of the water body, said Subharai Kalai, one of the community leaders.

The lake is the perennial source of water flow for at least four tributaries of main rivers of the district Bijoy, Burima and Kakri. Also, the lake water fed the ground water and made the water level remain constant at 5.30 metres for past two decades. “We used to lift potable water from the lake till a few years back when other sources of surface water and piped water were not available in the village. But use of lake water for bathing, washing and other domestic purposes are prohibited since the beginning. Even when there was extreme scarcity of water in the habitation, people lift the water for domestic

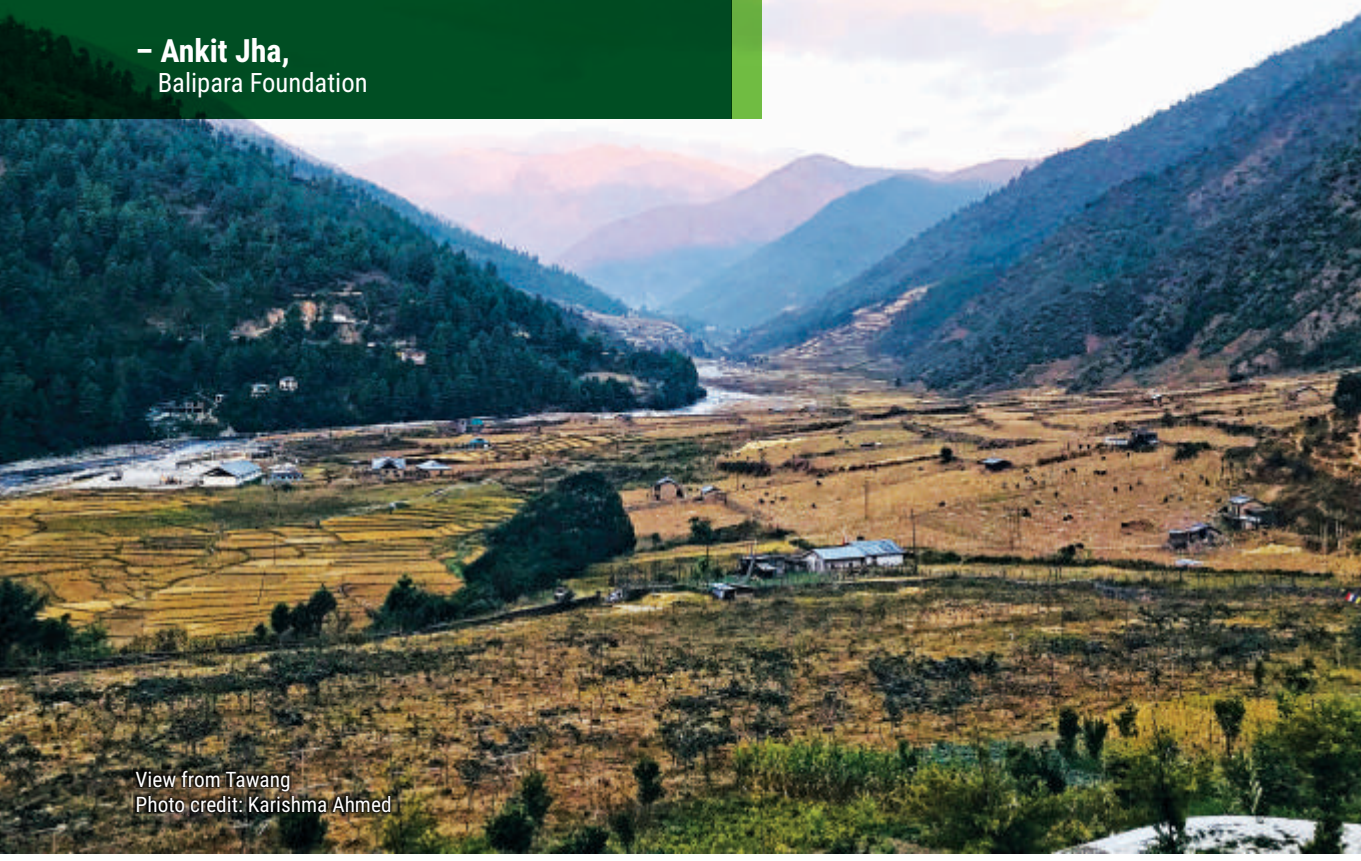
purposes and only holy dips on particular occasions are allowed," said Bicharai Kalai, another elder man of the village.

"Since the childhood, we have been seeing how the lake was worshipped by our forefathers. We are also continuing the practice and as a result, quality of water is as worthy as drinking," said Sunil Kalai, an Assistant Professor, Mass Communication in Tripura University. He attributed as part of their community tradition for the last few years, the lake has been used as an option for livelihood of all 60 families in the hamlet. The villagers contribute by releasing fish-ling in the lake and usually once in a year, all the villagers join in fishing activities and everybody gets the equal share. Otherwise, fishing is being allowed if there is any community feast or social ritual. However, the lake is not used solely as a business module, for preserving its purity, tradition and ecosystem, Kalai stated.

Traditional knowledge and practices like those of the people of Dwar kai Kala reveal how indigenous communities can play a role in watershed management and conservation to restore and regenerate Tripura's rich water resources. With effective and efficient local control, combining traditional ecological knowledge & practice with science and technology, Tripura's water bodies could be restored to full ecological health, and protected for a sustainable future.

ARUNACHAL PRADESH
The Future of Community Driven Mindful Tourism

– Ankit Jha,
Balipara Foundation



View from Tawang
Photo credit: Karishma Ahmed

Sitting atop the North Eastern tip of India, Arunachal Pradesh is as serene a tourism destination as it can get for unwinding and enjoying the picturesque landscapes. Brimming with rich cultural heritage, the state of Arunachal Pradesh is home to 26 major tribes and more than 100 sub tribes. It is also popular among travellers and tourists for its myriad small and big festivals that are held across the year. But all this diverse culture is deeply rooted in the environmental legacy of Arunachal Pradesh. The state has a forest cover of around 93% of which 60% are clubbed under very dense and moderately dense forests. These forests are rich in several species of flora and fauna. But it is especially popular for its faunal diversity. The State has about 20% species of the country's fauna, about 4,500 species of flowering plants, and more than 500 species of orchids.

According to the data by WWF, more than 60% of forests (accounting for 3.1 million hectares) fall under community custodianship and have traditional village institutions taking care of them. For decades, if not centuries, indigenous communities in Arunachal Pradesh have been living interdependently with forests and source most of their income, livelihoods and food from these forests. Forests have been the mainstay of the local economy and play a significant role in satisfying the livelihood needs of the indigenous communities. Traditional indigenous practices have also played a vital role in preserving the biodiversity of the region, particularly the floral biodiversity through traditional forest management and kitchen gardens.

Renowned for its tourist destinations like Tawang, Ziro Valley, Namdapha National Park, Sela Pass and many more, Arunachal Pradesh is easily one of the most visited tourist places in the North East India. However, the current model has proved detrimental for the socio-ecological fabric of the region. The traditional model of tourism doesn't factor in the environmental degradation caused to the region in the form of increasing carbon footprint, vehicular and point source pollution, accumulation of waste etc. This is where community led mindful tourism has a very critical role to play. With careful investment and support, mindful tourism could play a critical role in diversifying incomes and creating income resiliency among communities while preserving the biodiversity and ecosystems of Arunachal Pradesh.

Lessons from the Bhutan Model

The Eastern Himalayas have always been a popular tourist destination due to their cultural and environmental diversity but COVID-19 has presented an opportunity to formulate a new tourism paradigm which relies on the principle of **'low volume and high value'**. This will make the region a go-to destination for high end tourism based. Bhutan's successes in this arena lies in its focus on nature immersion, local participation, conservation, visitor learning experience and moral imperatives. Entry into Bhutan is carefully regulated through tourist quotas and high fees and most of this revenue is re-invested in enhancing tourism infrastructure, albeit sustainably.

As an alternative source of livelihood, mindful-natural tourism has the potential to generate revenue year around and this gives communities a better chance to sustain themselves and indulge themselves in entrepreneurial ventures. Income generated from mindful natural tourism has a greater level of stability, inoculating communities against the external economic pressures that often drive them to destroy natural capital to enrich their incomes. It also opens up avenues for dispensing nature education and conservation values - both to visitors and to local communities.

Investments in mindful natural tourism could provide the support for the conservation of the endangered hornbill, hoolock gibbon and all other critical species found in the region. However, entry through mindful tourism has to be

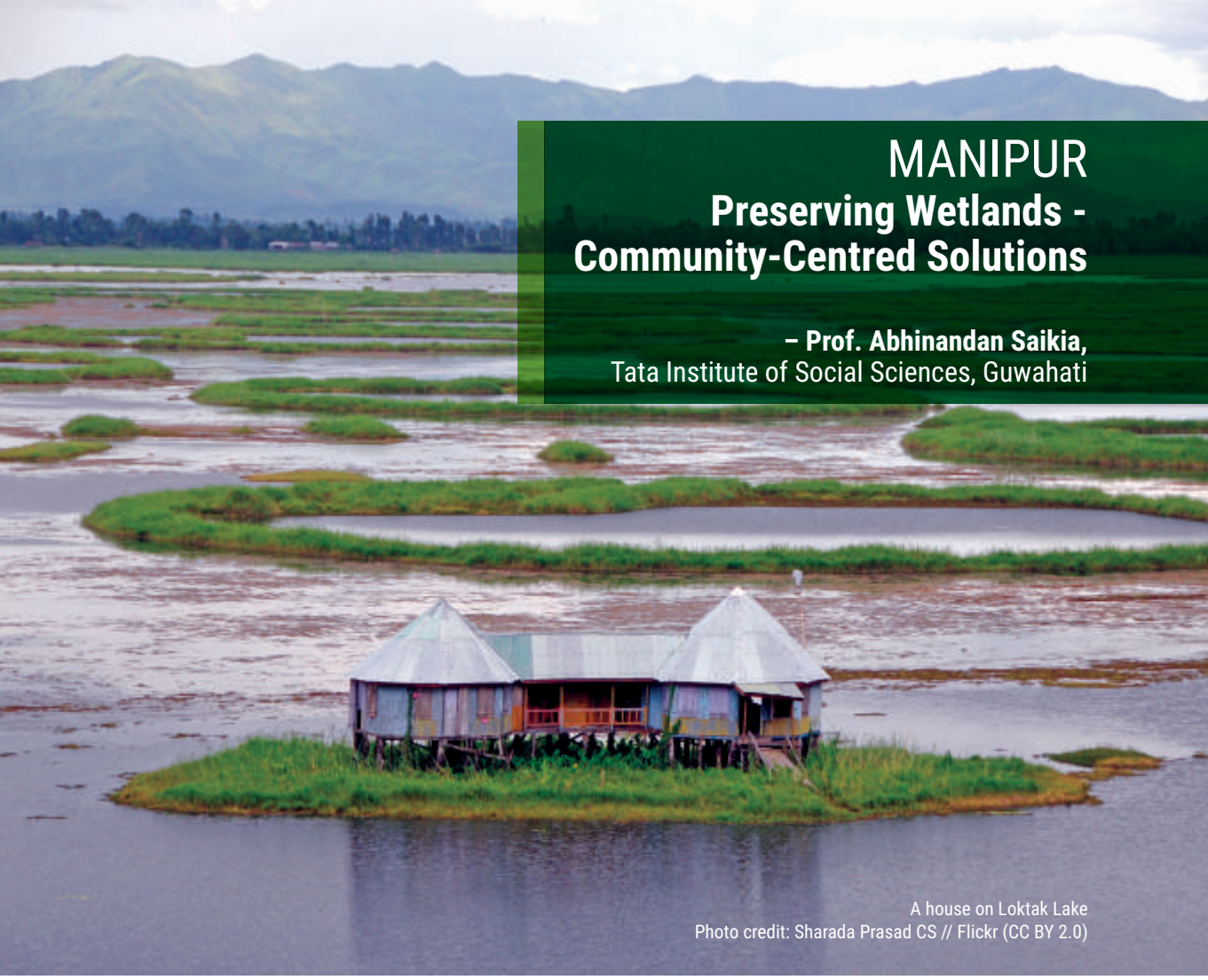
carefully regulated and managed to preserve the integrity of ecosystems and minimize value leakage from local economies. Applying lessons from the Bhutan model can help enrich, preserve and develop nature and culture for bio-cultural experiences as a unique model of Arunachal Pradesh tourism.

Communities and Mindful tourism

The culture of mindful natural tourism is still catching up in the region and there is a growing need to educate the youth as guides and teach them about the rich and unique species through research, documentation and advocacy campaigns. Arunachal Pradesh offers a lot of opportunity for adventure and wellness tourism which remains underleveraged in the state. With abundant medicinal plants, forests and faunal species - avitourism, floral tourism etc can be some of the thrust areas. The rich traditional knowledge systems and cultural practices need to be projected as the USP of the tourism activity in the state. The understanding possessed by the indigenous communities about the environment around them can be a valuable asset in promoting mindful tourism.

Arunachal Pradesh's global reputation for its festivals attracts a number of domestic as well as foreign tourists annually. These festivals need to be promoted as a part of cultural tourism which can help generate livelihood for the communities as they offer home stays, local cuisine and historical curation to the visitors. With the world experiencing a slow down to a global pandemic and the work culture being disrupted, people are on the lookout for unexplored terrains that also offer them the scope to work remotely. This needs to be capitalized by building infrastructure, ensuring connectivity, safety and basic amenities for the travellers.

Developing such models of community-owned tourism enterprises through these activities will significantly help in triggering the rural circular economy. As the natural capital helps generate financial capital, it must further be used in enhancing outcomes for communities - better access to universal basic assets such as healthcare and education, better skill development and better technical knowledge, to reinvest in enhancing and preserving natural capital for the future.



MANIPUR
Preserving Wetlands - Community-Centred Solutions

– Prof. Abhinandan Saikia,
Tata Institute of Social Sciences, Guwahati

A house on Loktak Lake
Photo credit: Sharada Prasad CS // Flickr (CC BY 2.0)

Sangai, Phumdi, Siroi and Loktak – are the keywords associated endemically with the 'Land of the Gems' – Manipur. A sibling among seven sisters of Northeastern states of India, the state of Manipur is known for its rich cultural and biological diversity. Located at the Indo-Burma hotspot of biodiversity, it has the forest types ranging from tropical to that of sub-alpine zones. In fact, though small in area, the forest of Manipur represents the types of forest in the northern hemisphere except that in tundra. Besides, the region has been the Vavilovian centre of origin of a variety of angiospermic plants (the famous *Siroi* lily flower). It is enriched with considerable inflow and outflow of flora and fauna between the south-east Asian countries and the Indian sub-continents through this region. The Manipur – Mizoram Kachin Rain Forests has the highest bird species richness of all ecoregions within the Indo pacific region. The biological distinctiveness of the region has been characterized as globally outstanding.

Surrounded by Patkai hills in the North and Chin hills (bordering Myanmar) in the south, the valley of Manipur is gifted with a rich water basin. It is mainly occupied by 155 wetlands like ponds, swamps, paleochannels, lakes and floodplains which cover 2.37% of the total geographic area of the state. Four categories of lakes, namely valley lakes, oxbow lakes or cut-off meanders, tectonic/landslide lakes, and artificial reservoirs are found which constitute together about 82% of the wetlands of the state. Historically, these wetlands have been emotionally related to cultural and ritual activities, fortification and recreational activities since the beginning of the Manipuri culture.

The World's only floating National Park – Keibul Lamjao National Park is found in this state which is located adjacent to the Loktak lake – a Ramsar site of international significance. The Eld's deer which is locally called the *Sangai* is found in this habitat. It is a critically endangered brow-antlered deer found in Manipur which live in a tiny speck of land, mostly grasslands locally called *phumdi* that float on water. The natural adaptation of this species in this ecosystem is unique which has earned it a name – 'dancing deer'. Interestingly, it is not the *Sangai* that dances, but the peculiar nature of its habitat that lends this trait. While treading through *phumdi,* the deer's hooves sink in the spongy, moist ground which from a distance looks as if it is dancing.

Fishing is one of the regular occupations apart from agriculture. The lake provides about 50% of the total fish production of the state. The Loktak Lake and *Pats* (local word for 'wetland') supports a huge fisher flock's livelihood. The number of fish species found in Manipur was reported to be 125 which often share a similar phenotype with fish fauna available in neighbouring Myanmar. Fisheries has been playing an integral role in the Manipuri society as fish forms a part and parcel of every Manipuri dish served on the table. Apart from it, most of the aquatic plants from these wetlands are highly marketable for their flowers, roots, rhizomes and stems, fruits and seeds for various purposes including medicinal use.

Of late most of the wetlands are found to be in the state of habitat degradation. Factors like rapid urbanisation, massive increase in human population, municipal solid waste generation, over exploitation of fishing and climate change have caused significant changes in these waterscapes. Most of the wetlands are now in a state of early eutrophication and if proper measures are not implemented on time, it can result in deterioration of water quality and aquatic habitats (which include fish too). On the other hand, the livelihood support system of the fishing communities will be adversely affected.

Is there a way forward to mitigate such misfits?

The answer is yes, but then there is a need to provide a space where natural laws can go hand-in-hand with social laws. Even, within social laws, it is imperative to bring out parity among customary laws and state laws. The emergence of such platforms can generate co-production of knowledge systems in the near future

where the 'good' practices of Traditional Ecological Knowledge (TEK) of the communities (here – the fishing community) can be matched with 'modern' scientific knowledge of the state. It can help in identifying different technical/ecological and socio-cultural intricacies associated with development and technology transfer.

Second, keeping in mind, the interesting geography of Manipur, and its contact with neigbouring country of Myanmar, the State along with the Union Government of India should look for exploring an interactive space with the Government of Myanmar. It can be initiated through discourse like 'Border Areas Study' where the salient features – market, livelihood, ecology can be discussed through the lens of Sustainable Developmental Goals and Local Agenda 21. Exchange of information will help in enriching the niche further between these two geographies.

Third, a similar sort of an interaction cell can be established among the seven sisters of Northeastern region of India, so that tomorrow, the future generation could witness a rainbow where the *'Sangai* can once again dance'!

BANGLADESH
Sundarbans and the Sensitive Issue of Community Conservation

– Pragya Timsina,
CIMMYT Bangladesh

Mangrove forest at Kachikali in the Sundarban National Park, Bangladesh
Photo credit: Hiroki Ogawa // Wikimedia Commons (CC BY 3.0)

The Sundarbans is a UNESCO World Heritage site and a very important wetland ecosystem for Bangladesh as well as India. Sundarbans is known for diverse fauna which includes 260 species of birds, the majestic Bengal tiger and many other species of animals and reptiles. The location of Sundarbans is in the delta of rivers Ganga, Brahmaputra and Meghna. The Sundarbans reserve forest shares 40% of its area with India and the rest located in Bangladesh. The mangrove forest of Sundarbans is the largest stretch of such a mangrove forest in the world.

Due to its unique location and ample number of natural resources the Sundarbans provides ecosystem services to the communities living in and around it. The ecosystem services not only include opportunities for livelihood and food but also other benefits such as dampening of winds and floods via the mangrove forest. Very recently when the cyclone Amphan struck the Ganges delta, the flood water entered 15 kilometers inland into the Sundarbans, but there was far less damage in the region than if there had not been the mangroves in the Sundarbans.

Studies have shown that communities living in an around the forest in the Sundarbans have to live with a lot of adaptation strategies owing to the dynamic nature of the ecosystem present in the Sundarbans, strategies include resilience from the flood, adaptations in farming techniques - a very recent study by Suchandra Dutta and team suggest that the adaptation strategy that is most substantially used is practicing of integrated farming system in the Sundarbans.

The Sundarbans is a source of a lot of products for the communities living in and around it, they have the mangrove honey and varieties of fish at their disposal. One of the other major sources of income for the people living on the fringes of Sundarbans is the opportunity to provide tourism services to potential tourists. One of the interesting and beneficial points in favor of conservation of Sundarbans is its location, which is not a very accessible location and possibility of a mass tourism has been highly unlikely in the past. Sundarbans is around 4260 sqkm. in area, 55% of the Sundarbans forest is land vegetation cover and the rest is water body and remains inaccessible for tourism and agriculture.

The major issues that pose a danger to the Sundarbans are climate induced rise in sea level along with anthropogenically altered environment leading to rapid erosion and accretion and alterations in species diversity and productivity. Due to the healthy nature of the mangrove forests in the Sundarbans, they have been providing services and facilities for business, livelihoods and living. Community conservation in the Sundarbans has largely circled around the idea of protected forest. An attempt to conserve the Sundarbans was piloted by the MS Swaminathan Research Foundation and state Forest Department between 1996 and 2004.

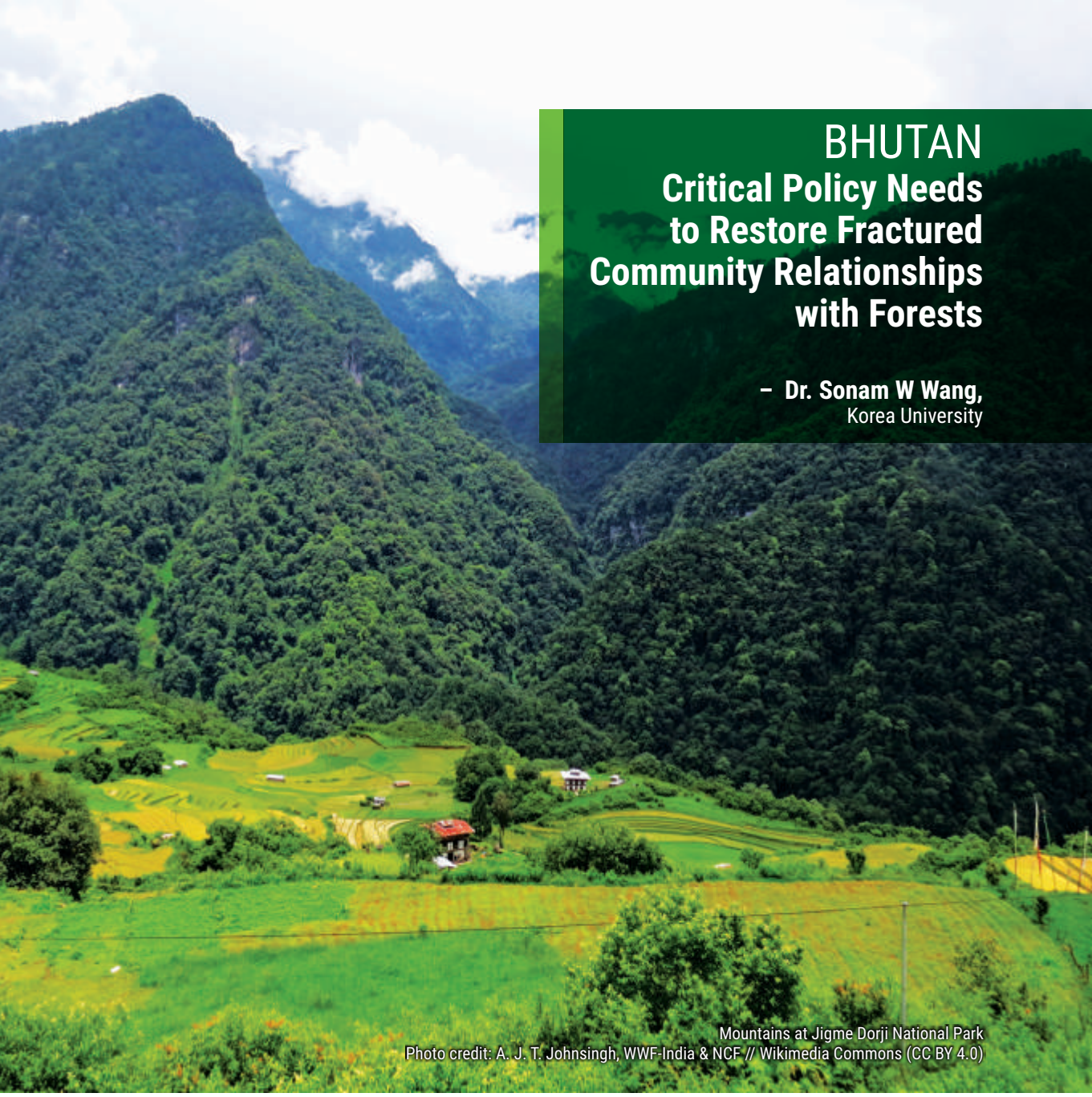
For the community that calls the Sundarbans their home, there are no recognized local rights within the reserved forest. The entry to the forest and collection of forest produce depends solely on permits issued by the Forest Department. Currently the management of the three wildlife sanctuaries of Sundarbans conserve the biodiversity aesthetic value and integrity of the Sundarbans.

Some of the continuous arguments raised by researchers to promote community-driven conservation in Sundarbans include restructuring of community institutions and strengthening participation of actual forest dependents in decision making and conservation and

restoration of the mangrove forests. This would lead to collaboration on addressing issues of tenure rights, legitimate sharing of mangrove ecosystem services and products and efficient conflict resolution, but this is easier said than done.

The major hurdle for the community living in Sundarbans is the possibility of seasonal farming, due to the saline nature of the area under agriculture, there is a possibility of producing only one crop here annually, hence the people in turn must depend directly on forest for forest-based products and fishery as the main source of livelihood this poses not only attract for the communities but also for the Sundarbans to provide these ecosystem services continuously for the people.

Due to this dependency, there has been pressure on resources with over exploitation, reduction in biodiversity and land conversion for agricultural gains. One of the promising ways of conservation Sundarbans is using nature-based solutions to help protect the environment and in return provide economic and social benefits by engaging local communities and empowering them in the process. Additionally, a dialogue between the two countries of India and Bangladesh is essential due to the shared nature of the Sundarbans by both the countries.



BHUTAN
Critical Policy Needs to Restore Fractured Community Relationships with Forests

– **Dr. Sonam W Wang,**
Korea University

Mountains at Jigme Dorji National Park
Photo credit: A. J. T. Johnsingh, WWF-India & NCF // Wikimedia Commons (CC BY 4.0)

Including a summary of recommendations from the 2nd Bhutan Eastern Himalayan Naturenomics™ Forum with Dr. Om Katel (Royal University of Bhutan), Dr. Pema Choephyel (Chief Officer of Bhutan Trust Fund for Environmental Conservation), Dr. Jeremy Brooks (Ohio State University) & Ugyen Namgyel (Bumthang Forest Division)

Forests and people in Bhutan have enjoyed an outstanding relationship based on mutual trust for each other. A common relationship of give and take, which is quickly becoming a rare commodity! Where, pro-forests lifestyles are manifested in our indisputable respect for all living things including plants. Forests are the source of our food, water, and,energy, including places of workshop. Globally, alienating forest dependent people from their forests has been a failed policy. Such policy choices had devastating impacts on people who lost their traditional rights and access to their basic needs such as water, timber, non-timber forest products, and places of worship. Such impacts have disproportionately affected disadvantaged groups especially the women.

The first major strike on the otherwise harmonious relationship between forests and people in Bhutan came in the late 1950s to early 1960s, when the forests of Bhutan were put under state ownership. Since then, Bhutan has followed a forest management regime based on protectionism, a popular forest management strategy instituted by colonial powers across the world. While Bhutan was never a colony of any country, state management of forest in Bhutan started with guidance by forest officers deputed from India. This allowed the protection based forest management strategy to take its roots in Bhutan.

The second strike came with the establishment of protected area systems. While the protected area concept originated from the Yellowstone model in the US, unlike in the US, Bhutan allowed the park residents to continue staying inside the parks with certain restrictions on resource uses and economic activities. Despite these restrictions, PAs opened an opportunity for reconnecting people and forests especially through the Integrated Conservation Development Program. The integrated conservation development programs engaged local communities in resource management and sustainable developmental programs. The community forestry program has further added to the initiative of the national parks by engaging people in owning and managing forest resources in their locality.

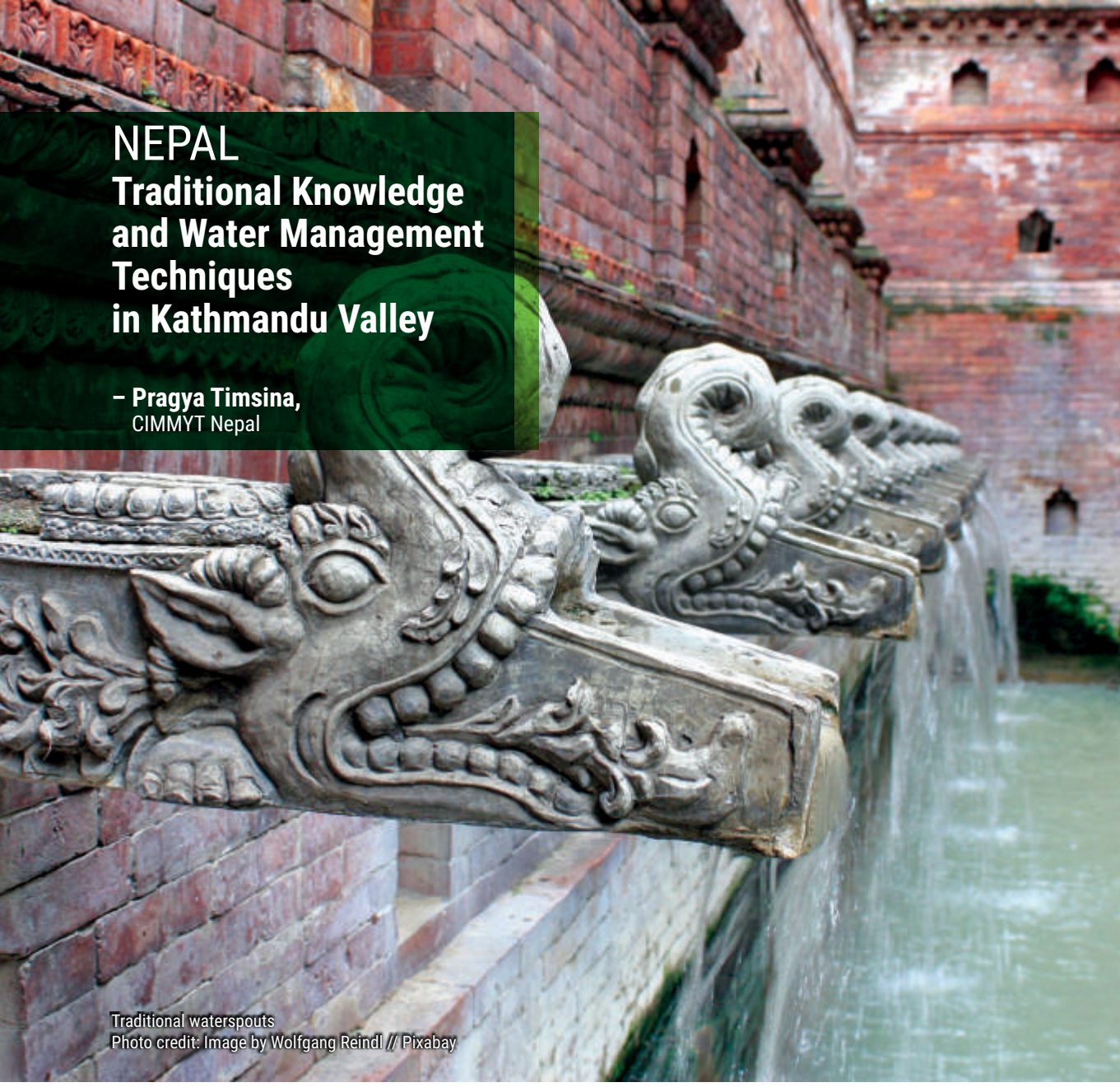
However, there is an urgent need to advance policy changes that will reconnect people and forests in a more significant way. Bhutan must modernize its forest policy to allow people to have more ownership over their forest resources. Local people's way of life and culture are useful for forest conservation and lack of these leaves a gap which is hard to fill, bad for symbiotic relationship. Local people's disturbance of forests has ecological benefits such as regeneration, reducing forest fires, etc.

Transfering ownership from community to state is not the best option unless accompanied by people centric policies and good leadership. However, in the absence of people-centric policies, illegal access may accelerate which combined with materialistic lifestyle based on consumption could further degrade our forests.

A decentralized approach is best, however, strong institutions backed by strong community norms and practices which are often rooted in religious beliefs are vital. Care needs to be taken regarding communities where resource management has not been their way of life. Community based solutions for forests is important in shared resources especially to balance short and long term needs. Balanced policies backed by transparent leadership are key for success.

We need to re-establish community forest relationships for the future of Bhutan's forests. Community based forest management and ecosystem based interventions for generating incomes (e.g. eco-tourism, wood based industries) will be crucial in achieving this. The understanding of interdependence between people and forests must be deepened through teaching (GNH is a good vehicle to achieve this). Research targeted at impacting policy for sustainability must be prioritized. Threat based programmes need to be urgently addressed and developed, to develop alternatives (e.g. biogas) to regenerate forest resources threatened by community utilization.

People are the face of our forests and if they are suffering then our forests are in trouble.



NEPAL
Traditional Knowledge and Water Management Techniques in Kathmandu Valley

– Pragya Timsina,
CIMMYT Nepal

Traditional waterspouts
Photo credit: Image by Wolfgang Reindl // Pixabay

The application of traditional indigenous knowledge and modern planning systems and water restoration has always been a debate among researchers and government bodies. There are numerous examples of communities restoring water bodies through traditional methods, but due to the anthropogenic stress and scale of such restoration techniques, application of these techniques have often been questioned. In the Kathmandu Valley of Nepal, the water supply system has a different story to tell.

The traditional Newari town planning concept had three of the major domains that is the natural domain which included the forests, the agricultural domain which included the food production units and the human domain which encompassed the settlement area. The Hiti system of water conservation contains- the ponds, the stone sprouts the Wells and the drains. This system evolved to promote and nourish the development of the cities in the valley. The water supply system of Kathmandu is called the Budhanilkantha system, the water supply system of Bhaktapur is called the Bhageshwori system and the water supply system of the Lalitpur is called the Tikabhairav system. These three districts makeup of what is known to us as the vast Kathmandu Valley.

Stone sprout is a traditional Newari water resource. Famously known in Nepal as 'dhunge dhara' or hiti (Newari) is a traditional stone drinking fountain found in Nepal. The stone sprouts are connected to an uninterrupted stream of water and it helps to utilize the rain, surface and groundwater. There, sprouts were a part of a complex water supply systems and have been in Kathmandu since the 15th century through periods of Licchavi Kings and Malla rulers who extended this water system and provided high quality water to the valley residents. These stones sprouts are carved out of stones are still in use and continue to meet the water supply demands of the people of Kathmandu Valley. There exists approximately 400 traditional stone spouts in the Kathmandu Valley (UN Habitat, 2008).

What is interesting to note here is that how a traditionally built system of water supply and connection of water supply systems is still in use in what is now the capital city of Nepal. Due to the immense influx of people from other parts of Nepal to the Kathmandu Valley, which was originally inhabited by the Newari people, the valley has been under immense stress due to exploitation of natural resources, increasing scarcity of water and high volumes of particle pollution. The people now heavily rely on water tanker deliveries and bottled water to meet their water needs due to scarcity of water in which was earlier built as a water sufficient city. There has been a mismatch between the perennial supply of water and the increasing water needs of the Valley. The water sprouts were used for multiple purposes including drinking, cooking, washing, cleaning, animal feeding and even irrigation by changing the water into the fields. The people of the Kathmandu Valley still use the sprout water, and some people must travel a lot of distance to get water in the winter due to drying up of these water sprouts. The dependence on water sprouts is not only at an individual level, hotels, restaurants and factories also depend on sprouts to meet their needs.

This traditional technology would have been very useful in Nepal due to especially during the monsoon season. The pond should be positioned at higher elevations throughout the region helping collect rainwater during the rainy months and allowing it to slowly restore groundwater levels for the rest of the year. The canals help to supply water to areas with water

scarcity with the help of the elevation. These water supply systems were designed to link local aquifers and ponds with water sources outside the city, while the drainage of these systems was directed to flow into the irrigation canals where it could supply to agricultural fields and eventually go back to replenish the groundwater. The other traditional indigenous water conservation that is vastly seen in the Kathmandu Valley is the construction of ponds all around the city of Kathmandu which connect with other water channels to form the larger water supply system.

While there is an alarming scarcity of water in Kathmandu city, replenishing natural aquifers is immensely important, owing to the high dependency of people on stone sprouts. Rapid urbanization and development that the Kathmandu Valley has witnessed along with intense pressure on resources due to influx of new residents in the valley is one of the threats to the water resources of the Valley. Researchers argue that there has been a loss of sense of stewardship to preserve such a vital source of water for the valley along with an efficient water recharge system for the environment which has a strong historical significance. Any effort to reduce water insecurity in Kathmandu must work to inculcate stewardship behaviour, whether through bridging the gap between communities and traditional water management or by introducing common pool resource management systems, and water recharge systems need to be shaped and streamlined for greater efficiency.

MYANMAR
Indigenous Livelihoods & Governance in Halting Deforestation

Gold mining in Shan state Myanmar
Photo credit: Ian Watkinson // Imaggeo.egu.eu (CC BY 3.0)

Summary of the proceedings of the 1st Myanmar Regional Naturenomics™ Forum with U Win Myo Thu (ALARM), Gaurav Gupta (WWF-Myanmar), Ngwe Lwin (Fauna & Flora International - Myanmar) & Dr. Graham Prescott (University of Bern)

Deforestation in Myanmar

Myanmar is home to rich and unique biodiversity, falling within the Indo-Burma biodiversity hotspot. With ecoregions ranging from mangrove wetlands to grasslands to rainforests to montane forests, it is home to 233 globally threatened species, including 37 critically endangered and 65 endangered species. Forests cover 63% of the country's areas and among these, the Northern Forest Complex, stretching across 12,000 sqkm. running from India to China in Kachin state is one of the largest intact forest areas in South-East Asia. 3 states represent nearly 59% of this total forest cover: Shan, Kachin and Sagaing. Of this forest cover, however, only 38% of its forests are intact and retain over 80% of their canopy.

Since 1990 alone, the country has lost over 20% of its forests and between 2010 – 2015, the country reported 546,000 hectares of forest loss, the third highest rate worldwide, trailing only Brazil and Indonesia. Approximately 16% of primary forest loss occurred between 2002 and 2019 and by 2014, only 13 large unfragmented forest tracts remained in Myanmar. Today, with concerted efforts to reduce deforestation, Myanmar is now the country with the 7th highest deforestation rate globally.

The worst of this deforestation has occurred in just a handful of states across the northern part of the country, with the state of Tanintharyi in the south being an exception. The 3 states with the highest tree cover loss accounted for a total of 56% of the country's total forest loss. Between 2001 and 2019, Shan state alone lost 1.27 million hectares of tree cover according to Global Forest Watch. The state of Tanintharyi, Kachin and Sagaing have also seen severe tree cover and forest loss within this period. All 4 states represent the richest remaining forest tracts in Myanmar and their loss represents a severe threat to the country's forest-based biodiversity.

There are three primary drivers of this deforestation in Myanmar: agriculture (both industrial and smallholder), forestry, infrastructure & mining. Mining, infrastructure and commodity agriculture – including rubber, palm oil, rice and corn – alone accounted for 1 million hectares of forest loss between 2002 and 2016. Most of this degradation and deforestation occurs in proximity to previously degraded or deforested lands. In Kachin, Sagaing and Tanintharyi most of this loss has occurred along major river systems, new highways, and near commercial development areas. Inside reserve forests, however, timber extraction is one of the primary drivers of forest degradation, caused by both overharvesting and rampant illegal logging.

Forests, Livelihoods & Communities

Over 60% of Myanmar's population lives in rural areas and depend in one way or another on forests for their basic livelihoods. Rural communities depend on forests for wood fuel, bamboo and rattan, fodder and forage for livestock, wild fruits and meat, and medicine. The forestry sector represents 4.1% of Myanmar's total employment, but does not account for the

vast employment provided through NTFPs – a largely informal sector. A 2013 estimate suggests that NTFPs bring in approximately USD 487 million for rural communities. Forests are also a key energy source for a country with poor electricity coverage including in its urban areas: nearly 77% of Myanmar's fuel demands are met through fuelwood alone.

However, forests in Myanmar provide services that extend far beyond the immediate economic benefits it brings to people. Ecosystems services such as insect pollination, mangrove fishery nurseries, water filtering, carbon sequestration and erosion prevention contribute an estimated USD 7.3 billion to Myanmar's economy.

Forests also play an important role for many of the indigenous communities of Myanmar, either as part of their customary lands or because of their cultural value. There are 135 recognized indigenous communities in Myanmar, largely heavily concentrated across seven ethnic minority states. Approximately 65% of Myanmar's forests are concentrated in these ethnic minority states as per the FAO's definitions of forests – but this percentage is much higher if the Tanintharyi region and its ethnic communities are included, as well as wooded land in Shan state and forest land managed by the Naga community in Sagaing.

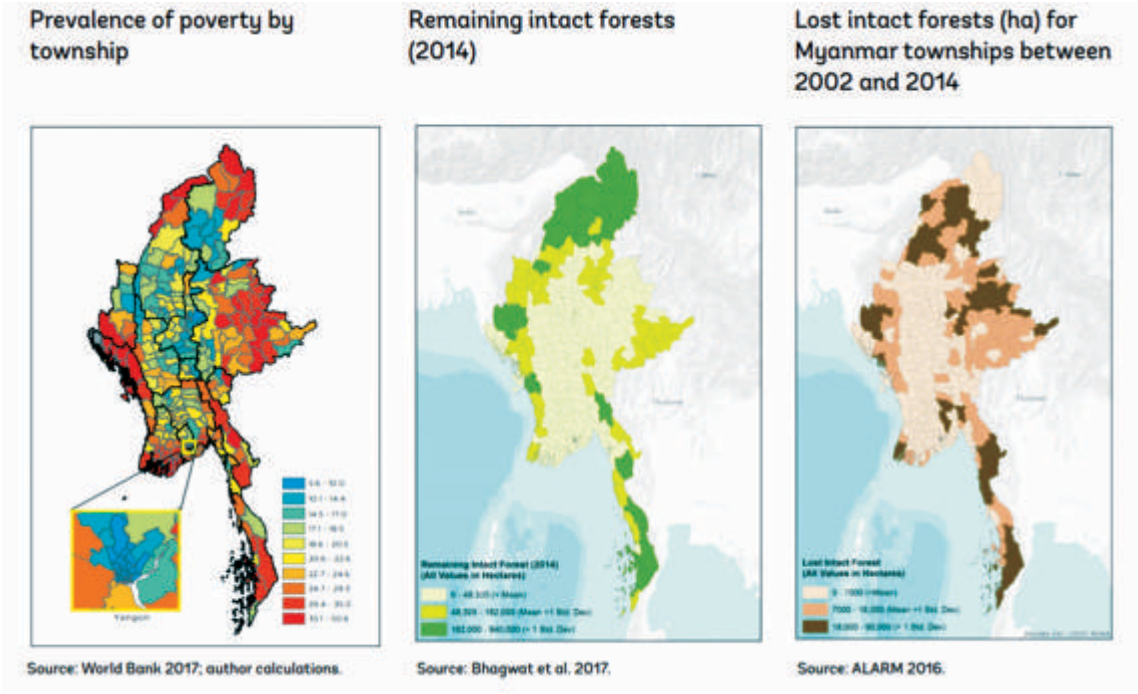
However, customary access and management of forest land by indigenous communities is poorly recognized in Myanmar. Communities often find themselves excluded from or with limited access to forests they have traditionally used to support their livelihoods. Traditional agricultural practices such as shifting cultivation are often accused of being the primary drivers of forest loss, though this is proportionately less than forest loss due to plantations, infrastructure, the timber trade or mining. This insecure land tenure has unfortunately led to a situation where incentives to conserve natural assets are undermined, driving communities to either participate in the local timber & forestry trade or to otherwise unsustainably exploit forest resources for livelihoods.

The correlation between forest land, forest loss and high poverty rates across Myanmar points towards this unfortunate relationship.

Community forestry initiatives are slowly making inroads in Myanmar, as an alternative to state-led preservation and management of forests. 2016's revised Community Forestry Instructions recognizes the existence of customary forest management practices and makes some provision for their exertion alongside district forest offices. However, there are pitfalls to this: reforestation under these programmes, for example, has oriented towards trees with high commercial values, which erodes the biodiversity of forests. Provisions under the CFI are limited in their potency and the recognition of customary practices is contingent on factors often outside of community control.

Towards Net Zero Deforestation

With the global push for zero deforestation, it is no longer enough to



Source: Myanmar Country Environmental Analysis. Sustainability, Peace, And Prosperity: Forest Resources Sector Report, World Bank, 2019

slow deforestation but also drive reforestation efforts in Myanmar. At current rates, the forest department restores around 30,000 hectares of forest annually, but these goals need to be far more ambitious. A total of 250,000 hectares of forest have to be restored annually to bring deforestation down to net zero and to effectively contribute to Myanmar's NDCs on forest cover restoration and preservation for climate change mitigation. However, caution needs to be exerted to ensure that the goals set are focused on quality restoration, rather than purely numerical target oriented - as they have tended to in the past.

Land use planning needs to be better integrated, balancing the need for infrastructure development, agriculture and livelihoods and conservation. Planned zoning is required, coupled with a high conservation value approach that designates areas of high conservation importance either as critical habitats or corridors for species. Companies sourcing produce from Myanmar need to actively push for zero deforestation across their supply chain, collaborating with communities sustainably producing crops without clearing forests for agricultural land. Enterprise development for communities is also vital - particularly support for cooperative development - enabling communities to access better

markets, diversify their crops and reduce dependency on forest produce.

Better legal and policy instruments are needed to improve overall forest governance. The limitations of a livelihoods approach and community management approaches need to be recognized in governance, particularly in areas where illegal mining supplements local livelihoods. Regular monitoring is needed, along with systematic and regular enforcement from local authorities.

Different indigenous experiences and traditions in the arena of forest management need to be incorporated into existing legal and policy frameworks, rather than applying a one size fits all model of community forestry. Indigenous practices need to be officially recognized and supported, to scale up forest restoration while encouraging forest ownership and management by local communities. Participatory mechanisms need to be strengthened and enhanced through effective platforms and mechanisms for exchange and evaluation of forest restoration initiatives. Only a multi-pronged approach, recognizing the myriad different driving factors behind deforestation can allow for the development of effective solutions that enable the country to achieve net zero deforestation - and protect its standing natural assets.

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