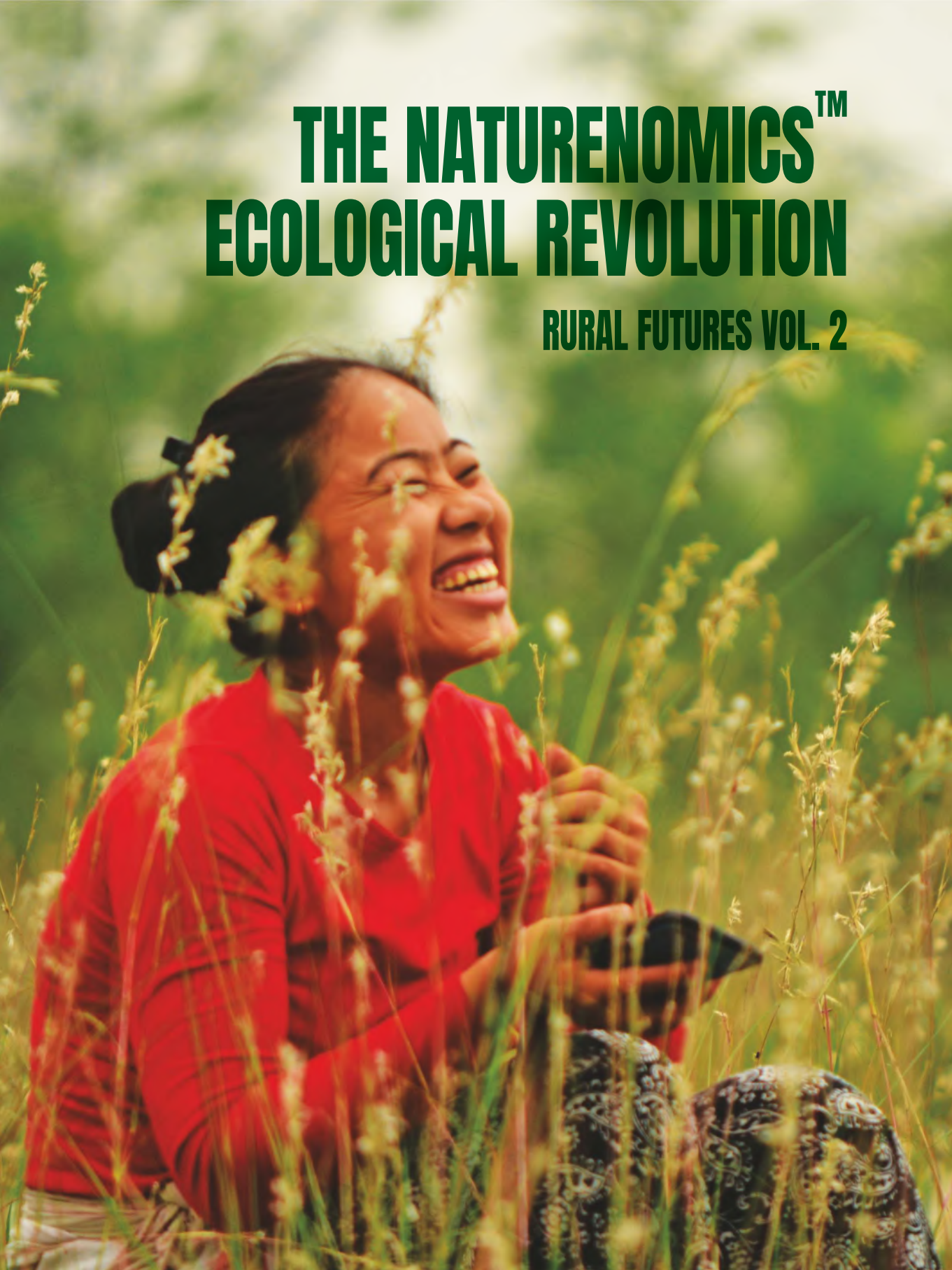
THE NATURENOMICS™ ECOLOGICAL REVOLUTION

RURAL FUTURES VOL. 2



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RURAL FUTURES

VOL. 2

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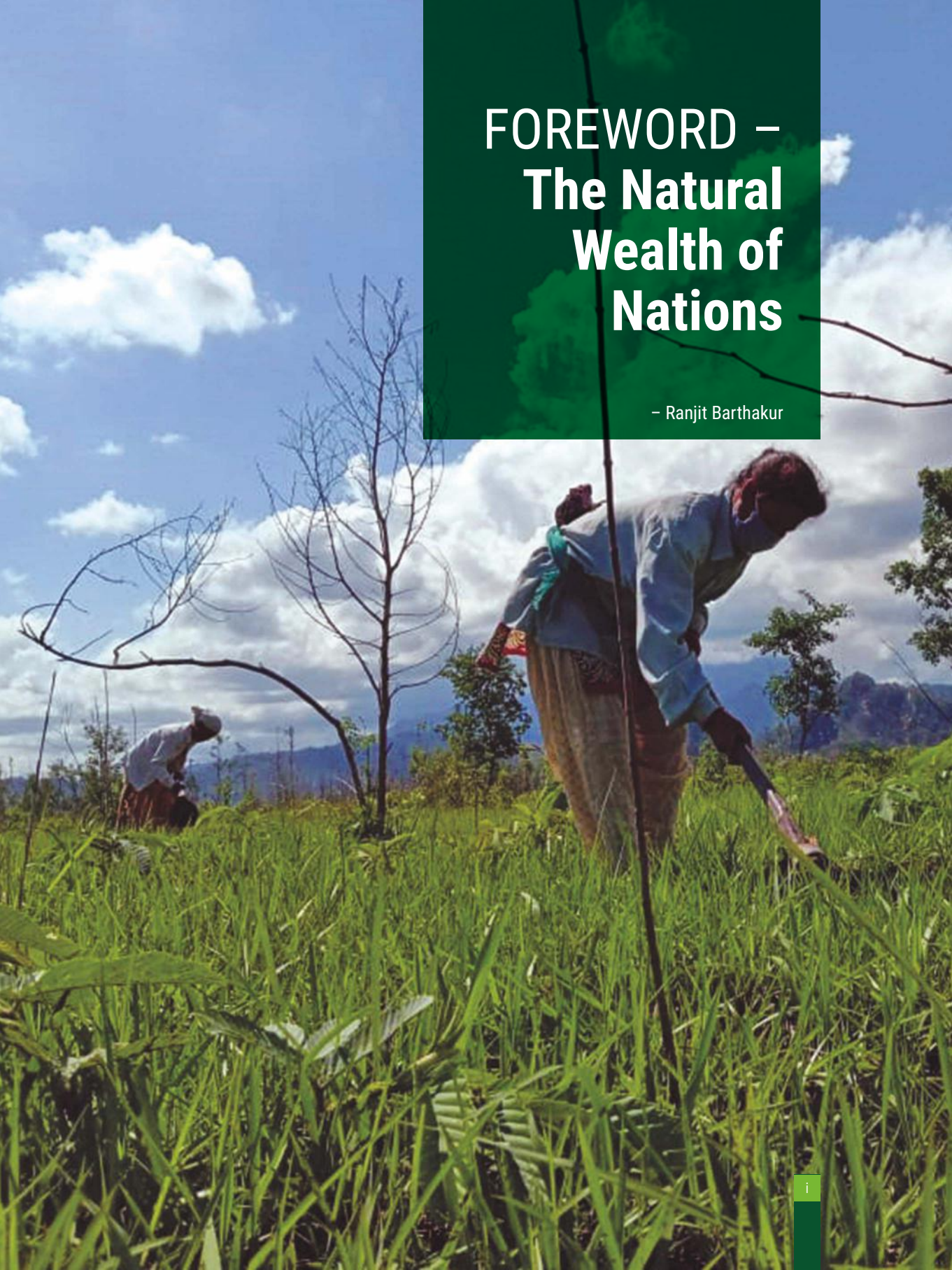

FOREWORD – The Natural Wealth of Nations

– Ranjit Barthakur

Mahatma Gandhi, way back in 1928 warned the world about the unsustainability, on a global scale, of western patterns of consumption - "God forbid that India should ever take to industrialisation after the manner of the west," he said. "The economic imperialism of a single tiny island kingdom [UK] is today keeping the world in chains. If an entire nation of 300 million took to similar economic exploitation, it would strip the world bare like locusts."

In 2020, the prophetic words of Gandhi seems to be our reality. The COVID-19 crisis has exposed the dangers that lie ahead down the path of ecological destruction the world is on today: virulent pandemics, droughts, water & food insecurity, desertification of once fertile soil, migration, conflict. What once used to be a once in a lifetime disaster is looking to soon become a once-a-year event. The Eastern Himalayas, the third pole of the world, are warming rapidly, threatening the lives and livelihoods of billions across India, China, Bhutan, Nepal, Bangladesh and Myanmar.

A tiny virus has brought the global economy to a standstill, revealing the cracks in the neoliberal economic agenda of the past four decades. The fragile ecological balance that makes life on earth possible depends on the cumulative and optimal functioning of ecosystems services provided by healthy, thriving natural assets. **Healthy ecosystems maintain the cycles that water our crops with rain, put oxygen back into the atmosphere, lock nutrition into the soil and regulate our weather systems within the narrow margin that allows for life on planet earth.**

Our economy depends on the vital functioning of these systems – an invisible flow of value through our economic system that remains unaccounted or underaccounted under the current economic paradigm. The World Economic Forum estimates that **$44 trillion of our $87 trillion global economy depends moderately to heavily on nature.** However, the value of these natural assets remain underaccounted and undervalued on our balance sheets. Meanwhile, costs incurred through natural asset destruction and depletion are externalized from business value chains and are disproportionately borne either by public institutions or by vulnerable communities - particularly frontline rural and indigenous communities. **We are living on borrowed time, imperilling not only our children - but our own futures.**

Since the dawn of time, we have used natural capital to drive our economic growth. **From early agricultural civilizations to the industrial revolution, natural resource use and extraction has underpinned the global economy, powering our thirst for better, brighter, faster, cheaper.** The 21st century's digital revolution continued to build on natural resources: metals to build our technology, rare earth minerals for our batteries and fossil fuels to power it. We have exploited and looted our natural wealth, spurring the global collapse we face today. The time to rethink how we use our natural capital is here: we have to take the leap forward to **create the Naturenomics™ civilization.**

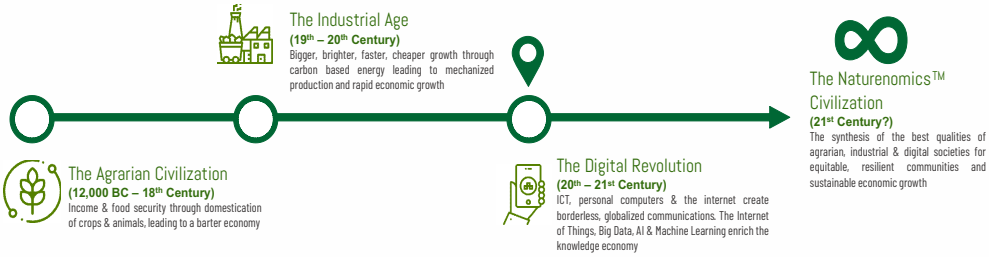

Fig 1: Natural capital through the centuries

The biodiversity, climate and pandemic crisis are precisely the opportunity we need to change our relationship with nature and with each other. If we can make the transition to an economy which invests in natural capital, rather than depletes it, we can change the story. The natural world has not yet crossed the tipping point: the window of opportunity has never been clearer - and narrower.

The most critical imperative for this Naturenomics™ revolution, is recognising that Ecology is Economy. We need a new economic paradigm centering natural capital and securing natural assets for sustainable community futures. This valuation is a must, to pave the way for social inclusion, capturing benefits from ecosystem goods & services to drive the delivery of universal basic assets such as healthcare and education for the indigenous, rural and local communities who steward our natural assets. Valuing nature and quantifying the benefits of the planet's capital assets is what will help us create an inheritance based on natural capital & natural assets - and a growth paradigm that reconciles human and natural capital needs for a truly sustainable future.

The Eastern Himalayas face a fragile and unpredictable future. Over the next decade, its smallholder farmers and indigenous communities will be threatened by extreme weather events & flooding, desertification, shrinking incomes and economic instability. **Yet the region's rich natural capital also offers an opportunity to transition to a new, sustainable model of growth** through five key transitions:

1. **Jobs for the future -** by 2030, the Eastern Himalayan region can create **3 million jobs through rewilding and agroforestry across over 6 million hectares of land,** if governments and businesses drive investments away from the destruction of nature towards its regeneration

2. **Rewild the economy -** investing **$4.2 billion in creating over 6 billion natural assets of the Eastern Himalayas will create over $91.6 billion in natural capital** over the next three decades, supporting the indigenous and forest-fringe communities

3. **Net zero by 2030 -** the region needs to invest systematically in decarbonizing its growth by moving away from fossil fuel dependency, enhancing infrastructure efficiency and investing in nature based solutions for carbon sequestration. Through the rewilding economy, the Eastern Himalayas could, on average, sequester an additional 19.5 billion tonnes of carbon annually

4. **Mitigate animal-human diseases -** the Eastern Himalayas are a risk prone zone for new zoonoses to emerge, especially as habitats shrink, bringing people into contact with wild virus reserves. **Investing in the region's forests can reduce these risks by up to 40% .**

5. **A Naturenomics™ economy -** to drive this future we need to achieve a balance between rural and urban communities and invest in rural communities to build Rural Futures: opportunities for natural capital employment and socioeconomic wellbeing through universal basic assets such as education and healthcare that reach all people. The natural capital value of this new rewilding economy can provide **universal basic assets coverage (healthcare, education, renewable energy access) to over 6 million households across the Eastern Himalayas.**

Achieving this transition through natural capital, however, means a fundamental rethink of how we account for natural capital. We need new methods for valuing and amplifying natural capital - across our value & supply chains, across our GDP and our economy. Without these three key changes, this transition cannot be completed:

- **A Nationwide Evaluation of our Natural Assets -** understanding the value of our natural capital reserves, especially in the Eastern Himalayan region & recognizing the role of and stewardship of indigenous communities in creating this value

- **An Ecological Budget -** recentering our financial budget around natural assets, with better accounting & valuation of natural assets and their impacts across our economy

- **Naturenomics™ -** moving beyond the traditional GDP definition of growth as consumption, towards an ecological driven budget and economic model, driven by a new model of economics based on natural assets

In June this year, we held the 1st edition of the Naturenomics™ Dialogues, Ushering in the Ecological Revolution, to start a conversation on the way forward for a green recovery in the Eastern Himalayas. This report is the outcome of those conversations and the bridge to **ecology is economy.** Building on the ideas put forward by the diverse group of thought leaders and practitioners of nature neutrality, this report sketches the way forward for the Eastern Himalayas to build a rewilding economy that restores and manages natural assets, unlocking the power of business, communities, technology and policy to deliver Rural Futures for resilient communities.

The COVID crisis offers a unique opportunity to rewrite the rulebook on growth, human development and quality of life. We need a new paradigm for resilient and sustainable relationships between people and nature – for our future. **By investing in the new rewilding economy,** we can take a first step towards building the Naturenomics™ civilization.

The Eastern Himalayas must not repeat the mistakes of the rest of the world, but must seize this opportunity and lead the revolution for interdependence between ecology and economy. We have to move beyond the GDP paradigm, because ecology is economy and without healthy ecosystems, life on earth ceases to exist. Ecology is economy has been the heart of these communities for decades, if not centuries. Their nature-centred values and vision for natural assets can fundamentally reshape how we propel growth in the region. **The rest of the world has a chance to learn from Eastern Himalayan nations** like Bhutan, and the rich indigenous perspectives of the 400+ communities of this tiny region.

The time for a revolution in ecology and economy is here. Let us invest in the new natural wealth of nations.

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The World & The Eastern Himalayas Today

– Ankit Jha

The onset of COVID-19 and the worldwide disruption caused by it has yet again triggered a debate about the paradigm of development we have been following since the advent of the industrial age. The relentless drive for economic growth has led to continuous depletion in the global natural capital bank in the form of biodiversity loss, pollution and land degradation. This has adversely affected human well-being by further increasing the resource equity gap (WWF, 2016). In this context it is imperative to discuss how the Eastern Himalayan region which is abundant in natural capital can set an example for the world to take a recovery route based in nature and deploy traditional knowledge systems to create alternatives to our current system of economic growth.

Fig 1: Map of the Eastern Himalayas

Spanning over a total area of 5,24,190 sq.km, the Eastern Himalayan (EH) region stretches to seven countries namely- Nepal, China, Tibet, Bhutan, India and Myanmar. The region also happens to be one of the four global biodiversity hotspots present in India. It is home to some of the world's most beautiful species of flora and fauna. The Eastern Himalayas intersect three global biodiversity hotspots with 38.9% of the Himalayan, 7.7% of the Indo-Burma and 12.6% of the Mountains of Southwest China. More than 7000 species of plants, 175 species of mammals, and over 500 species of birds have been recorded in the Eastern Himalayas alone (Jianchu, Shrestha, Vaidya, Eriksson, & Hewitt, 2007).

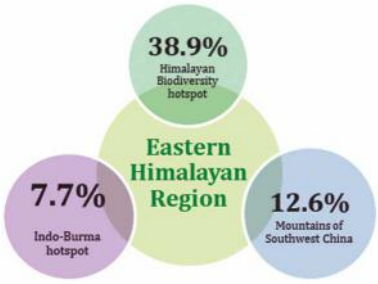

Fig 2: Intersection of global biodiversity hotspots in the Eastern Himalayan region

Being a global biodiversity hotspot also means that the region is also under constant spotlight over the conservation of the endemic species found here. There are 163 globally threatened species found in the Himalayas, including Asia's three largest herbivores – Asian elephant, greater one-horned rhinoceros and wild water buffalo – and its largest carnivore, the tiger. It has a very wide variety of plants, birds, mammals, aquatic life, and other living beings like the red panda and the golden langurs. North East India is home to more than 400 diverse ethnic communities with the total population of the region being 46 million (Office of the Registrar General & Census Commissioner, 2011). From snowline to sealine, the Eastern Himalayan region is one of the most unique ecosystems in the world.

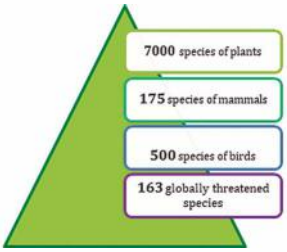

Fig 3: Species richness of the Eastern Himalayan Region

According to the India State of Forest Report (Ministry of Environment, 2019), the total forest cover in the North Eastern region is 1,70,541 sq km, which is 65.05% of its geographical area. These forests act as one of the largest sinks of carbon as they account for 28% of India's total estimated carbon stock of 7,124 million tonnes. Abundant with vast expanse of natural resources, the North East Region accounts for 34% of the country's water resources and almost 40% of India's hydropower potential (Gateway to the ASEAN India's north east frontier, 2014). It is strategically located on a quad junction of China, Nepal, Bhutan, and Bangladesh and is also directly linked to the South East Asian markets. The region is also a vantage entry point for the Southeast Asian markets. Yet despite its vast reserves of natural wealth and its diverse and young population, the natural capital of the Eastern Himalayas is poorly accounted for and poorly valued - despite the vital role it plays in managing weather systems, water systems and carbon stocks for India, China, Bangladesh, Myanmar, Bhutan and Nepal.

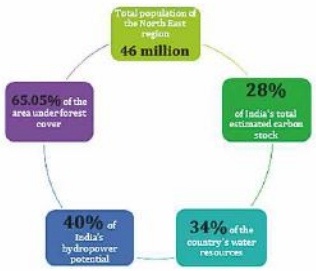

Fig 4: North East Region in a nutshell

Challenges & Risks

The Eastern Himalayas are one of the world's 'crisis Ecoregions' (Hoekstra et al. 2005), with 15% of the area officially designated protected areas. The region has been plagued by unprecedented population growth, habitat loss, climate change, biodiversity loss, frequent natural extremities, depleting natural assets, and resource based conflicts. Between the years 1961-2011, the Himalayan region saw a percentage increase of population by 250%, from 19.9 to 52.8 million. It is estimated that with this rate

of growth i.e. 3.3% annually, there will be a 13 fold increase in the number of people by 2061 (Apollo, 2017). This growth will be a big challenge for the Eastern Himalayas which is primarily dominated by tribal population that rely on agriculture for subsistence (Marchang, 2017).

Habitat & Biodiversity Loss

The rising socio-economic development of the Eastern Himalayas has led to an increase in the demand for timber, fodder, fuel-wood, infrastructure and other such necessities. This has resulted in the conversion of forests for agricultural lands and human settlements. In India's North East, growing population, growing food demand leading to proliferating 'unsustainable agribusinesses', practice of Jhum cultivation, industrialisation, urbanization have been the major drivers of deforestation. As per the ISFR (2019) the forest cover in the northeast marked a decline as the current assessment showed a decrease of forest cover by 765 sq. km. compared to 2017 data. The trend of forest loss in the northeast region has continued for more than a decade as the region has witnessed a loss of about 3,199 sq. km. of forest area since 2009. Independent assessments by the Global Forest Watch suggests that North-east India lost an estimated 11,400 km2 of forest cover between 2001-2017 (Global Forest Watch). Such large scale deforestation has caused degradation and habitat fragmentation in the region which has had an adverse effect on the regional biodiversity and ecosystem services that communities depend on.

Fig 5: Trend of orest loss in the NER

Land degradation due to overgrazing by domestic livestock is widespread in the lowlands and alpine ecosystems. The flora of fragile alpine meadows has been overexploited for traditional medicine (because medicinal plant collectors invariably uproot the entire plant, regrowth is hampered) (Himalayas-Threats, 2005). A shift towards cash crop production is another factor responsible for land degradation. Shifting cultivation is commonly practiced in the region and many tribal communities in this region depend on this form of agriculture for food grains and vegetable production. But due to an increase in demand, the time limit for land regeneration considered by the cultivators has come down and the practice has turned intensive. Traditionally, jhum cycles used to be a ten year process but presently jhum cycles in most areas of northeast India have been reduced to as little as 3-4 years according to official data - though independent data suggests this might not be the case. This drastic reduction in the cycle leaves insufficient time for the soil to recuperate or for secondary forests to regenerate. This has led to dwindling productivity, increasing poverty, poor living conditions for the labourers, soil erosion, forest

degradation and loss of biodiversity and ecosystem services.

Government at several occasions has made efforts to put an end to this practice by creating alternatives for the communities but the promotion of cash crops like timber, tea, rubber, cashew nut, oil palm etc. has replaced one form of destruction with another - the rise of monoculture plantations where there previously weren't any. The economy vs. ecology debate in the promotion of cash crops has always been contestable. A study published in the Public Library of Science suggests that ever since the oil palm industry in South East Asia has seen a boom in the last couple of decades, it has been one of the biggest drivers of deforestation (Vijay, Pimm, Jenkins, & Smith, 2016). The oil palm has also been one of the most polluting industries. The direct discharge of palm oil mill effluent (POME) adversely affects the environment leading to water pollution and land degradation (Iskandara, Baharumab, Anuarab, & Othaman, 2018).

India is one of the largest importers of palm oil from Indonesia and Malaysia for its domestic consumption. Since the early 1990s, India's palm oil imports have skyrocketed from about 100,000 to over 8.8 million metric tons in 2014. This has prompted the government to aggressively push for an increased domestic cultivation of oil palm through programs such as the Oil Palm Area Expansion (OPAE) and National Mission on Oilseeds and Oil Palm (NMOOP). In 2004-05, the GoI introduced the Oil Palm Development Program in three states of NE India- Mizoram, Tripura and Assam. To push its agenda further, the government of Mizoram introduced the New Land Use Policy which faced a lot of resistance from the locals as the law wanted to do away with the traditional jhum practices and lure the locals in cultivating commercially viable oil palm.

Nagalimvoice, 2014 suggests that communities took cues from neighbouring countries of Indonesia and Malaysia which saw the forest and biodiversity loss, and realised that while oil pam would reap them economic benefits, it would be unsustainable in the long run. Similarly Srinivasan (2014, 2016) and Velho, Datta, Datta-Roy & Dollo (2016) have pointed that conservation scientists working in Arunachal Pradesh have also cautioned against oil palm establishment in the state, highlighting deficiencies in the government's oil palm policies, such as lack of sufficient dialogue with stakeholders, low transparency with the policies, biased experimental studies, and non-evidence based actions (H. S. Sathya Chandra Sagar, Sharmin, Richard, & Clause, 2020).

Forests habitats are also being cleared for extracting natural resources like oil and coal present abundantly in the region. The exploitation of the region due to its rich resources started in the 19th-century with 'discovery' of oil, tea and coal in the eastern Himalayan foothills by the British colonists. Gradually they turned this region into their easternmost post giving them an opportunity to trade with countries like China, Myanmar and Bhutan and extract as much as they could.

Oil and gas exploration across India's Northeast, pursued from British Colonial times, still remains a contested subject with resentment from citizens and civil societies towards government's policies.

The Indian government under its **Act East Policy**[1] wishes to connect India with the economy of the rest of South-East Asia but extraction of natural resources through drilling and mining has a detrimental impact on the social and environmental fabric of the region. The incident of blowout in the Baghjan oil field in Assam demonstrates the fragility of the ecosystem of the region and how it adversely affects the well-being of the community and the biodiversity of the region. The oil spill caused by the incident affected two ecological sensitive zones of Maguri-Motapung wetland which is part of the Dibru-Saikhowa National Park (DSNP) eco-sensitive zone. DSNP is home to at least 36 species of mammals and at least 382 species of birds (Choudhary, 2020). At the spill site at Baghjan 5 well caracasses of birds, fishes and even a carcass of "endangered" Gangetic dolphin in the Maguri wetland was found.

Climate Change & Natural Extremities

Climate change is one of the major threats affecting the lives of people and threatening the biodiversity in the Eastern Himalayas. Since the Eastern Himalayas houses a snowline, a major proportion of annual precipitation comes down as snow. The Bay of Bengal is primarily responsible for the precipitation in the region that leads to the snowfall, but with increasing temperatures, the glaciers and the ice covers are melting thus causing erratic behaviour of the major rivers in the region. According to The Hindu Kush Himalaya Assessment by ICIMOD, at least a third of the huge ice fields in Asia's towering mountain chain are doomed to melt due to climate change. The report suggests that even if carbon emissions are dramatically and rapidly cut and succeed in limiting global warming to 1.5C, 36% of the glaciers along in the Hindu Kush and Himalaya range will have gone by 2100. This will have serious consequences for nearly 2 billion people who rely on the waters flowing from the Himalayan rivers (Wester, Mishra, Mukherji, & Shrestha, 2019).

The seasonal temperature analysis from 1970-2000 indicates that the EH region is experiencing widespread warming of generally 0.01 to 0.04°C per year. There is an annual mean temperature increase at the rate of 0.01°C per year or higher. However, certain regions like the Yunnan province of China, part of the Kanchin State of Myanmar, and the far eastern part of Arunachal Pradesh, India have seen minimum/no significant changes. This variability is also a concern for the scientific community as the unpredictability makes it difficult to develop adaptation and mitigation measures that can be adopted across the region. The current trends and future projections point towards increasing temperatures and variability in the rainfall patterns as a consequence of climate change. This leads

[1] India Act East Policy was unveiled by Prime Minister of India, Narendra Modi, at the 12th ASEAN-India Summit in 2014 held in Myanmar.

Act East Policy is the successor of Look East Policy. This policy was initiated in order to recover from the loss of the strategic partner -USSR (end of the Cold war 1991) as India sought to build up a relationship with the USA and allies of the USA in Southeast Asia.

us to another obstacle that the EH region has to contend with - flooding and changing river dynamics (Sharma, et al., 2009).

Annual flooding has been a persistent problem for the region. Every year there is news of loss of human lives and wildlife displacement because of heavy floods. Changing and unpredictable rainfall patterns are threatening the food security of the local communities. Warmer temperatures have led to glacial meltdown resulting in rivers changing their course, natural hazards, affecting water supplies, propagation of invasive species due to optimum temperatures etc. (Jianchu, Shrestha, Vaidya, Eriksson, & Hewitt, 2007).

COVID-19 & the Gender Gap

The COVID-19 crisis has exposed already prevalent social inequalities. While it has spared no one, women and girls have been the most vulnerable due to the unequal socio-economic and political power relations. As economies struggle, the already existing gender gap on local, regional and national levels has widened further. According to a Human Development Working Paper by UNDP, women are more prone to economic shocks compared to men because of lower earnings, savings, and job security as they constitute a majority in the informal sector. Data suggests that there are around 740 million women worldwide, and over 70 percent of women in informal employment in developing economies (Rivera, Hsu, Esbry, & Dugarova, 2020).

Data suggests that as a result of the pandemic, the female employment in April 2020 was at 61 percent of the pre-lockdown yearly average, whereas for men, it was 71 percent. The strict imposition of lockdown also had a differentiated effect in different groups. For the Scheduled Tribes (ST), employment in April this year was 22% lower compared to employment in the previous year. Rural women were the most hit with employment rates being 57 percent of the previous year's average (Deshpande, 2020). While the current set of data by the **Centre for Monitoring Indian Economy (CMIE)** is from April 2020 and gives a wider picture of the effect of the pandemic and the lockdown, it shows the increased disparity across gender and caste within the rural-urban divide. This data advocates the fact that there should be a sense of urgency to address the already existing disparities in order to build a more resilient and a just society.

Since the North East is abundant with land based resources, agriculture and farm related activities constitute the primary source of livelihood for the people here. While women are actively engaged in agriculture and allied activities, their intrinsic agency of awareness or the ability to affect their life by having power to make choices is often curbed by socio-cultural norms. This leaves them in a vulnerable state where they are prone to getting fired from their jobs and hence there is little room for them to practice their rights and demand for a fair treatment and equality of opportunities and

outcome. There is a huge disparity between the Male Work Participation Ratio (MWPR) and Female Work Participation Ratio (FWPR) within the region. The census data from 2001 and 2011 on gender gap points it to be 16.67% and 18.72% respectively whereas the national average is 23.78% and 27.76% respectively (Kaur, 2016).

Hence in the light of the COVID crisis, it would be imperative to analyse the impacts of COVID-19 through a gendered lens and assess what policies need to be put in place in order to reduce the exposure of women from such shocks. This would also help them regain their agency and reduce their vulnerabilities mainly caused as a result of the social practices.

Water Insecurity

With the Brahmaputra and Barak rivers (586 BCM) constituting roughly 32% of the total average annual water resource potential (1869 BCM) of India, the North East is rich in water resources and is

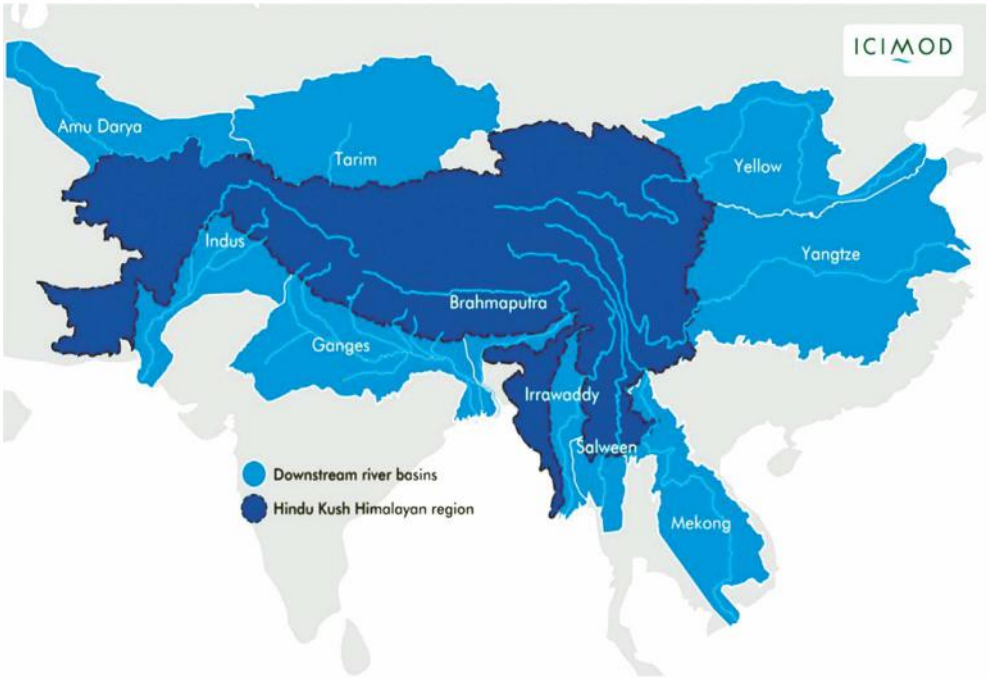

Fig 6: Water resources- HImalayas ICIMOD

popularly known as the 'Water Tower of India'. The region is also well above the national average of 1544 cu.m.per capita per year[2] in terms of water availability (Bhatt & Kaur, 2016).

[2] This is based on the Central Water Commission's (CWC) estimation. 1869/1210 = 1544, where 1210 billion is the population of India as per Census 2011.

But the mere presence of such vast resources is not enough to ensure water security. Since the water resource distribution across rivers is uneven, access to safe drinking water and sanitation has been a concern for the people living in the region. According to Census 2011, except for Arunachal Pradesh and Sikkim, more than one-third of the households in the North East do not have access to safe water. Data also suggests that in the states within the North East (except Sikkim), more than 50% of the households have to depend upon water resources from outside the premises of their homes (Office of the Registrar General & Census Commissioner, 2011).

The region is also plagued by arsenic and fluoride water contamination, as well as land degradation characterized by water erosion and seepage of agricultural toxins in ground water and other water bodies. Contamination of water by arsenic, fluoride and other metals and metalloids, along with bacteriological contamination, has raised widespread concerns regarding drinking water security and safety. According to government estimates, fluoride contamination affects 23 districts and arsenic contamination affects 24 districts (out of a total 33) in Assam. A research study done in 2015 suggests that nearly 700,000 people are facing major and minor health hazards associated with arsenic contamination in one way or the other in the North Eastern Region (Das, Sudipta, Jyoti, Barooah, Yadav, & Chetia, 2015).

According to the Economic Survey (Assam) 2017-18, floods are responsible for a loss of Rs. 200 crore on an average every year. Between the year 2010 and 2015, 880 villages were completely eroded, 67 villages were partially eroded, and 36,981 families lost their homes to erosion. There is a loss of livelihood as well since floods take with them significant portions of farmlands. The data on water resources by the Govt. of Assam suggests that Assam has lost 3,800 sq. km of farmland to erosion since 1954 (STATISTICS, 2018). As per the Govt. of Assam data, lower levels of income linked with lower literacy rates leads the households to being water poor. It's a structural deficiency that despite being endowed with water bodies and river basins, the accessibility to safe drinking water is low (Joy, Das, Chakraborty, Mahanta, Paranjape, & Vispute, 2017).

Water insecurity is also spurring increasing conflicts and social upheaval through displacement and desperation migration. Trans-boundary water concerns mainly with China and the rampant development of dams for hydropower have led to discontentment amongst the citizen groups as it threatens their present and future water needs. Annual flooding of the river Brahmaputra due to diverted waters and unequal distribution upstream and water diversion is the main reason for fuelling social unrest especially in states like Assam which sees land erosion, loss of life and livelihood, displacement of people every year.

Brown & Black Energy

The signing of the Paris Agreement in 2016 was a welcome move in trying to deal with greenhouse-

gas-emissions mitigation, adaptation, and finance. Through the Nationally Determined Contributions, India has committed to achieve about 40% cumulative electric power installed capacity from non-fossil-fuel energy resources by 2030. The North East could play a major role in helping realise this dream, but it has been suffering from 'resource curse' ever since the British discovered the region and its vast resources. Assam and Meghalaya have become major hotspots for coal mining and oil and gas extraction. The current extraction by Coal India Ltd in the North East region is at 465 million tonnes (MT), out of the total coal prospect of 525 MT.

This has had disastrous consequences for the ecological fabric of the region - the case in Baghjan and forest loss in Dehing-Patkai are the tip of the iceberg. Unsustainable coal mining and proliferating coke industries have also led to deteriorating air quality, acid mine drainage, increasing metal content seeping into groundwater leading to disruption in aquatic life. It adversely affects the water accessibility for human consumption in an already water deficit region as rivers also get polluted due to industrial waste. According to the latest State of India's Environment report published by the Centre for Science and Environment, the Central Pollution Control Board (CPCB) has recognised 60 polluted river stretches based on biochemical oxygen demand in different north-eastern states. A NITI Ayog report suggests that that the discharge of industrial and mining effluent and dumping of waste have been identified as the major causes of pollution of these stretches, which are mostly located near towns and cities along the river stretches in Manipur, Mizoram, Nagaland and Tripura (NITI Ayog, 2018). Amplifying the already deteriorating ecology of the EH region, the draft EIA 2020 has done away with oil and gas exploration and highway expansion from its purview. If all of this falls in place, it would lead to large scale deforestation weakening the already fragile ecosystem leading to more intense floods, earthquakes and landslides.

The proliferation of hydropower in Sikkim and Arunachal Pradesh, though "clean" energy, have brought their own risks for both downstream communities as well as biodiversity and ecosystems in these states. Arunachal Pradesh has become the cradle for hydropower and there have been ambitious plans to set up almost 170 hydro-electric projects that are poised to provide more than a third of India's total hydro potential. Recent protests in Dibang over the Etalin Hydropower project's proposal to flood the Dibang valley - traditional home to the Idu Mishmi community - and the expanding debt of Sikkim's Teesta dams indicates the limits of hydropower as a clean energy source.

Isolationism, Social Inequality, Migration, Conflict

Within the stretch of the Eastern Himalayas, Nepal and Myanmar have been dealing with the consequences of long term geopolitical issues and instability arising from them. Being geographically sandwiched between two of the most populous and power centres of south Asia, Nepal has been facing tremendous challenges in maintaining cooperative relationships with its neighbours. When it

comes to trade, Nepal is the top border-trading partner among India's five eastern Himalayan neighbouring nations of Bhutan, Bangladesh, China, Nepal, and Myanmar (Tripathi, 2019). But recent geo-political tensions are affecting the long term cultural, social and economic ties between the two countries. Similarly Myanmar has been trying to overcome the years of civil war that decimated its environmental resources. Extreme steps towards militarisation, dam projects and mining in the border areas has threatened the habitat and biodiversity in the region.

Habitat destruction due to conflicts and unsustainable development measures can have a disastrous effect on the communities living in the border areas as they depend upon the forests to sustain and manage their lives. Insurgency and militancy have also adversely affected the North East. The major victims of the years of conflict have been the habitats and the biodiversity of the region. Militant groups have at times resorted to unethical practices like strategic destruction of wildlife sanctuaries, poaching, deforestation, timber extraction and disruption of the food chain to create turmoil in these regions. Poaching of wildlife and logging of high value timber is mainly done to raise funds for procuring war related supplies. In Manas National Park, Assam, 64 Rhinos were poached in 1980 as a result of which, the park was added to the list of World Heritage Sites in Danger in 1992. During the period of conflict between 1989-94, militants ravaged the Panbari and Bhuyanpura ranges of Manas National Park, while Bansbari, though severely damaged, survived the militant offensive (Mandal & Sarkar, 2016).

The conflicts in the North East have resulted in the degradation of the environment and amplified the socio-economic misery of the communities through their eroding rights to access to land and natural resources on which they depend for livelihood and subsistence purposes. As a consequence of conflicts, the local communities become burdened with significant financial and hidden psychological costs. Anticipation of conflict discourages them to put in their hard earned money in building a business or other source of livelihood which renders them vulnerable.

The North East has for long been isolated and absent from India's development aspiration, struggling to secure its place within the national narrative. The primary reason can be attributed to the lack of development and infrastructure within the region despite such a huge population across the eight states within the region. Of late there has been a strong push to make the North East the commercial hub under the Look East Policy and now the Act East Policy which aims to promote economic cooperation, cultural ties and develop a strategic relationship with countries in the Asia-Pacific region. But the absence of substantial development has led the youth to flee the region in search for employment, education and better lifestyle and away from years of social unrest and political tensions afflicting the region. Studies suggest that the majority of the migrants fall under the age group of 15-30 years and move to metro cities like Delhi, Mumbai and Bangalore (Reimeingam, 2018). This brain drain has an adverse effect on the regional development as the youth are less willing to participate in traditional activities like farming and agriculture which has led to erosion of cultural and social values.

The Eastern Himalayan countries share a vast network of natural forests and corridors for animal movement that play a crucial role in regulating the environment of the region. Border issues and conflicts pose a great threat to the biodiversity of the region and a better cooperation would be needed to ensure that communities do not face the heat of egoistic geo-political tactics adopted by different countries.

The Eastern Himalayas – the Biggest Obstacles to Ecological Growth

The Eastern Himalayas' biodiversity richness have rendered it vulnerable to increasing anthropogenic pressures as the region is being turned into a development landscape. This has an adverse effect on the rural communities especially the indigenous communities as majority of them are smallholder farmers with 80% of the total 70% agricultural dependency of the North East region. Since they are dependent on forest resources and ecosystem services for their livelihoods, any alteration in the natural environment consequently affects their lives. While there have been efforts to create an integrated approach to poverty alleviation and biodiversity conservation in the region, the complex geography, culture and demography become a hurdle in achieving sustainable development at the desired pace.

Land has always been a bone of contention for individuals, communities and countries. Land as a crucial resource has been the cause of several conflicts in human history and continues to be one. Because of its socio-cultural diversity and uniqueness, the Eastern Himalayas has a diverse and unique land management system as well. In the North East there are constitutional safeguards to protect the rights of the tribal population living in the region, but while most of these apply to the hill regions, they exclude the plain tribes of Assam. Bhutan's forests are nationalized, with little scope for forest-fringe communities to sustainably harvest forest resources. Nearby Nepal has seen a similar conversion of communally held indigenous land tenure to state held land, though policies for community forestry have devolved some control of forest land to communities since the 1970s (Land Links, 2018). On paper Myanmar recognizes the customary rights and management systems of indigenous communities, but with poor formal recognition of these rights, indigenous lands are at high risk of being classified as VFV (vacant, fallow or virgin) land i.e. ripe for development (Erni, 2016).

Most of the land management in the region is done through customary practices and tribal social systems existing for hundreds of years. The laws and practices differ from tribe to tribe and region to region. There are common lands that include uncultivated forests, rivers and natural resources and are maintained and used by the village community. These are mostly non-transferable as they are collectively held and there is a value which the communities attach to these commons. Then there are individual properties for fuel-wood and fodder which belong to individuals and may/may not be transferable.

Communal lands are the reason why the forests in the region have been better managed. The forest fringe communities have traditionally depended on natural forests for procuring NTFP and other resources needed in daily life. Over the years they have developed this knowledge bank which guides their consumption and promotes conservation. But with urbanisation, these customary land rights are eroding. A threat to commons would pose a threat to their survival as well.

With the draft Environmental Impact Assessment 2020, a silent nod has been given to divert forest lands for developmental projects without getting clearances. This could get amplified as the draft Forest Policy 2018 has also pushed for involving the private sector for afforestation and reforestation activities which would mean privatisation of India's natural resources and creating private forests. It also ignores the human-forest relationship unlike the policy of 1988 which emphasized the need to strengthen it. It completely overlooks dependence of communities on forests for their livelihood and overemphasizes carbon benefits, which are small and come at significant costs to local people and biodiversity.

These loopholes and deliberate attempts to weaken the legislations would curtail the rights of indigenous communities and forest-dwelling people on ownership and control of non-timber forest produce and disenfranchise them of their customary rights and the right to life. This growing contest over land ownership needs to be addressed and a community centric traditional management system should be pushed for better management and long term sustainability of the forests and the natural environment in the EH region.

Another major set of challenges that the Eastern Himalayas face is increasing militarisation and proliferating developmental projects in countries like China, Nepal, India and Myanmar. Securing their borders has become a priority for these countries. Forests are being cleared to build military bases and that has caused severe impact to the trans-boundary resource sharing. Habitat fragmentation has become a comorbid problem of this form of land appropriation. Water being one of the critical resources in the Eastern Himalayan region has also become a negotiating tool between nations. This kind of resource-diplomacy has a negative impact on the communities living downstream in parts of India, Bangladesh, Bhutan and Myanmar. Controlling the flow of the river by building dams is one of the most commonly cited examples because of the kind of effect it has on the environmental, economic and social infrastructure.

The aforementioned barriers can only be overcome if and when there is authentic information pertaining to these issues. The Eastern Himalayan region's vast spread across often inhospitable terrain comes with its share of difficulties of being unable to document the natural environment. The physiography of the region is such that there are limited resources on the visible ecosystems in the region. Inaccessibility, lack of technological penetration, barriers to communication are some of the issues that have limited the scope of information which could come out of the region. While this is a

big setback, it also gives the scientific and conservation community immense scope to take up studying various unstudied and understudied sub-regions within the Eastern Himalayas. It would be imperative to do so as it would provide much needed insights into the environmental dynamics at play within the region while also helping in the development of strategic measures to conservation and preservation of the natural capital.

The Opportunities

The North East accounts for nearly 25 percent of the country's forest cover within just 7.98 percent of the geographical area of the country. According to the Indian State of Forest Report 2019, the total forest cover in the NE region is 170,541 sq. km. which is 65.05 percent of its geographical area (Ministry of Environment, 2019). Across the border in Bangladesh, the Chittagong Hill Tracts account for 40% of the country's forests (Ahammad & Stacey, 2016). In Myanmar, the Chin, Kachin, Sagaing and Northern Shan state collectively hold some of the country's richest and densest forests, including the Northern Forest Complex, stretching across 12,000 sqkm. running from India to China in Kachin state - one of the largest intact forest areas in South-East Asia.

There is no doubt that the region's endowment with a storehouse of natural resources is the perfect precursor to development. Presence of forest land on such a massive scale can help create multi-dimensional employment opportunities to build a rewilding economy based around natural capital regeneration and including activities like agroforestry, eco-tourism, livestock rearing, traditional skill based product development etc. Abundance of all the natural capital present within the region must be recentred to drive value creation in a regenerative and sustainable manner that creates socioeconomic mobility for communities, while preserving and restoring natural assets. Strategic management and restoration of natural resources would provide immense employment opportunities while also being able to conserve these natural resources.

Indigenous Communities: Practices & Knowledge

According to the World Economic Forum's Nature Risk Rising Report, around $44 trillion of economic value generation, which is more than half of the world's total GDP, is dependent on natural resources. The depletion of natural capital – including assets like forests, water, fish stocks, minerals, biodiversity and land – poses a

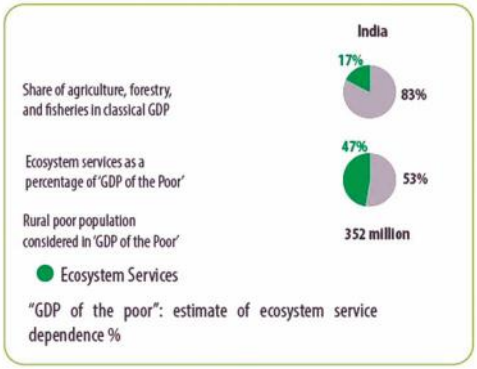

Fig 7: Ecosystem services as GDP of the poor (source UNEP)

significant challenge to achieving poverty reduction and sustainable development objectives (Herweije, Evison, Mariam, & Khatri, 2020). **The Changing Wealth of Nations (2018)** published by the World Bank suggests that low-income countries depend on natural capital for 47% of their wealth (Lange, Wodon, & Carey, 2018). This makes biodiversity utterly important to human life and for poverty reduction.

Environmental management by means of cultural and social practices has for long been an integral part of the identity of many indigenous communities across the world. Several international bodies have advocated for the need to promote these indigenous systems and help create harmony with nature. For example, Article 8 of the Convention on Biological Diversity urges us to "...respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity...." (Nations, 1992)

Indigenous communities depend on the local knowledge systems for everyday decision making with respect to resource usage and conservation. Traditional knowledge systems represent a healthy alternative to income and growth-based paradigms to ensure sustainability. It substantiates the need for natural capital valuation in order to regenerate the natural assets. The basic underpinning of natural capital valuation is that biodiversity forms the basis of other life forms by providing essential ecosystem services. Such knowledge potentially offers valuable insights into the environmental and ecosystem governance systems of different communities and could complement broader-scale scientific research with local precision and nuance. A fusion between traditional knowledge systems and scientific knowledge could enhance the currently working assessment and conservation measures.

The communities of the Eastern Himalayan region, e.g. in the North East, believe that it is the forests that form the basis for their lives and hence they live in a symbiotic relationship between people and nature (Mahongnao, Noklenyangla, & Kumar, 2017). For instance- the Ao Naga tribe of Mokokchung district, Nagaland have a unique way of conserving forests. They divide the forests into blocks wherein one of the blocks is designated as a conserved area. Such mechanisms ensure that the local people are in sync with their environment and follow the protocols so as to not exploit the nature around them. Similarly Mawphlang, Meghalaya which is famous for its sacred forests is a perfect example of how indigenous communities have adopted cultural sanctions to nurture and preserve their four hundred years old traditions of conserving its forests. With a very rich cultural and ethnic diversity, the North East region is full of instances of such Traditional Ecological Knowledge (TEK) systems in place. These knowledge systems and traditional practices must be formally recognized and centred in policy, to allow for a more nuanced approach to both conservation and development, where communities can take a leading role in leveraging their knowledge to protect, manage and enhance natural capital.

Innovation & Technology - Energy, Conservation and Community Development

The adoption of the Paris Agreement goals for achieving net zero has turned the spotlight firmly on renewable energy. The international community has understood its obligation to firm up the transition towards a low-carbon economy in order to guarantee a sustainable future for the planet. Countries across the Eastern Himalayas have taken different approaches to this transition. Bhutan, for example, already has a highly low carbon energy sector through its development of hydroelectric power - though this over-reliance on hydroelectric has its own issues in the context of changing climate and water insecurity in the region.

In India today, initiatives like the National Solar Mission and UDAY scheme, have placed the country at the forefront of the global move towards solar power - though its expansionary coal policy lies at odds with its purported desire to be a solar superpower. Both Nepal and Myanmar depend heavily on biofuels for energy security, which on the whole have a lower emissions footprint than fossil fuels, but still leaves significant scope for a renewables transition (IEA, 2018a & 2018b). In Bangladesh, the successes of the solar home systems policy in increasing energy security for people is now the basis for the country's 2021 goal of universal coverage through solar energy (IEA, 2018c).

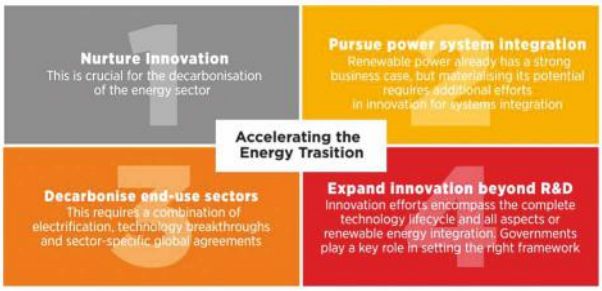

Fig 8: Innovation for Decarbonisation (Source IRENA)

The Eastern Himalayan region with its complex geography and topographical variations has proved to be a constraint to the growth and development of the region. Lack of infrastructure has been another contributing factor. Even in the high-potential energy sector, the power system remains relatively undeveloped with an annual per capita power consumption (257.98 kWh) almost one-third the national average (778.71 kWh), and aggregate technical and commercial losses of more than 30%, compared to the national average of less than 20% (Anbumozhi, Kutani, & Lama, 2019). The centrality of the Eastern Himalayan region on the junction of China, Nepal, Bhutan, Bangladesh and Myanmar could prove advantageous in promoting regional cooperation and push for energy and technology exchange within the region.

The geography of the Eastern Himalayan region also comes with its own set of benefits. Large river systems and abundant land provide for an amazing base to tap into renewable energy through solar plants and mini-hydel plants. Switching to the use of clean energies comes with a plethora of

advantages. One of the most highlighted being that they are inexhaustible and do not emit greenhouse gases in energy generation processes. Widespread renewable resource availability reduces the trade related dependencies and consequently the economic burden on developing countries.

Innovation and technology have a role to play in the Eastern Himalayas extending far beyond the possibilities of the renewable energy transition. In the notoriously difficult to map and monitor terrain of the Eastern Himalayas, technology has a role to play in managing natural assets and bridging the gap between resources and needs for natural capital enhancement. Of particular importance is the possibilities of technology for leveraging peer to peer finance and investment, to create natural assets and drive investment and support towards regenerative agricultural practices in the region. Technology also has a role to play in innovating greater efficiency in agriculture - whether through digitized and sensor-based management systems, or machine learning to analyze climate and crop data to enable better decision making. Scope exists, as well, for combining renewables and crops through agrivoltaics and for enhancing the efficiency of infrastructure and buildings, as well as technical solutions to achieve net zero e.g. direct capture, alkaline treatments etc.

On the conservation front, innovative models like use of drone technologies for monitoring wildlife movement has become a go-to tool for the conservationists and the state. Drones are also being used in inaccessible lands within the Eastern Himalayan region for plantation and forestry activities. Remote sensing and aerial imagery based vegetation; forest mapping and water conservation initiatives have also slowly been mainstreamed. Digital databases and archiving solutions provide the opportunity for communities to be directly involved in monitoring and studying biodiversity. Such technological innovations give communities the opportunity to be a part of the conservation movement and use their skills and knowledge to aid the scientific community. It gives the power of localised environmental governance back in the hands of the communities. It makes them future ready and helps reduce their vulnerabilities to natural calamities using such innovative technologies. It can also help put their skills on the map and build a brand based on the local products and services.

Business & Debt for Nature

Globally, businesses depend on nature for **resources** such as food, fibre, minerals and building material; **ecosystem services** such as pollination of crops, water filtration, waste decomposition, climate sequestration and climate regulation; and **healthy and prosperous societies** that give them their customers and workforces. There is interdependence between natural health and prosperity of businesses and environmental loss poses the greatest threat to the global economy (Business for Nature coalition, 2020). Natural losses have immediate costs on businesses in the form of operational risks and

disruption in supply chain, resilience, liability risks, and regulatory, reputational and financial risks.

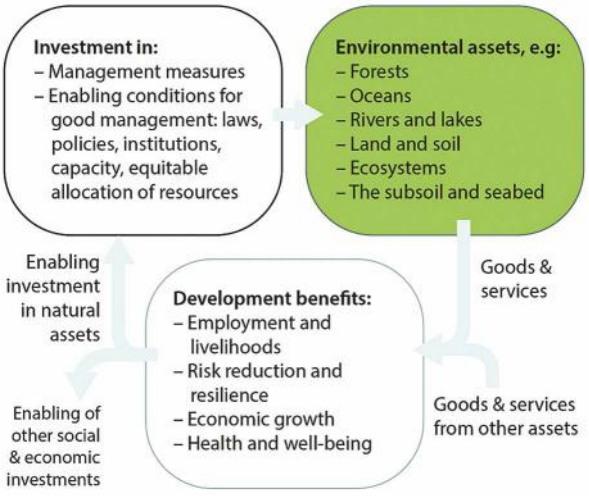

Fig 9: Benefits of investing in natural capital (Milligan & Mehra, 2018)

Having a functional model that works in harmony with nature offers immense opportunities for businesses by providing long term viability, cost savings, and increase in operational efficiency. Developing nations could gain up to **US$ 2 trillion/year of economic benefits** as they have the largest standing natural assets. According to The New Climate Economy report of 2018, **65 million new low-carbon jobs could be created by 2030** with ambitious climate action. Assessments by the World Economic Forum (2020) put this figure much higher, at 195 million potential jobs through key transitions in sustainable land & ocean use, infrastructure efficiency and renewables.

Investing in natural capital is therefore critical for meeting green-economy and growth objectives that could ensure product supply in the long run. This could either be achieved through direct investment or through investment in increasing resource-use efficiency, reducing footprints, minimising or reducing negative impacts on natural capital as a result of the nature of the business. By investing in nature/natural capital, businesses can reduce the risk posed to the supply chain, capital base, resources, liabilities and reputation associated with a change in the stock of natural capital.

Better assessment, by businesses, on the use of natural capital across their value chains would also help build a knowledge base around existing natural capital stocks, their current usage and the future projections. This baseline information could then be used by stakeholders and investors in making judicious decisions in making decisions. The switch to a more sustainable value chain is the key to business longevity today and requires a move beyond the CSR mindset, to make environment and social good a part of the business process.

India has been experiencing continued economic growth since the liberalization of Indian economy and is aspiring to increase its growth rate substantially. Being strategically located, India's North East is on the country's development radar and the need to grow would increase the competition for energy, land, and water and has considerable potential to hasten the depletion of the region's natural capital. Similar scenarios are playing out across the border in Myanmar, where the natural capital rich states of Sagaing and Kachin also overlap with rich mineral deposits, and where agribusiness is

driving deforestation to expand plantations.

The Eastern Himalayan region which is abundant in all forms of natural capital and brimming with potential for tapping renewable energy could lead by example. Business could invest in the region and go local by involving communities and creating sustainable products based on locally sourced raw materials. Investment in the region and localised entrepreneurial initiatives by big businesses would lead to the development of the local economy based in nature itself. This would boost the market for sustainable products and make businesses resilient while also taking care of the financial well-being of communities.

Being endowed with natural capital is a win-win situation for the businesses, the state and the communities as it would help businesses decentralise their supply chain and build more sustainable product catalogue while employing local resources and communities in the manufacturing process.

Debt for Nature

As countries spend extensively in combatting the COVID-19 crisis, constrained finances and growing debt offer the opportunity for Eastern Himalayan countries to explore debt for nature models that facilitate natural capital financing while alleviating debt burdens.

The original **debt-for-nature swaps** were financial transactions in which a portion of a developing nation's foreign debt is forgiven in exchange for local investments in environmental conservation measures. In simple terms, a debt-for-nature swap is a swap of some of the debt that a country owes in exchange for nature, in the form of land. The idea was conceived out of the need of the developing nations to pay off their debt while also promoting conservation. Huge amounts of debt meant deleterious effects on the environment which was unsustainable. Since 1987, debt-for-nature agreements have generated over **US$1 billion** for conservation in developing countries. Debt-for-nature swaps might not be a panacea, and they can only help alleviate some of a nation's debt, and protect some of its rainforests, but they are a huge step in the right direction.

Debt for Nature swaps came under criticism from the 90s onwards as poor terms of agreement and vague clauses for implementation either led to slim to no changes on the ground - i.e. a wastage of investments - or disenfranchised indigenous communities of land rights, undermining local governance structures as decision-making power was placed in the hands of national and central governments over resource allocation. In response, indigenous communities in Latin America proposed their own alternative to debt for nature swaps, the debt for stewardship model where debt concessions turn greater control over to indigenous communities to manage land and resources with a conservation focus.

The Eastern Himalayan region could benefit from applying a similar principle that allows and supports

indigenous communities to practice traditional forest management and conservation practices, and grant them greater stakes in landscape management. With more than 400 different ethnic communities living in the Eastern Himalayan region, it can capitalize on the human resources by using 'debt-for-stewardship' swaps or 'debt for indigenous rights' swaps. These swaps would consider and formalize the rights of the indigenous communities with respect to the access and ownership of land resources. The swaps would also ensure a continuous flow of funds for the implementation of landscape reclamation by indigenous communities to realize their visions of environmental and economic progress on their newly formalized lands (Knicley, 2012).

Since population growth and development go hand in hand, it is very important to understand that this development should not come at the cost of nature. The natural capital in the Eastern Himalayan region forms the backbone for all the economic and ecological benefits it provides to the communities living here. Debt for nature swaps could help create the necessary investment pool with agroforestry and sustainable agriculture initiatives and other such ventures involving communities. This would take care of the debts at the national level while also providing the much needed opportunities to the communities to thrive and develop.

With the spread of coronavirus only increasing, the debt for nature and business for nature needs to be streamlined even further. Several studies have suggested that Coronavirus being a zoonotic disease could be attributed to the large scale deforestation and increasing human-animal interactions. And it has also been suggested that activities like deforestation, expanding agricultural landscapes and infrastructure development could further trigger such pandemics. Loss of biodiversity would have a cascading effect on human and environmental health. Concepts like business for nature and debt for nature could prove significant in curbing the damage to the environment and the services offered by nature.

The Need for a New Paradigm - The Eastern Himalayan Opportunity

Business as usual has put the world on track to destroy the planet. Both the IPCC and IPBES reports on climate change and biodiversity respectively, show us the future that continuing on the pathway for business as usual portends: a rise in severe heat waves, rising sea levels, droughts, water insecurity coupled with vicious floods, an ice-free Arctic, the disappearance of critical biodiversity across our food production systems.

Countries under the Paris Agreement have obligations to reduce their emissions to limit the world's temperature rise to just 2 degrees celsius. However, according to Climate Action Tracker, many of

these commitments are insufficient, risk-prone or clash with other policy actions being undertaken by governments globally. Other research suggests that even factoring for all these contributions, a global GDP growth rate of 3.5% annually still puts the world on track to exceed its carbon budget. At this rate of growth, they suggest the world is on track to a 3-4 degree temperature rise and that for the temperature rise to the 1.5 degree celsius scenario, global GDP growth has to be limited to 0.45% (Storm & Schroeder, 2018).

The writing is on the wall. GDP measures no longer capture the full scope of information and data that governments need in order to make wise policy decisions for a climate and biodiversity secure future. A new paradigm is needed: one which meaningfully integrates ecological indicators and factors and which accounts for the full scope of the cost of business, development and growth today, rather than externalizing environmental costs.

The low carbon economy of the Eastern Himalayas is ripe for the experiment in a post-industrialist economy - an economy which centres natural capital and natural assets. Equipped with a young and ambitious population, the region is perfectly poised to take bold action for truly transformative change towards the Naturenomics™ goals.

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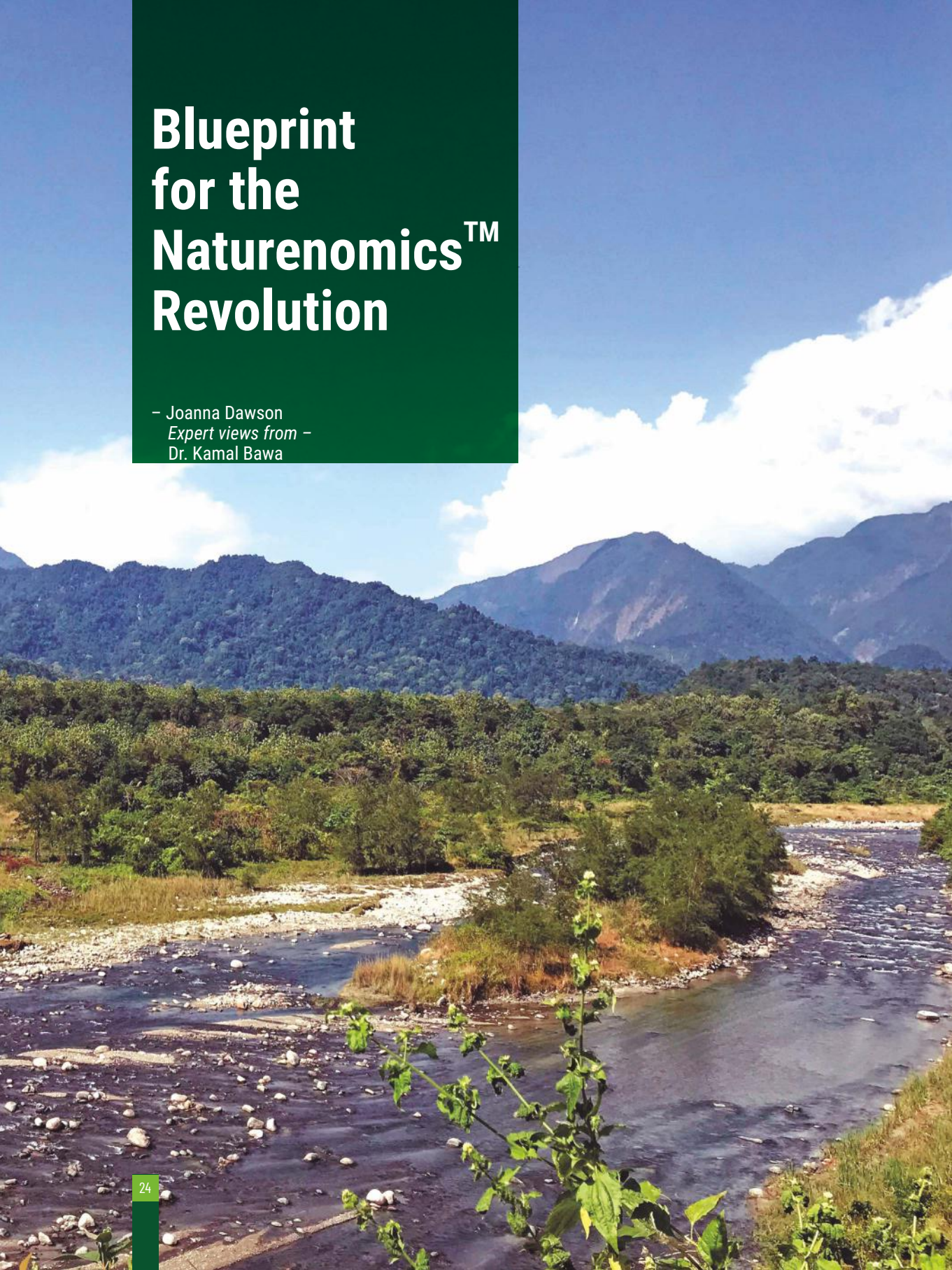
Blueprint for the Naturenomics™ Revolution

– Joanna Dawson
Expert views from –
Dr. Kamal Bawa



Ecology is Economy - the Naturenomics™ Goals

The strategic value of the Eastern Himalayan region cannot be overstated, from its centrality as a water source for India, China and Southeast Asia, to its diverse population - 246 million people across over 400 different ethnic groups. At the confluence of more than 2 billion people across South Asia, China and Southeast Asia, it has a young and ambitious demographic and its rich cultural diversity supplies a plethora of rich perspectives and traditional knowledge that can transform policy, science and knowledge for a unique future.

The Naturenomics™ perspective on economy offers opportunities for growth in the region, by building on ecological value creation businesses such as mindful tourism and agroforestry. However, the Eastern Himalayan region needs to resist the global drive towards urbanization - no longer feasible in a world that is facing biodiversity breakdown because of ecosystem decline. Urban areas are estimated to be responsible for 70% of the world's carbon emissions and consume 60% of the world's energy (World Bank, 2019), damage nearby watersheds through chemical run-offs (Jiang et al., 2008) and produce over 2 billion tonnes of waste annually of which a third is dumped openly or burned (World Bank, 2018). In recent years, India's North East has seen urban populations grow by 30%. This trend is no longer sustainable and instead we must drive greater investment in strengthening and building rural communities for ecological growth.

The Eastern Himalayas' rural regions are rife with ecologically-centred growth opportunities. As the world debates green recoveries, the Great Reset and Green New Deals, key goals for people and ecosystems must take centre stage in leading the future of the Eastern Himalayas.

Natural Assets

Approximately 30% of the global population closely depends on forests and forest products. In developing countries with good access to forest resources, forests & their produce account for 20% of incomes in rural households (Vedeld et al, 2007). In total, forests add $4.7 trillion annually to the global economy both directly through its natural resource value, and indirectly through ecosystems services (Costanza et al, 1997).

This natural capital is the invisible, underpinning value of the global economy today. Healthy ecosystems and wildlife together add high value to the global economy. An estimated $44 trillion of the global GDP of $87.6 trillion depends on healthy ecosystems. Without their ecosystems services and their natural capital values, we would lose half of the global economy today.

Despite this, the world is losing its forests at nearly 10 million hectares a year, costing $6.3 trillion or

8.3% of the global GDP annually (Nkonya et al, 2016). Since 1990, over 80 million hectares of primary forest have been lost: an area larger than Turkey (FAO & UNEP, 2020).

Research estimates a 2 billion hectare restoration opportunity globally, of which an estimated 500 million hectares are available for total rewilding (WRI, 2014). If forests were fully rewilded, their total natural capital value contribution to the global economy would rise to $13 trillion, or 15% of the global economy through key forest-based industries, the carbon market and mindful natural tourism.

Forests play a central role in the Eastern Himalayas today. In a region that consists largely of smallholder farmers, the ecosystems services forests provide through soil enrichment and nutrition (for example) ensure the longevity of both livelihoods and food production systems. The region still retains, on average, 60% of its forest cover today, despite rampant deforestation within its dense forests.

It is these natural assets that have been the traditional driver of the local economy - employing millions through forestry, non-timber forest products and agriculture, sequestering carbon on an unprecedented scale for constituent countries and protecting communities from emergent zoonotic diseases.

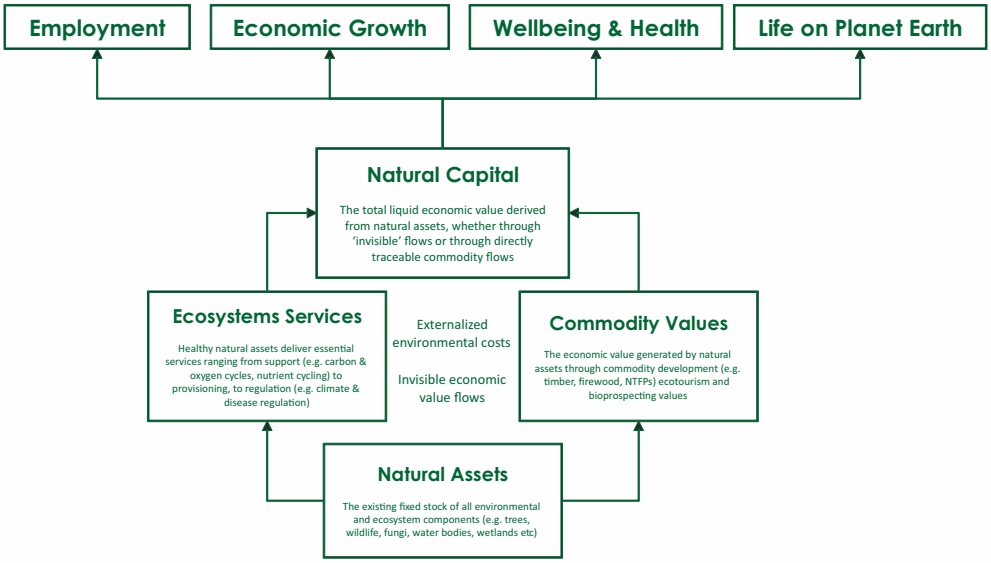


Fig 1: The traditional economy

By unlocking the full potential of the region's natural capital, we can transform the region's economy to build a full rewilding economy. Rather than investing in an economy that destroys natural capital, we need to incentivize and drive investment in building a rewilding economy which restores natural assets, creates green job opportunities for rural communities, enhances the region's ability to meet

net zero targets and improves health outcomes by lowering the risk of new emerging diseases.

Through this, the rewilding economy can help the region achieve five key goals –

Net Zero

Energy production & use accounts for 30% of emissions today, followed by industry (17.6%), agriculture & land use change (17.5%), transportation (15%) and waste (3.2%) (ClimateWatch, 2018).

To achieve net zero, these emissions need to be reduced cross-sectorally and minimizing residual emissions spurred by energy inefficiencies or outdated technology. However, achieving neutrality calls for reducing emissions by 45% by 2030 and reach net-zero by 2050 to meet this goal.

In the best case scenario, meeting the conditions for keeping temperature rises below 2 degrees globally requires the removal of between 500 million to 3 billion tonnes of carbon from the atmosphere annually – and a storage capacity of 50 – 250 billion tonnes of carbon. For a >55% chance of keeping temperatures below the 2 degree rise, approximately 11 billion tonnes of carbon will need to be sequestered annually by 2050. For a 1.5 degree scenario, this figure is even higher (Gasser et al, 2015).

Natural climate solutions, like restoring forests, can provide 37% of cost-effective CO2 mitigation needed through 2030 for a >66% chance of holding warming to below 2 °C. Natural climate solutions are also cheaper. Over a third of cost-effective natural climate solutions can be delivered at less than $10 per ton (Griscom et al, 2017; 2020).

Employment

According to the World Economic Forum, 15 key transitions towards a nature-positive future, across land & ocean use, infrastructure and energy will deliver $10.1 trillion in business opportunities and create 395 million jobs by 2030.

Together, these three areas threaten 80% of our biodiversity today. Catalyzing this transition calls for $2.7 trillion in public-private investments by 2030 and concerted skilling & education for mainstreaming sustainability, natural asset management and decarbonization. Doing so will power innovation, create a new wave of businesses and pave the way for a regenerative Naturenomics™ economy. A rewilding economy in the Eastern Himalayas can provide employment for over 3 million households, generating direct natural capital income of up over $91.6 billion over a 30 year period. To get there, however, we need to drive better skilling and education, incorporating nature-based and green educational components and better technological education for innovation.

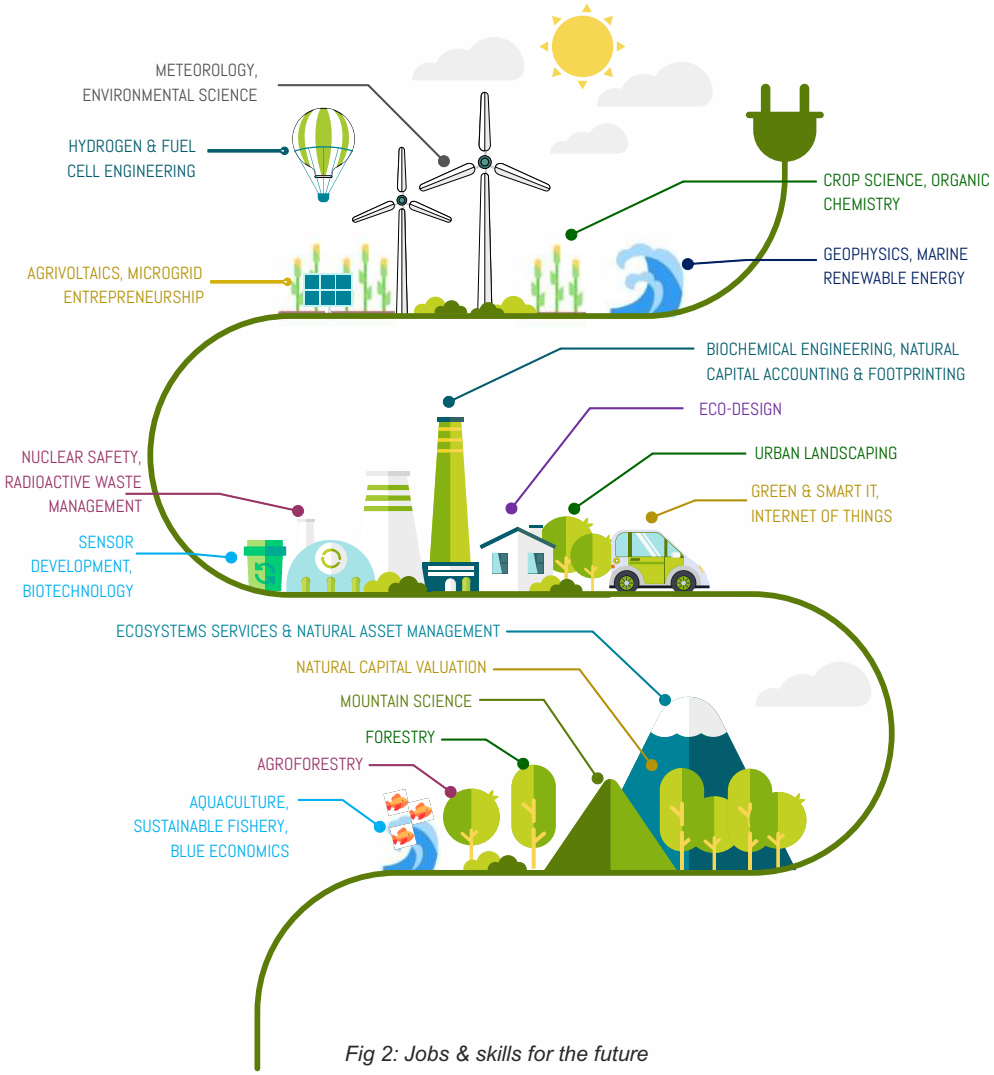


Fig 2: Jobs & skills for the future

Health & Universal Basic Assets

31% of emerging diseases are linked to deforestation (EcoHealth Alliance, 2019). An estimated 1.7 million viruses live in mammals and birds. In tropical countries, still home to intact forests, 25% loss of intact forest increases contact between people and wildlife, exponentially increasing risks of transmission. Of the biggest outbreaks of the past decade, nearly all of them began in tropical countries: Zika (Brazil, Nipah (Malaysia), Ebola (Guinea), MERS (Saudi Arabia), COVID-19 (China).

The costs of the COVID-19 pandemic are projected to run into trillions of dollars. By comparison, a few natural solutions could significantly reduce zoonotic disease transmission and cost a few billion dollars. Reducing deforestation will cost $9.6 billion and reduce risks by 40%. Monitoring and halting

the wildlife trade would cost $22 billion to the global economy. Reducing spillover through comprehensive health plans for cattle is one of the simplest and most easy to control solutions, costing $1.2 billion. Implementing these solutions for a decade would still amount to only 2% of the costs incurred by the COVID-19 pandemic (Dobson et al, 2020).

The Eastern Himalayan region has been fortunate enough to avoid the worst of these outbreaks. However, research projections suggest the region is one of the global high risk areas for new zoonotic diseases to emerge. Investing in the rewilding economy is not only a question, therefore, of creating green jobs but of investing in preventive healthcare measures to ensure better health outcomes of communities.

Investing the natural capital value generated from the rewilding economy can provide access to universal basic assets for 3 million households - renewable energy, access to water, education, healthcare, food security & self-sufficiency, waste management, wildlife friendly connectivity and transformative living & community spaces.

Naturenomics™ - Indigenous Communities, Technology, Women & Businesses

Making this transition will require unprecedented and ambitious action on a scale never seen before in this region. In a natural capital rich region like the Eastern Himalayas, the full value of natural assets need to be unlocked through innovative natural capital based financing to invest in this economy. Businesses have a role to play, by better accounting for their impact and use of natural capital across their value chains to capture the full cost of their growth - and transforming their value chains to minimize these true costs, paving the way for greater regenerative capabilities.

The key to driving this transformation, however, lies in the region's indigenous communities - especially its youth and its women. Their proximity and rich body of knowledge concerning the region's natural assets can help them take the lead as stewards of natural assets - but this knowledge and nearness has to be developed and strengthened. Local governance structures need to be strengthened and equipped to manage natural assets. Technology needs to be leveraged both to monitor and assess natural assets, and to bridge the resource gap between rural communities and urban and international centres with resources that can be invested in natural assets.

Together, these multidimensional ingredients will unlock the Naturenomics™ Goals:

Fig 3: The Naturenomics™ Goals

If all these forces can come together - communities, technology, business & finance, policy - the Eastern Himalayas can make the leap to the post-industrial revolution: the Naturenomics™ Revolution for ecology and economy.

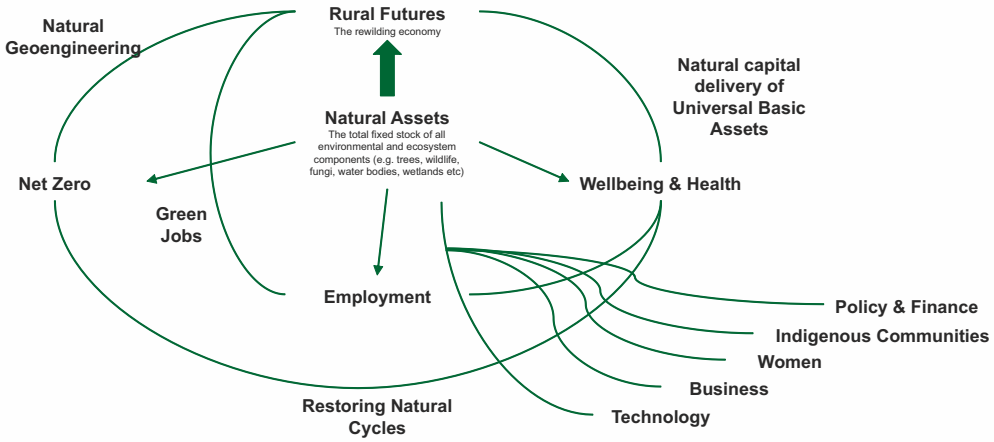


Fig 4: The new economy

Data source: The Atlas of Restoration Opportunities - India, WRI (2018); Global Forest Watch (Accessed 2020)

Achieving Net Zero

Natural Capital & Natural Assets

The world's greatest carbon sinks lie in its forests, wetlands, peatlands and oceans. Collectively these have the potential to absorb around 60% of the world's annual emissions or 22 billion tonnes of carbon. Out of this, protecting, managing and restoring natural assets on land have the potential to sequester 10.2 billion tonnes of carbon, with the greatest opportunities lying in tropical countries – including those of the Eastern Himalayas. Both India and Myanmar fall within the top 10 countries for the most cost-effective natural climate solutions (Griscom et al, 2020).

The North East of India, despite being only 7% of the country's total land mass, holds 25% of its carbon stock in its forests, which cover 65% of its total area. Of these, approximately only a third are old growth forests with the highest carbon stock and today these forests are under threat. Next door in Myanmar and Nepal, similar scenarios are playing out. 62% of Myanmar's land remains under forest cover but continues to lose over 250,000 hectares of tree cover annually – the forestry sector in Myanmar continues to be a net emitter of carbon, rather than a carbon sink (Global Forest Watch, Accessed 2020). Nepal meanwhile retains only 30% of its primary forests and since 2010 has been losing forests at a rate of 0.25% a year.

The natural assets of the Eastern Himalayan region, ranging from mangrove wetlands in both Bangladesh and Myanmar, to the broadleaf forests that dominate the region are the lifeline of the indigenous communities of the region. Attempts to meet national targets for emissions reduction however have focused largely on supplanting the biodiverse forest ecosystems of this region with plantations that can be harvested profitably – where the data exists. A report on compensatory afforestation in India by the Global Rainforest Movement (2019), for example, found that restoration that was alleged to have taken place in Arunachal Pradesh and Sikkim had used non-native, commercial species which disrupted the natural ecosystems.

The continuity of these natural ecosystems specifically is important. The temptation to atomize a forest or a mangrove wetland to individual trees as natural assets is natural but dangerous: an ecosystem as a whole is an asset in its own right and provides services that an individual asset can either not provide or can only provide in part. For example, introducing monoculture plantations in Southwest China resulted in a depletion of water resources, rather than water recharge, which scientific restoration according to the existing conditions and endemic species could have avoided. Other research indicates that biodiverse forests are better at retaining carbon than monoculture plantations. Biodiverse ecosystems also support a broader range of wildlife, including key pollinator species which are crucial for agriculture: vital in a region where over 70% of the population depends on agriculture for employment and out of which, over 80% are smallholder farmers.

Building and protecting the region's natural assets is key to meeting net zero targets by 2030, to contribute both to country NDCs as well as building climate resilience in the region – especially pertinent, since temperatures have already risen by 1.3 degrees Celsius in the Hindu-Khush-Himalayan region, which includes the Eastern Himalayas (Krishnan et al, 2020). While an immediate energy transition to complete renewable power (albeit in a sustainable fashion, avoiding the megadam projects that have traditionally formed the backbone of hydel capacity in the region) is important, practical realities mean this complete transition is a long way off.

The forest restoration potential of the region for achieving net zero is immense. An estimated 2.3 million hectares can be restored through total rewilding in the North East alone according to data from the World Resources Institute (2018) - and a total of 4.2 million hectares including restoration through agroforestry. Just reducing forest loss to zero

Fig 5: Total restoration potential of the Eastern Himalayan region
Source: Natural Climate Solutions Atlas (2020)

in 2019 would add 86,215 hectares of forest cover back to the region – and remove 570,000 tonnes of carbon dioxide from the atmosphere annually on average (Global Forest Watch, accessed 2020).

However, achieving net zero targets through restoration of green cover has to go beyond the pure focus on increasing hectares under cover. Monoculture plantations of timber crops such as teak or eucalyptus can have seriously disruptive effects on local ecosystems, reducing their overall capacity to draw down carbon. Meanwhile, naturally biodiverse forests sequester carbon better than plantations. Evergreen forests have carbon stocks that are 30 – 50% higher than monoculture plantations, and during the dry season, natural forests sequester carbon 29% more efficiently than plantations do (Patton et al, 2020).

Better protection and management of natural assets in the region will play a critical role for meeting net zero too. Standing assets such as the old rainforest of Dehing Patkai, for example, already hold rich carbon stocks and older forests are better able to sequester carbon than younger forests (Luyssaert et al, 2008).

Meanwhile just cost-effective initiatives for protecting and managing existing ecosystems in the North East, by avoiding deforestation and degradation, eliminating grasslands conversion, avoiding impacts on peatlands and mangrove ecosystems, fire management, improving natural forest management, reducing harvesting for fuels and maintaining optimal grazing would prevent the emission of 21 million tonnes of carbon annually (Nature4Climate, 2020).

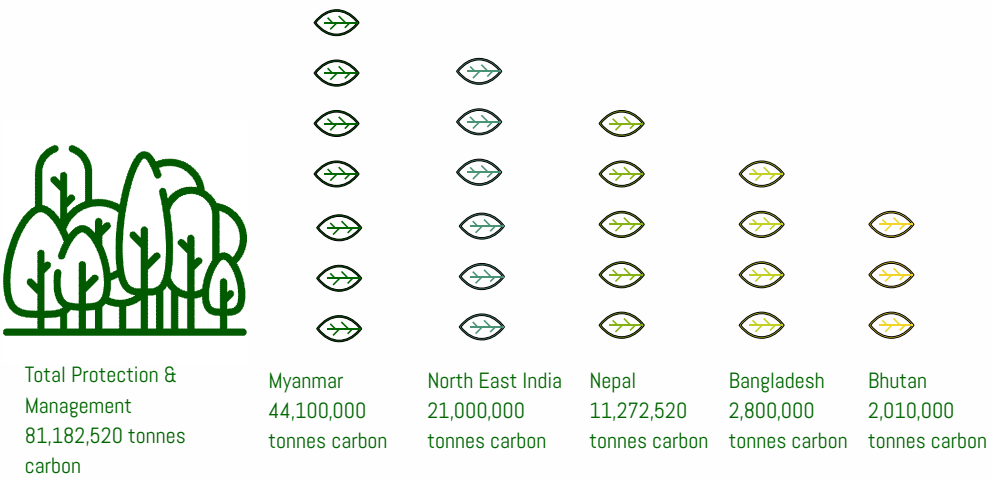


Fig 6: Total protection & Management Potential of the Eastern Himalayas

An estimated 15% of strategic global agricultural lands, if rewilded effectively, could sequester 30% of the world's annual carbon emissions (Strassburg et al, 2020). Optimizing the natural capital of agricultural land is essential both for achieving net zero, by reducing total emissions from agricultural land. 23% of global emissions comes from land use change – largely driven by agriculture.

For the Eastern Himalayan region to achieve net zero, a transition towards restorative agricultural practices is necessary across all levels, from changing existing cultivation practices towards low impact, low carbon practices, to the introduction of new and effective models of cultivation which turn land that emits carbon into land that draws down carbon.

The region is especially ripe for these interventions as both private corporations and governments seek to drive agribusiness investments in commercial crops. States like Mizoram, for example, are facing formalized policy pushes to transition indigenous communities from traditional jhum practices – by introducing oil palm agribusiness to replace localized farming. Neither solution works equitably for people or biodiversity, whereas restorative agricultural practices, ranging from agroforestry to zero tillage and other conservation farming practices, have better impacts on both biodiversity and incomes: well designed agroforestry raises, on average, yields by 64% while offering better resilience for farmers and greater biodiversity for local species (Pretty & Bharucha, 2014).

In turn, biodiversity friendly agriculture and restorative agricultural practices like organic farming are better at sequestering carbon than traditional monoculture plantations. In the North East, over 5.3 million tonnes of carbon could be sequestered annually with its 3.8 million hectares of agricultural land through restoration practices including introducing trees on agricultural lands, the use of biochar, nutrient management, optimizing grazing intensity and scaling up legume production & growth which facilitate the capture of both carbon, as well as other greenhouse gases such as nitrogen (Nature for Climate Mapper, accessed 2020; author calculation). All five solutions optimize the natural capital systems involved in agricultural production, enhancing yields per hectare overall while diversifying crops, expanding food security and creating overall resilience, especially for smallholder farmers.

But to achieve these targets through restoration and protection of fragile forest resources, as well as the introduction of restorative agricultural practices, existing policy frameworks have to be updated to meet the challenges of net zero, reframed to include ambitious targets and clear guidelines and integrated across different departments and sectors to ensure a clear plan for action. New policies need to be introduced, as well, to support this transition and support farmers across the region to transition to restorative agricultural practices.

A New Environmental Policy

Bhutan's successes at achieving negative emissions demonstrate some key lessons for its neighbouring Eastern Himalayan countries – India, Myanmar and Nepal. Perhaps its greatest success has been its commitment to rigorously protecting its forests and minimizing impact on its natural ecosystems by opting for a naturally low carbon growth plan. The Gross National Happiness' holistic focus, beyond the parameters of economic growth, has also helped the country frame an alternative

growth narrative. Part of the index focuses on overall ecosystem health, pollution and its interlinkage with overall human wellbeing, pushing the envelope to focus on growth beyond income and consumption terms.

India, Myanmar and Nepal all have ambitious national targets within the Paris Agreement framework for both restoring forests and reducing emissions towards net zero. Both Nepal and Myanmar have policy provisions for community forestry and India's Joint Forest Management policy for benefit sharing between communities and the government while restoring forests are steps in the right direction.

However, in practice, some of these policies conflict directly with policies being pursued for land allocation and use and businesses and others are spottily implemented on the ground. Evidence from the Compensatory Afforestation policy in the North East indicates that funds are being poorly utilized for restoration efforts on the ground. Funds being marked as spent on restoration is going into plantations which do not exist on the ground, or else being spent on buildings or vehicles (Ghosh et al, 2019). Other evidence suggests that the plantations under the Compensatory Afforestation have largely been monoculture timber plantations that supplant and disrupt the local biodiversity – and in some parts of the country, have been accompanied by the displacement of local & indigenous communities.

In nearby Myanmar, the Vacant, Fallow and Virgin Land Management act stands at odds with its official commitment to securing indigenous tenure in customary forests and lands, and its commitment to mitigating emissions through forest restoration by allowing forest land allocations to businesses (Erni, 2018). Nepal's policy of decentralization of forest management through its policy for community forestry. Today community forestry groups manage 25% of Nepal's forests, though around 63% of these community forestry groups are concentrated in its hill regions (Ghimire et al, 2020). Forward-looking though this policy is, the existing evidence suggests a need to rethink some of the community forest management practices as it has had either no impact or negative impact on carbon stocks in forest areas.

Integrating Biodiversity, Climate & Economic Policies

Accordingly, policies across the region need to change and be updated to meet these challenges for achieving net zero. More importantly, there is a dire need for an integrated policy approach, for people, economy and ecology to effectively manage the natural assets of the region. Climate policy and environment policies need to support each other and take precedence as a regulatory framework for businesses and infrastructure development. While the rest of the world recognizes the central value of nature in the economic system, the Eastern Himalayan region cannot afford to continue with the siloed policies of an outdated mode of development, no longer suited to tackling or building resilience in the context of a burgeoning climate crisis and more.

Protecting Natural Assets In Key Ecosystems

The region is at the heart of some of the world's identified priority ecosystems for both biodiversity protection and carbon sequestration. Nepal's successes in reducing deforestation by decentralizing control to communities and making communities and forest departments partners, rather than antagonists, shows the way forward for protecting natural assets. But policies need broader sea change, to move from heavy infrastructure to support energy (e.g. big dams, coal & oil extraction) or the incursion of roads into key ecosystems towards circular infrastructure and stronger systematic planning for land use in the case of roads. Trend patterns from around the world, including in Myanmar, show that the creation of roads near forest areas, or into forest areas pave the way for the entry of heavy logging industries – and the ultimate demise of forests. Systematic land use planning and forecasting for travel infrastructure will allow for forests to be better protected.

Scientific Compensatory Afforestation

Meanwhile, compensatory afforestation policies need to be tailored to the needs of the time and cannot be issued as a get out of jail free card to businesses, allowing them to tear through critical and old growth forests. Business land use has to be planned in conjunction with infrastructure planning, to avoid deforestation. Afforestation must be planned scientifically, utilizing local species and maximizing biodiversity, not sowing monoculture plantations. Similarly, the global movement for zero deforestation in agricultural supply chains must be adopted wholesale in the region and agribusinesses must be encouraged to opt for more sustainable forms of growing – whether agroforestry combined with sustainable timber forestry, or organic and restoration agriculture.

Incentivizing Business for Nature

Businesses must be actively encouraged to incorporate the biosphere components of the SDGs in their value chains by a strategic mix of incentivization and penalization. Value chains need to source material sustainably and by minimizing impacts on soil and forests, which both become carbon sources when disturbed. For this, businesses must be able to accurately assess their overall impact on the environment,

Fig 7: SDGs stacked
Source: Biosphere Futures // Illustration: J. Lokrantz/Azote

across LEWWAC – land, energy, waste, water, air & carbon. This assessment, however, must go beyond the existing paradigms of global standards in Environmental Impact Assessments. Positive impacts on the environment, especially on carbon sequestration or reducing emissions, must be positively weighted in greenlighting business use of land. For businesses in eco-sensitive zones, using nature based solutions or agriscaping to reduce impact on fragile ecosystems must be a requirement for operations, to mitigate the emissions driven by land use change.

Lessons from Bhutan & Regional Cooperation

The key success to Bhutan's carbon neutral status is its forests, which occupy 70% of its total area and sequesters 6 million tonnes of carbon annually. Commitments in both its Environment Protection Act and other policy instruments are targeted to ensure its forest cover does not fall below 60% (Yangka et al, 2019). Its forward thinking plans for low carbon development, transport by 2040, energy efficiency and economic development interdependently function to reduce carbon emissions by managing land and energy – the biggest sources of carbon emissions – to both absorb carbon better (protecting forests) and reduce emissions (enhancing energy security & efficiency). The country's practice of vetting all its policies through the Gross National Happiness index and whether its impacts build on its four pillars of good governance, sustainable promotion of socioeconomic development and the preservation of culture and environmental conservation has provided for holistic development, without risking its natural assets – therefore minimizing its natural carbon footprint.

The rest of the Eastern Himalayan region must learn from this, in actively creating provisions to protect its carbon stocks held in its shrinking forests. Roadmaps for the future must integrate sustainability as a concern, both for building energy security as well as designing and upgrading infrastructure. With India slipping below Bangladesh in performance on both GDP per capita and the HDI, the time is ripe in the North East states to push for an alternative to growth – closer in substance to Bhutan's Gross Happiness Index, which is both people and ecology-centred, as well as yielding data to drive the transition towards net zero by 2050.

The recent agreement signed by all 8 countries of the HKH region led by ICIMOD for cooperation on mutually achieving climate goals is a step in the right direction. Once connected ecological corridors stretch, fragmented, across the Eastern Himalayan region. These shrinking forests and the ensuing land degradation and their restoration for net zero are a pan-regional problem and require pan-regional support to stop them. For example, growing power demand in India pressures Bhutan's hydropower dams – 22% of Bhutan's hydropower capacity is exported to India – driving their expansion and risking its forests (Climate Action Tracker, accessed 2020). Policies for energy efficiency and security through the region must be interlinked and function interdependently to minimize investments in projects with poor returns & high risks of becoming stranded assets, while

building energy security for people and minimizing energy emissions in the Eastern Himalayas.

Circular Restoration Economy

Globally, indigenous communities manage lands holding 17% of the world's carbon (RRI, 2018). Research by the World Resources Institute (2014) indicates that strengthening their land tenure is one of the most critical tools in the pathway for achieving net zero. For a region with 400 different indigenous communities, spread across a range of landscapes that vary from degraded to pristine and untouched, the greatest asset for achieving net zero through natural assets is its cultural and social capital: its people.

The successes of Nepal's community forestry programme in its hill areas show us that with scientific support and training, indigenous communities can turn their forest management skills to create carbon sinks in the forests they manage. Governments must partner with indigenous communities to manage existing forests and make them the key stakeholders, driving rural employment through restoration opportunities. In the North East this opportunity could be as high as 2.3 million hectares. A landscape approach is necessary, to eliminate fragmentation and degradation, locking carbon back into the soil.

Sustainable Forestry & Restoration Businesses

Timber and agriculture still remain a central feature of the natural resource economy, but making their growing and usage practices more sustainable will both ease pressures on deforestation, while enhancing carbon absorption. The spread of timber plantations must be limited and must adopt sustainable harvesting and growing practices which regenerate the soil, while replenishing trees, to ensure green cover is maintained.

Standing forests are increasingly coming into their own as an asset class in the carbon sequestration market, with a potential to generate up to $800 billion annually by 2050 (Vivid Economics, 2020). An increasing number of businesses are investing in them as an offsetting tool. Other businesses are investing in developing restoration as a commercial activity and service, for example, by leveraging drone technology to drive restoration or encouraging peer to peer investments in tree plantation. Other consumer-oriented businesses are tapping into conscious consumer markets to sell products (e.g. sustainably harvested NTFP) to finance restoration activities. These businesses are a growing opportunity and must be the backbone of the restoration economy.

Restoration and sustainable timber can only go so far. The best carbon sequestration takes place in standing, old growth forests and for these to survive, at least 30% of ecosystems need to remain protected and intact.

Indigenous Managed Landscapes

Historically, protection of ecosystems has been coupled with the eviction of indigenous communities from traditionally held land. A growing body of research, however, reveals that indigenous communities are the best managers of land. Indigenous land hosts the greatest amount of biodiversity, and manage at least 293 billion metric tons of carbon across their lands. This amounts to 17% of total carbon stored in forestlands and if released at once, would be at least 30 times more annual global emissions. A report found that secure land rights and tenure, contrary to expectation, increased the amount of carbon stored in indigenous lands as deforestation slowed – secure tenure created greater ownership and security, allowing long-term relationships with land and forests to either continue or be formed.

Indigenous communities across the Eastern Himalayas have long managed forests across the region. Nearly a third of forests in the North East are already managed by indigenous communities – and once more, clear land tenure correlates with better forest health, lower deforestation and degradation. Where standing forests remain under their control, their tenure must be secured and enshrined as landscape territories of coexistence between biodiversity and people. A twist on the older debt for nature swap – the debt for stewardship swap, proposed by indigenous groups in the 'eighties, in response to poorly constructed debt for nature swaps – could easily finance this transition, providing communities with greater autonomy in managing landscapes and enhancing natural assets using both modern science and traditional knowledge (Knicley, 2012).

Indigenous Communities

The Eastern Himalayas are home to over 400 distinct indigenous and ethnic communities, who speak over 40 different languages and represent all the major religions, as wellas a myriad indigenous faiths and practices. Collectively, they manage a third of the region's most dense forests. Their unique body of traditional ecological knowledge and customary land management practices have played an important role in preserving and enhancing the region's biodiversity and ecosystems.

For many of these communities, the Eastern Himalayas are not just home. Many of its lush landscapes are spiritually significant to these communities and protecting them is deeply interwoven in their cultural fabric. Sacred groves dot the region, allowing unique biodiversity to thrive untouched. Sacred peaks such as Khangchendzonga in Sikkim and Jomolhari in Bhutan are now protected areas, recognized as vitally important conservation zones because of the pristine and well-preserved nature of their ecosystems – tended to by the indigenous communities living within them.

Special constitutional provisions in India, and policy provisions in Nepal and Myanmar, recognize the

customary land rights of the communities. On paper these provisions allow communities relative autonomy and control over traditional lands: over two thirds of forests within the region. Within these forests, communities often have designated conservation zones, whether in the form of sacred groves, community managed forests or community conservation areas. Community autonomy and control over land and traditional land management practices have effectively turned these areas into protected zones, despite the lack of official designation.

Today, however, these lands and forests are threatened by agricultural pressures ranging from agribusiness, to energy infrastructure and extraction, to mining and development. Poor access to good jobs has been driving migration outwards to urban centres, leading to a further erosion of indigenous knowledge and cultures, and assimilation into the dominant local cultures. COVID-19 has disrupted this migration trend, forcing many to return back to their villages because of the rampant job loss. However, it remains to be seen whether or not this migration reversal is permanent or not.

Newer policies are also further undermining the rights of indigenous communities to access customary lands. As outlined in the previous sections, acts like the Compensatory Afforestation Act or the Vacant, Fallow and Virgin Land act further contribute to the marginalization of indigenous communities' access to their customary forests and lands. This unclear tenure and clarity of control over forests in customary lands has further contributed to the degradation of forests, particularly in conversion to standing cash crops or use in development related activities.

However, forest-fringe and indigenous communities are the stewards of this natural capital and have the biggest stake in ensuring the region's natural capital survives and thrives. For the region to achieve a net zero future, these communities, their skills and knowledge must play a central role as conservationists in their own right. This means actively investing in these communities, to enhance their socioeconomic mobility through natural capital to reduce pressures on land and identifying and strengthening leaders among women as one of the largest forest stakeholders in the region. Building the region's natural capital is the first step in generating the value to invest in the future of communities, through delivery of universal basic assets such as healthcare, education, access to water, energy & food security etc.

Women Leaders

Forest degradation and loss has a disproportionate impact for women among forest-fringe communities. Their role as harvesters and gatherers has meant a higher work burden as they are forced to travel further and deeper into forests to access NTFP forest resources. Where markets for NTFPs have begun opening up, women have found themselves further disenfranchised by their lack of access to markets and because their collection of NTFPs is primarily for consumption within families.

Men, meanwhile, access markets and through increased harvest of NTFPs for market, end up exacerbating the pressures women face to travel further to harvest NTFPs because of degrading forests. These increased pressures and declining access to resources contribute to declining food, income and nutritional security among women in these communities (Mishra & Mishra, 2012).

Erosion of collective systems for managing natural resources tends to concentrate access to resources and lands in the hands of men, disenfranchising women on average among communities in the Eastern Himalayas. Similar patterns play out in the transition from collectivized systems of agriculture such as shifting cultivation towards settled agriculture.

Financial & Economic Independence

Of critical importance, therefore, is enhancing the financial independence of women among communities in the Eastern Himalayas. Restoration activities can often add an extra burden of work on women, while failing to augment their incomes, or with their earnings frequently ending up being controlled by menfolk in their families – replicating a pattern of dispossession seen around the world in livelihoods programmes targeted at women.

Financial and economic independence for women, therefore, must be intimately linked to two things: i) secure tenure over land and ii) incomes through livelihood domains which fall under their direct ownership.

Policies defining land ownership and tenure in terms of individual households, over recognizing collective land management systems have played a role in undermining the bargaining power of women in managing land and natural capital. Protecting existing collective management systems will go a long way towards protecting the tenure rights of women in communities, giving them a stake and a voice in local management of resources. Investing in building their ownership over land, where ownership has become fragmented is another important point of intervention. Women's overall propensity to invest back in their communities will amplify the impacts of these investments, though they must be encouraged carefully to minimize the risks of gender-based violence in retaliation against perceived increases in influence.

Investing in incomes through livelihood streams consisting of resources or capital owned by women is another important tool in building financial independence for women. Anecdotal evidence collected by the Balipara Foundation suggests that for women, farming and restoration-based incomes do augment their earning potential, but self-owned businesses such as weaving – which exist completely outside of the domain of the community's menfolk – were stronger tools for winning masculine recognition of their strength as businesspeople in their own right, and therefore equal negotiating partners at the bargaining table. Investing in strengthening women's ownership, therefore, over both resources and multiple streams of livelihoods is key to building financial independence.

Equal representation on decision making institutions

At a local level, natural capital management decisions are made by formally convened groups such as Forest User Groups, Joint Forest Management Committees or Eco-Development Committees. Because of its traditional links with natural resource control, and therefore, land management and control, men have been over-represented on these communities, while women's voices are pushed to the margins. However, women tend also to be the biggest demographic involved in forest use and access, albeit for usually non-commercial purposes.

As one of the stakeholder groups most impacted by decisions on how forests are used, they offer the rich knowledge of a) the opportunities for developing bioresources for sustainable harvest, b) critical needs for forest management and c) how different decisions will impact both their workload and the overall health and productivity of these forests. Bringing women on to these communities are critical for adding their perspective on how forests are accessed and used, in making usage and benefit-sharing decisions regarding forest resources – and ensuring their secured and equal access to forest resources in a sustainable, beneficial way.

Gender sensitization with men

Both financial independence for women and equal representation in decision-making institutions have to be coupled with gender sensitization among men. In the early days of microfinance, where micro-loans were provided directly to women, evidence suggested a correlation with increased instances of domestic violence against these women, as they were perceived to be taking the place and power of menfolk in the family. Greater gender sensitivity must be fostered through targeted focus and discussion groups, to work with men and women to see each other as equal rights holders – regarding equal tenure, equal access to forest resources and markets, equal earnings on restoration or other NTFP-based commercial opportunities and equal decision-making capabilities on managing and enhancing natural capital.

The Expert View: Indigenous Knowledge, Technology, and Conservation

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Success in conservation, restoration, and sustainable use of biodiversity requires multiple approaches. We know that integration of concepts and tools from social and natural sciences is needed to address complex environmental challenges. Equally, if not more, important is the incorporation of informal, traditional knowledge systems.

Indigenous people everywhere have a deep knowledge of their surrounding landscapes, ecosystems, and individual species. Such traditional knowledge, accumulated over millennia, has been the basis of local resource management. As our conservation challenges mount, we need this knowledge steeped in the historical perspective of people and places to manage declining natural capital and build local stakeholder networks to augment our conservation efforts.

Moreover, when the pandemic has severely disrupted our lives and isolated us, we need means to "reconnect" with each other, and with Nature to continue our joint efforts to repair and restore life on the planet. We have the untapped potential of digital technologies, which, combined with other multiple efforts, can facilitate documentation and mainstreaming local knowledge and practices to foster restoration and conservation and realize sustainable development goals.

One popular example of mainstreaming traditional knowledge in conservation is Peoples Biodiversity Registers (PBRs), a concept developed and popularized by Professor Madhav Gadgil. PBRs seek to document local peoples' knowledge about their biological resources both at the species and the community level so that they can preserve this knowledge and benefit from the use of such knowledge. The National Biodiversity Authority (NBA) has the mandate to compile thousands of PBRs throughout India.

Under the National Mission on Biodiversity and Human Well-being, the NBA has developed plans to make electronic PBRs) e-PBRs. The e-PBRs will facilitate the compilation and expansion of this knowledge by local communities themselves. Moreover, many other elements of knowledge can be easily added to the information about biological resources.

Another and a more practical example of the use of digital platforms by local communities is in the field of agriculture. The ekisaan portal was designed to be an interactive portal, not for compiling peoples knowledge but for integrating science and other information with farmers' experiences in sustainable agriculture. Such digital platforms for conservation can allow scientists, people, and policymakers to connect and use multiple strands of knowledge and experiences for promoting conservation and sustainable use of natural resources.

Digital platforms focusing on developing information systems offer a cost-effective way to bring together experts and local people to develop plans, evaluate and monitor programs, and scale-up efforts. Such information systems should not be confined to conservation. Sustainable Development Goals in the environment, including climate change mitigation, are interlinked with goals of reimagined agriculture, public health, restoration of lands and ecosystem services, and a green economy. Equally important digital technologies offer a true potential for participatory science and decentralized governance of resources at the local level.

Nature-driven social equality – Rural Futures to Universal Basic Assets

Over 2 billion people depend directly on forests for livelihoods around the world. In the Eastern Himalayas, where the largest employer is the agricultural sector, most farmers are smallholders who depend on forests for the ecosystems services they provide vis a vis soil nutrient enhancement, or on NTFPs to augment their survival. One of the biggest causes of degradation in the Eastern Himalayan region has been the slow conversion of once forest land into agricultural land – specifically settled cash crop plantations.

Much of the conservation efforts of the past two decades have focused on combating poaching, preventing man-animal conflict through symptomatic relief & devising models for alternate livelihoods to reduce the forest-fringe's dependencies on the forest. These efforts have missed out on the meshwork of human habitats that lie interspersed between forest land (protected areas) and wildlife corridors. It is these human habitats that lie on the forefront of climate change, man-animal conflict and complete lack of social & social delivery assets. For effective conservation and long-term sustainability of our natural assets, it is imperative that the forest-fringe communities constitute key decision-makers & execution managers of this habitat restoration programme to ensure i) indigenous cultural values embedded as key principles driving the project ii) community benefit shares top priority along-with ecological restoration iii) economic incentive to community during and after the project to ensure durability & longevity of efforts.

Rural Futures – A Natural Capital Circular Economy

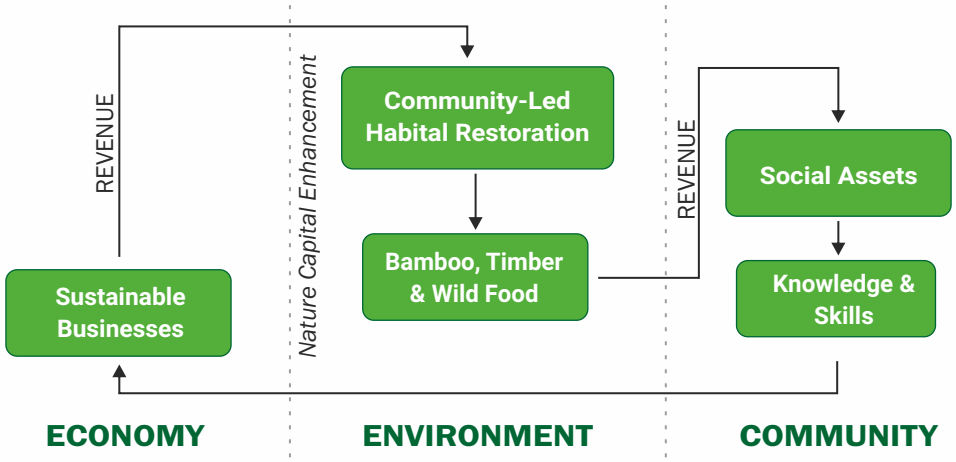

Fig 8: An action model for the Rural Futures Framework

Central to the Rural Futures framework is the creation of a rewilding economy, through the restoration and management of wild habitats across the Eastern Himalayas, which, in turn, strengthens the natural capital pool of the region, i.e. increases the overall worth/hectare of land. Initial funds are poured into restoration work, involving communities in the restoration of degraded forest land through habitat restoration. This initial economic impetus through the first in a series of ecosystem-related services increases community incomes – on average, based on our existing modelling and evidence, by 40%. Other studies suggest that a $4.8 billion investment pan-India towards forest restoration, could generate up to 25 million jobs through MGNREGA annually (Matta, 2009). Restoring up to 100 million trees in the North East alone, based on our Rural Futures calculations and wages, would create employment opportunities for 400,000 people across the forest restoration value chain and generate INR 5 billion annually in immediate incomes, increasing to INR 107 billion in natural capital incomes from agroforestry, bamboo and sustainable NTFP harvesting on maturation over a 10 year period. At 2.3 million hectares in the North East, based on the Rural Futures model of calculation, this would generate jobs for 1.2 million households and a natural capital earning of up to INR 2.5 trillion over a 30 year period, following an initial investment of INR 125 billion.

This rise in income and socioeconomic mobility attracts a downstream value chain (fueled by nature capital liquidation). This value chain creates incentives for further restoration of habitats through ecosystem derived revenue and creates a self-propelling positive feedback loop. Promotion of businesses based on ecosystem-based services generates alternative sources of livelihoods in these areas. These depend on the availability of thriving forests and promote the concepts of sustainable forestry and habitat expansion through mindful use of bamboo, cane, timber & wild food.

The growth in numbers and outcomes of sustainable businesses is intricately linked to growth in community knowledge & skill-set in a way that increase in community knowledge, decision making ability & autonomy creates an environment for entrepreneurship & overall growth. Overall enhancement in community socio-economic mobility & skills creates a spirit of entrepreneurship and growth of nature-based small-holder industries such as:

Organic Agro-Forestry

Products derived from an organic agro-forest, whether processed (value-added) or not have a high demand in the global food market. Agroforestry in forest buffer zones ease pressures on forest resources, while providing a direct pool of resources for communities to access – both for local consumption and for sustainable harvesting to sell on local markets.

Mushrooms, Bamboo & Other Products

Mushrooms have high potential for local market consumption in the Eastern Himalayan region, while

providing critical nutrition to undernourished communities. The rich fungal biodiversity of the region also makes it ripe for identifying and foraging high value mushrooms for spawning and sale, on international markets at a higher tier of income.

Local Weaves & Crafts

Local communities have ancient traditions of weaving & dying their fabric and some of these practices are incredibly laborious. The products created out of such techniques are in niche demand and provide a business opportunity for those skilled in the art. There is an untapped opportunity to create an end-to-end value chain in the Eastern Himalayas, sourcing material for weaving through driving local growth of cotton & silks instead of importing them externally – reviving traditional knowledge on growing cotton locally, while enhancing overall sustainability of products.

Local Medicine

Local medicines derived from plants (a part of the indigenous knowledge of the local communities) can supply a booming alternate healthcare industry and lead a transition to organic and natural healing practices.

Mindful Tourism

The mindful tourism potential of spaces where communities co-exist with forests & wildlife is immense and this can have a multiplier effect on the growth of the local economy. However, visits to these sites must be carefully regulated, as in Bhutan, to minimize stresses on the local ecosystems as well as minimizing overall carbon footprints. COVID-19 disruptions to overall travel have also opened up avenues for expansion in virtual reality tourism, allowing for enriching experiences while minimizing overall pressures to ecosystems.

Natural Capital for Universal Basic Assets

Natural capital must constitute a community security, enriching community well-being in the long-term - not just individual pay-outs which enhance income security in the short-term, but are not invested in building local community infrastructure. The lessons from Alaska's fund dividend demonstrate that community ownership over natural assets develops only when communities are able to think of natural assets as long-term investments in their own future - not immediate dividend earners. Creating a natural capital dividends based fund for delivering Universal Basic Assets provides such a route for sustainable investments in community futures, lending vulnerable forest-fringe communities in the Eastern Himalayas the tools with which to build self-sufficiency and self-reliance.

Natural capital regeneration remains at the heart of this, both through habitat regeneration providing the underlying value for delivering Universal Basic Assets and through the development of natural capital enriching agricultural processes such as agroforestry and agroecology, which preserve native strains and build seamless habitat spaces for biodiversity enhancement. Creating common land trusts, for example, will provide the means for absorbing natural capital values from community-controlled regeneration sites, for reinvestment in building both Universal Basic Assets, as well as protecting and enhancing the land.

The natural capital generated through the sustainable use of community owned natural assets will be able to provide for access to the following community social assets/services.

1. Water – drinkable and recycled, for effective water usage
2. Renewable energy – powering all infrastructure, households and appliances
3. Education – with a strong focus on nature learning & indigenous knowledge systems
4. Transformative living spaces – by blending the traditional and modern for sustainable, low-carbon design
5. Sustainable livelihood opportunities – income security through natural capital regeneration

Access to social assets will ensure a 'better' quality of life with increased opportunities for livelihoods and reducing intergenerational transfer of occupation within families. Autonomy over the process by which these social assets are created will ensure the communities' ability to evolve programmes outcomes and impacts to enhance overall and intergenerational well-being.

Building Community Institutions

The Eastern Himalayan region hosts a range of community institutions involved in the governance of forest resources from formal Forest User Groups, Joint Forest Management Committees and Eco-Development Committees, to Community Conserved Areas to the more informal structures that consist customary land management systems. Many of these institutions are concentrated among the many indigenous communities of the region – and many operate at varying levels of activity.

Strengthening these institutions coupled with increased representation of women – particularly young women – on these committees offer a critical opportunity for economic transformation of the region, through nature-based solutions such as forest landscape restoration and agroforestry that strengthen local economies & markets and reduce inequality. In addition to questions of tenure, capacity building to manage natural assets is critical especially for the technical aspects of mapping and tracking natural assets and their growth, as well as managing finances for effective benefit

sharing. In addition to these and to commons management techniques, gender sensitization to bring women on board as leaders in these committees is essential, as is awareness and education on ecological degradation and its impacts on lives and livelihoods.

Business Transition to Naturenomics™ Compliance

Globally, managing our natural assets effectively calls for an investment of $400 billion annually, against the $52 billion that is being invested each year in biodiversity conservation (Huwyler et al, 2016). The public sector has its limitations in bringing such funding to scale, particularly when the biggest impacts to natural assets are coming from the private sector – which depends heavily on natural capital to grow, but has so far externalized the risks and costs of natural capital depletion on to public institutions. Continued investments are only fuelling the further destruction of nature. A recent study revealed that the world's largest investment banks provided finance of $2.6 trillion directly to projects linked to ecosystems destruction and depletion (portfolio.earth, 2020) – fossil fuels, mining, agribusiness, infrastructure, tourism & transport and the logistics sector.

Meanwhile, the World Economic Forum's 2020 Global Risk Report showed that biodiversity depletion and climate change risks top the risks globally both in terms of actual impact, as well as perceived riskiness by businesses around the world. On the other hand, business opportunities in sustainable land and ocean use are yet to be tapped into and represent an over $3 trillion business opportunity (WEF, 2020c). Estimates suggest that investors could profitably put money into enterprises in habitat restoration, water conservation and sustainable land use, while closing the conservation funding gap by more than half.

Investing patterns have to change – and businesses are slowly making that transition, by incorporating ESG guidelines for operations, or signing on to sustainability practices and pledges. However, business value chains continue to remain exposed to natural capital risks and natural capital risk measurement remains poorly mainstreamed and measured, with the result that capital continues to flow into the destruction of nature.

Measuring & Mitigating Biodiversity & Environmental Risks

According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), natural disasters caused by nature loss and climate change cost more than $300 billion per

year (2019) and biodiversity loss is a source of financial risks and threatens the availability of ecosystem services, such as wood, animal pollination and soil fertility, on which economic activities depend. According to WWF, nature provides services worth at least $125 trillion/year globally (2018). Wherein, pollination increases the global value of crop production by US$235-577 billion/year (Lautenbach et al, 2012). The estimated economic cost of land degradation is more than 10% of annual global gross product (IPBES, 2019). Land degradation and climate change are predicted to reduce crop yields by 10% globally in the coming years and up to 90% in certain regions by 2050 (Cherlet et al, 2018).

An estimated $44 trillion of the global economy is exposed directly to biodiversity and natural capital loss risks. Countries like India, Nepal, Bhutan, Bangladesh and Myanmar, with economic sectors that depend highly on nature-based products have GDPs that are even more dependent on nature than the overall global economy. Up to 60% of India's GDP, for example, is moderately to highly dependent on nature (WEF, 2020a). In India's North East where 70% of the region depends on farming for livelihoods, out of which the vast majority are smallholder farmers, this dependence is even higher.

Developing nations, such as the Eastern Himalayan region, are also on the frontlines of climate change and biodiversity loss driven disasters. This, combined with the level of income exposed to climate and natural risks, makes the region particularly vulnerable and low overall social development diminishes resilience for communities. Accessing finance to combat these growing challenges and risks is becoming tougher, and on the whole, is more costly for developing countries than it is for rich OECD countries. On average, interest payments for vulnerable countries are expected to increase to up to $168 billion over the next decade.

Driving Naturenomics™

On the other hand, preserving natural assets and better valuing them could help developing nations like the Eastern Himalayan region gain up to **$2 trillion/year of economic benefits** (AlphaBeta, 2016; UNEP, 2014) as they have the largest standing natural assets. This could help in creating millions of jobs through a shift to sustainable business practices, better leverage of payment for restoration & ecosystems services practices and overall, better valuation of natural capital.

The principles of Naturenomics™ posit six key elements to measure for enhancing and managing natural assets: Land, Energy, Waste, Water, Air & Carbon. Measuring business impacts across these six areas, as well as business dependency across these key areas will help businesses identify their biggest exposure across their value chains – and the opportunity to create sustainable, circular value propositions for consumers and their products, managing resilience in the face of climate change and biodiversity loss.

Area	Indicator
Land	Green cover enhancing biodiversity
	Soil health & toxicity
	Green certified buildings/facilities
Energy	Energy efficiency
	Renewable energy mix/coverage
	Life-cycle assessment for energy consumption across products & supply chain
Water	Water neutrality
	Water recycling
	Waste water treatment
	Water use across products & supply chain
Waste	Waste sent to landfills
	Recycled materials use
	Waste recycled
	Waste generation
Air	Ambient air quality
	Outdoor air quality
Carbon	Annual absolute reduction in carbon emissions
	Carbon neutrality

Transforming Impact Assessment

Current environmental impact assessment requirements across the Eastern Himalayan region focus on driving impact mitigation – i.e. not avoiding impacts, but instead lessening the damage done and minimizing impacts on sensitive environments. The focus on mitigation accepts without question the premise that for businesses and economies to grow, ecosystems will have to be damaged. Under this paradigm, the full downstream impacts of ecological destruction are largely externalized, not included in the remit of corporate accounts or formal impact assessments. These costs are borne by public institutions: such as rising healthcare costs due to increased air pollution, rising costs of mitigating flood damage (spurred by deforestation and climate change).

As the full impact of the biodiversity and climate crisis become evident, the minimum action framework of the impact assessment for mitigation framework has to be transformed to meet the

challenges of the present. Mitigation and avoidance can no longer be the only aims: **adaptation is critical.** Positive impacts too have to factor into the weighting of an impact assessment. Mainstreaming positive impact assessment and weightage across the value chain will help drive businesses to innovate and build services and products that restore or regenerate nature, not destroy it.

The ecological handprint method has been floated as an alternative to the footprint thinking of the past, which has focused on damage mitigation and not adaptation opportunities (Guillaume et al, 2020). Unlike the footprint, the handprint model of accounting focuses on the good that has and can be achieved and is a useful tool for identifying opportunities and possibilities for action, as well as providing the framework for identifying which stakeholders have the biggest opportunity and scope for action. Used in unison with footprinting methodology, it provides a holistic framework to operationalize impact measurement and assessment, driving positive impact through:

1. Including positive impact indicators
2. Quantifying the reduction of negative impacts caused by other actors involved across the value chain
3. Identifying and describing the actual pathways by which an improvement occurs beyond the supply or value chain to the **value network**
4. Defining attribution i.e. which actor in a value chain is responsible for a positive or negative impact

The Naturenomics™ rubric makes use of both the mitigation and adaptation drivers identified in both the footprint and handprint methods to drive change, particularly in restoring green cover to manage biodiversity and transforming the business relationship with waste – one of the biggest drivers of environmental degradation. For a more comprehensive assessment of impact that leads to a mindset shift for adaptation and mitigation, businesses must adopt similar accounting measures to identify the opportunities that do exist in their value chains and networks for driving the net zero agenda, but which remain as yet underleveraged. In such impact measurement systems, positive impacts must be given greater weightage and reference to facilitate action, not avoidance.

Investing in Nature & Communities

Between 1970 and 2016, the world has seen a 68% decline in mammal, bird, amphibian, reptile and fish populations globally (WWF, 2020). An estimated 41% of known insect species are in decline. Estimates suggest that insects could vanish from this planet within this century – threatening total ecosystem collapse, or the sixth extinction event. In total, 1 million plant and animal species are threatened with

extinction within this century. An estimated 30% of threats to species globally are directly linked to international trade (Moran & Kanemoto, 2017). Habitat loss, overexploitation and ecosystem degradation, linked to businesses are among the primary factors driving this change.

Corporate Biodiversity Management

In this context, environmental impact assessments and measurement present a limited assessment of a business' impact across natural assets. Increasingly, global regulators are encouraging companies to include biodiversity assessments and management plans in their operations – particularly for businesses in sectors that depend heavily on thriving biodiversity for their continuity (e.g. fisheries, agribusiness & allied products).

Corporate biodiversity management focuses on reshaping and designing the business' value chain to drive profits while protecting biodiversity. To do so requires a full corporate accounting of biodiversity impacts across the value chain, to identify alternative action points to protect biodiversity. It also means identifying the precise cost and risk exposure the business entails through biodiversity loss for a full, in-depth cost-benefit analysis.

While protecting biodiversity might sound like a restraint on businesses' full opportunities, this is based on the assumption that protecting biodiversity is a non-economic activity. However, evidence shows that even protecting up to 30% of the world's land will directly add an average value of $250 billion to the global economy annually, and an additional $350 billion in non-monetized benefits through ecosystems services (Waldron et al, 2020). For businesses which depend heavily on biodiversity across their value chains, like agribusiness, protecting biodiversity is a question of long-term strategic survival.

Nature Based Solutions & Sustainable Businesses

Overall, the nature sector is expected to grow by 4-6% in the post-COVID recovery period (Waldron et al, 2020): competitive when compared to agribusiness and fisheries which are expected to grow only by 1-3%. Nature based solutions such as forest landscape restoration and integrated wetlands management remain unleveraged as of yet, but represent key opportunities in driving businesses – especially in the Eastern Himalayas with its rich natural assets.

Around the world, start-ups are increasingly exploring the forest restoration space as a business opportunity, rather than an environmental obligation. In 2020, the world's first Rural Prosperity Bond was launched with an explicit focus on investing in restoration based activities ranging from agroforestry to forest restoration. Others are tapping into the carbon credit market to finance forest restoration while generating benefits for customers.

For businesses heavily exposed to the risks of forest and wetlands ecosystem degradation, investing in nature-based solutions is a matter of reinvesting in business. Floods cost Assam INR 200 crore annually (Government of Assam, 2018), but effective wetland and watershed management coupled with forest landscape restoration could significantly reduce the devastation caused by flooding – generating savings on flood damage repair.

Local communities play a key role in this, as the primary stakeholder in the natural assets of the Eastern Himalayan region. Around the world, businesses are increasingly transitioning their supply chains towards greater sustainability by investing in building sustainable local businesses for communities. The higher premium on sustainable products attracts greater value for both communities and businesses, offering greater opportunities for socioeconomic mobility. Better sustainability and support from businesses to make the leap to sustainability, whether through initial financial support or through training, offer better returns over time for communities, particularly in the agribusiness, fishery, forestry and allied sectors.

The Eastern Himalayan region is becoming a prime target for oil palm growers, both in India's North East as a means to mitigate "unsustainable" shifting agriculture practice, as well as over the border in Myanmar. The challenge is to move from unsustainable shifting agricultural practices towards greater sustainability, but not at the risk of creating dependencies for communities through exclusive district-wide buyback deals for corporates (Scroll.in, 2014; 2018), and not through the spread of monoculture plantations of oil palm. These spreading, settled monocultures end up having a stronger impact on local biodiversity, by virtue of their lack of diversity and by replacing local species, disrupting habitats for key pollinator species. Existing evidence also suggests that the Eastern Himalayan region has the potential to be a hotspot for new zoonotic disease emergence (Allen et al, 2017) – a risk which will be further elevated by the spread of oil palm, if it is coupled with unchecked deforestation.

Conversely, businesses investing in agricultural produce in the Eastern Himalayas must invest sustainably and by building bridges with local communities, facilitating their ability to become sustainability entrepreneurs in their own right. The rich natural assets of the region are an opportunity for eco-startups to take root, driven and led by local youth and indigenous communities, with their rich knowledge of the species.

A Naturenomics™ Policy

The future of Eastern Himalayan communities, biodiversity and economy depends on critical action taken within this narrow window of opportunity. Beginning the transition to a rewilding economy now will reduce downstream losses and dangers, but achieving this calls for a concerted policy push to

move in the right direction - whether through incentives or through penalization of incorrect practices.

A Rewilding Economy & Natural Assets

- **Invest:** $4.2 billion for extensive, deep rewilding across the Eastern Himalayas
- **Create:** 6 billion natural assets to restore over more than 6 million hectares of forest land
- **Reach:** 3 million rural households to build incomes through restoration-based activities and power entrepreneurship for sustainable business
- Raise net zero forest cover commitments beyond the 33% figure, recategorize forest cover enhancement to focus on restoration, especially converting open forests to moderately dense and very dense forests
- Hone forest monitoring systems to add thresholds for forest cover that better reflect natural, healthy biodiverse forests
- A landscape approach to restoration, to rebuild destroyed forests and implement restoration only across areas that once used to be forest land
- Holistic restoration, to restore thriving and living biodiversity through scientific endemic species restoration (identified through local seed & species assessment, historical assessment or ethnobotany) and monitoring of species and forest health
- Enhance local governance systems, streamline policies supporting community forest management and access to merge with local governance structures, to enhance governance of natural assets and build community capacities to manage common pool natural resources
- Develop payment for restoration, management and carbon sequestration schemes that directly benefit communities involved in natural asset management and monitoring
- Schemes and technical skill development opportunities for forest-fringe communities to scientifically monitor forests and biodiversity
- Infrastructure and systematic support for the preservation of heirloom seeds

Nature-centred social equality

- **Invest:** $91 billion from enhanced natural capital in enhancing natural, business and social infrastructure

- **Create:** climate resilient livelihoods and access to universal basic assets such as healthcare and education across 6 million households
- **Reach:** 6 million households of, on average, five people each
- Inclusion of natural capital in income reporting measures, to reflect on the real body of wealth managed by communities
- Drive resources back into rural communities by driving natural capital profits back to communities that steward natural assets
- Streamline processes and policies for communities to access natural capital wealth
- Strengthen local governance structures and streamline authority to allow local government structures to manage natural capital earnings and reinvest them directly in the community, rather than receiving these earnings through indirect or allocated means that may not reflect their natural capital contributions
- Support structures for channelling natural capital investment in building schools, healthcare centres, low carbon climate-resilient living spaces, wildlife friendly connectivity, micro-grids for localized renewable energy distribution and better watershed management
- Incentive support for sustainable businesses and climate resilient livelihoods to bridge the resource and skill gap for communities

Building local natural capital markets

- **Invest:** $2.9 billion
- **Create:** INR 200 billion in direct revenue through food forestry in the first 3 years and INR 913 billion from the third year through food forestry and bamboo plantations
- **Reach:** 2.1 million households across North East India
- Streamline agroforestry policy across states to provide support schemes for farmers to transition to agroforestry models, especially introducing crop insurance schemes and purchase/buyback support for the early transitional period
- Technical training systems for restoration agriculture practices & for crop intensification & diversification through agroforestry models
- Bridge market access for communities, particularly women through wildlife friendly infrastructure and through direct digital infrastructure and means

- Leverage traditional low carbon and low impact cultivation techniques with stronger science for restorative agricultural practices
- Harmonize frameworks for natural asset measurement across agricultural lands and develop incentive and subsidy schemes for farmers making the switch to restoration agriculture

Unlocking business, communities & finance

- Develop uniform standard and reporting requirements for measuring and publicly reporting natural capital and biodiversity impact/use across business value chains as per global recommendations
- Create a standardized code for sustainability practices & requirements for businesses
- A stronger system of support and penalization to nudge businesses to take action on these areas, particularly to support and foster natural capital and biodiversity positive behaviour
- Strengthen the Environmental Impact Assessment framework to include measurement and framing systems for positive impacts, with greater weightage for projects with measurable positive impacts on biodiversity and natural capital
- Enhance and support public accountability mechanisms for communities in impacted areas or in proximity to businesses to identify and report on local environmental and biodiversity threats through local government structures and independent review bodies
- Involve impacted communities directly as stakeholders with vetoing rights in projects and programmes in their areas
- Involve communities and their traditional knowledge in policy development processes for natural capital
- Support schemes for women owned sustainable businesses and livelihoods including robust market access
- Equitable land ownership schemes to strengthen women's access, ownership and management of land

A holistic growth index

- Mandate natural capital reporting and valuation at a national, regional, local and business level

- Integrate natural capital in the GDP
- Integrate ecological factors and indicators across social and economic dimensions of measurements
- Transition to a holistic array of development indicators for natural capital regenerative social development

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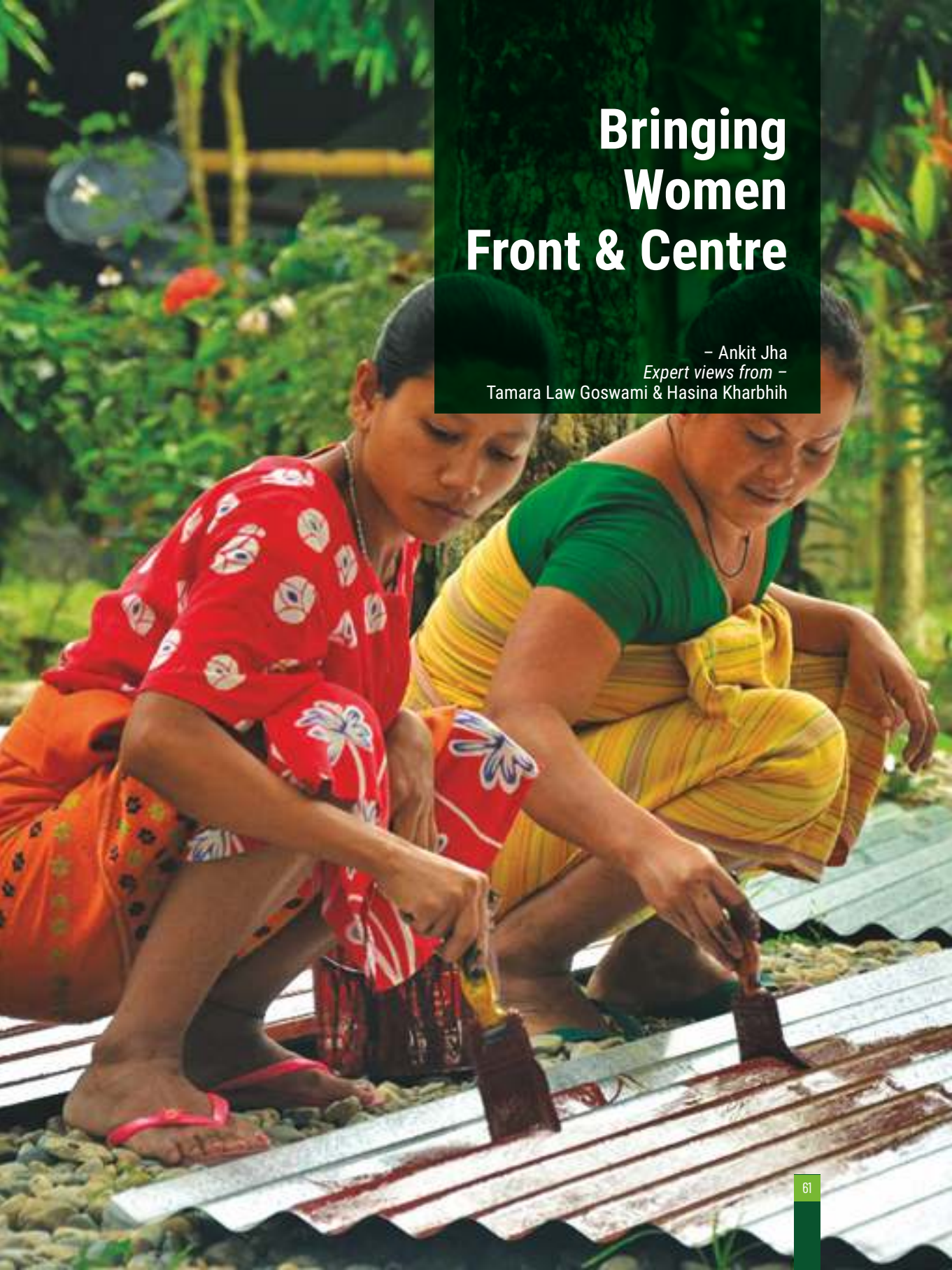

Bringing Women Front & Centre

– Ankit Jha

Expert views from –
Tamara Law Goswami & Hasina Kharbhih

Why women?

Agenda 21 of the United Nations Conference on Environment and Development (1994) recognises the need to bring women into environmental decision making because of their ability to build a close relationship with the environment through the roles they perform (Nations, 1992) . Traditionally, women in the rural communities have been involved in NTFP collection for fuel wood, while men have taken to cutting trees for firewood to sell in towns, or for making tools. This creates an uneven balance within the economy of the household as men enjoy their rights to sell and earn while women have to depend on men to bring in the money.

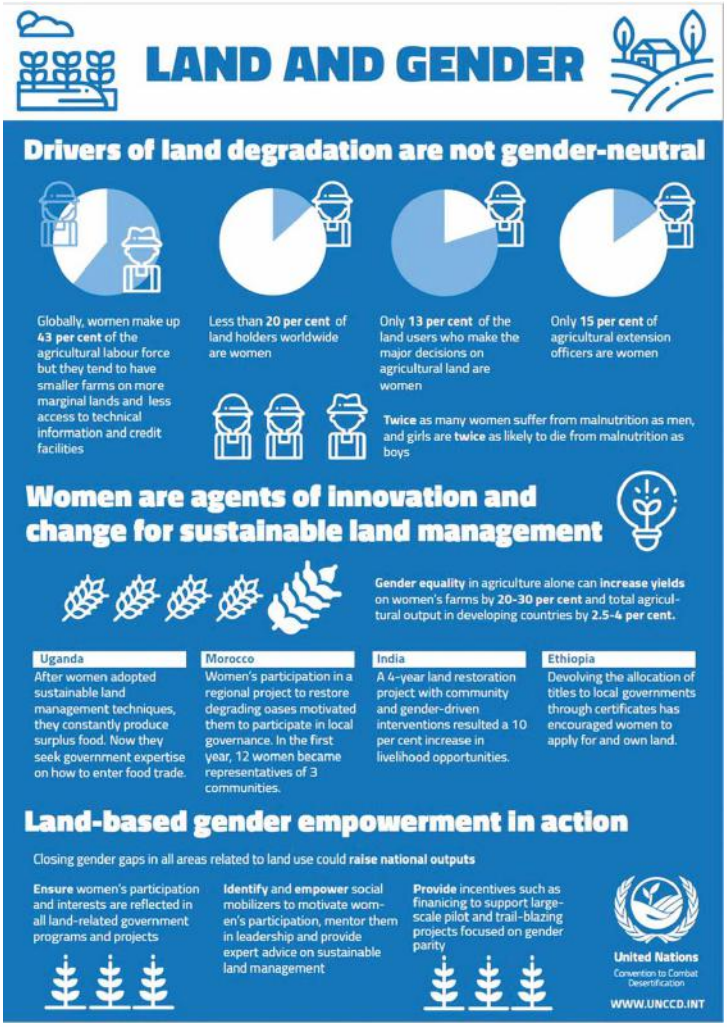

Fig 1: Land & Gender
Source: UN Convention to Combat Desertification

With fixed gendered roles, women have to give in to the social and household norms as a consequence of which, they end up compromising their financial autonomy. The difference in control and access to resources has differential implications in maintaining the biodiversity of the region. This is where women's knowledge becomes a crucial instrument for conservation (Hannan, 2002). Women are believed to be the carriers of the generation of traditional knowledge with respect to the environment around them. It has ranged from the use of medicinal plants to being quick to mitigate and adapt to natural disasters. Women also continue to be central to food production systems in the global South, in terms of the work they do in the food chain. As most farmers in the world are women, and most girls are future farmers; they learn the skills and knowledge of farming in fields and farms (Shiva, 2010).

But human history has seen women being bound by socialized roles and gendered division of labour which has eroded their natural rights. While there is an active involvement of both men and women in the use and management of natural resources, a stark inequality exists in the ownership and access to these resources. In forests, women and men tend to depend on the same resources for their livelihood but use it for different purposes. Due to the multiple household roles they undertake, women end up losing out on opportunities which could result in their economic and mental well-being. Empirical evidence from sub-Saharan Africa points to the fact that with an increased access to resources, in the form of income, land, or assets, women invest more in the socio-economic well-being of the household. Doss (2006), Duflo and Udry (2004) suggest that women tend to give a priority to food and nutritional security. Corroborating this Thomas (1994), Menon, Van Der Meulen Rodgers, and Nguyen (2014) opine that women also gravitate towards putting the money in activities associated with the well-being of their children particularly daughters ((Choudhuri & Desai, 2020).

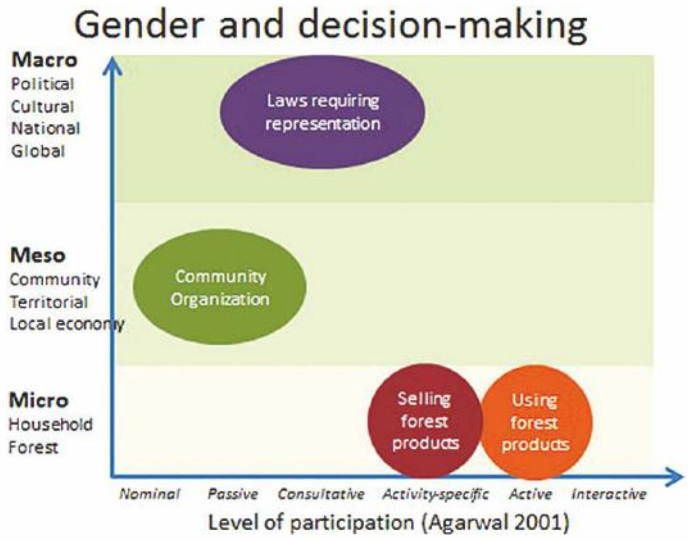

Fig 2: Gendered participation
Source: Gender and level of participation in agro based activities (Agarwal, 2001)

This small snippet of how women are important to an ecosystem's health and the need for their liberation from the oppressive social and cultural restraints, answers the question of why there is a need to bring women to the front and centre. Their say in framing conservation strategies could help build a society based on ecological principles while also helping solve the issue of socio-economic well-being of the households.

The Expert View: Natural heritage – women's traditional knowledge in the Eastern Himalayas

By Tamara Law Goswami

Sustainability Consultant

The more marginalised one is (like women) the more one depends on common pool resources / nature-based resources for sustenance and livelihood. The risks of climate change and the COVID-19 pandemic are more intimately felt by women than men, and women are impacted differently than men are, with the changes to their work burden and resource access. These changes are further impacted by migration, as men appear to be migrating out, placing greater responsibility on women to manage community lands and natural resources, all unpaid.

In general, common pool resources like forests and water are perceived differently by men and women, linked intimately to the differences between how they access and use these resources. In the North East, men have been the ones on the forefront of market access, while women still use natural resources to nurture households and family well-being. Therefore, for a woman a tree denotes shelter, food, fuel, fodder, water; for a man, this tree is reduced to its commercial and market value – timber and livelihood. In this paradigm, forests and rural livelihoods are closely linked with commodification of natural resources, prevailing culture of extraction (most by men), unpaid labour by women (if they have extraction rights) and an absence of trade rights.

Women are the custodians and teachers of culture and traditions. This is true of the handloom and handicraft industry, as well. Whilst women's skills are in demand, they are rarely the final decision makers and/or participants in business negotiations for the final products, as that responsibility falls largely to men who have greater market access. Women in the region have been marginalized by multiple social forces – traditional roles, patriarchal norms, religion etc. However, this exclusion from the public sphere undermines a true democracy. Women's voices need to be heard because 1) they have much insight on family health and well-being as they play the role of primary caregivers in families 2) women average 6 hours of unpaid labour per day versus 36 min for men (all-India average) 3) their roles in households have empowered

them with the skills and ability to adapt and bring community together 4) they live closer to and are highly dependent on natural resources and so understand and can appreciate intricate interdependencies between natural, social and economic worlds. Women must represent themselves on decision-making bodies - direct democracy instead of representative democracy. We have to ensure they are not only well represented in communities, but that their inputs and opinions matter for institutional decision-making and resource allocation.

To do so we have to take a gender-sensitive approach to recognizing the value of the knowledge women have at their fingertips: we have to acknowledge that a woman's knowledge and a man's knowledge of the same resource could be very different. Women own a great deal of knowledge on natural resource management but have weaker resource rights – on average 66% of women in the North East region are landless (Dang, 2019), women lack access to markets and have poor trading rights, and as forest and land access rights move from collective systems to private ownership models women are losing access to resources that once were the backbone of their livelihoods and community survival strategies.

There is a need to recognise women as agents of change, with something valuable to contribute. Women have historically been driven to be more flexible and innovative with resource use, to support their families. Women have also traditionally been the seed savers and therefore protectors of biodiversity and nutrition - even more critical at a time where genetic biodiversity loss in food production systems threatens the resilience of our global ability to produce food for ourselves (FAO, 2018). Discounting women is equivalent to discounting at least half of the wealth, knowledge and wisdom of a community, particularly in decision-making.

A gender sensitive approach to policymaking concerning livelihoods and forest access and use needs to be taken. Existing forest policy focuses on leveraging NTFPs through markets, without the support of a gendered lens that recognizes the additional work burden it places on women, while financial benefits accrue to men. Effective gender-sensitive policies will have to focus on levelling this divide by specifically targeting the women who do the bulk of NTFP harvesting work, creating market access and schemes that support them, allowing for greater financial independence.

A rights-based approach is crucial. Policy needs to focus on putting the so-called control of primary natural resources back into the hands of women who work closest with them. This must also include a right to protection of traditional knowledge systems, benefits from the use of plant genetic resources, and right to participate in decision-making on food and agriculture. Also, those mechanisms that allow communities to legally own forests, and those

created with the express purpose of acknowledging community-based rights; provide the greatest protections for women.

There is also a strong need for better awareness and support, to help women access their rights as there exists a huge gap in perception of responsibilities, realities and expectations which needs to be filled.

Closing the Gender Gap Through Natural Assets

Despite several calls for inclusion and integration of women within the world economy, the gender disparity in accessibility and control over land as well as other productive resources still exists. According to the World Economic Forum's Global Gender Gap Report(2020), India ranks 112th on the overall Global Gender Gap Index.

The report also suggests that at 35.4%, the economic opportunities for women are extremely limited in India. While the country has closed two-thirds of its overall gender gap with a score of 66.8%, the condition of women in the fringes of India's society is precarious (Global Gender Gap Report 2020, 2020).

Oxfam's India Inequality Report (2018), data suggests that 80% of all the economically active women are employed in the agriculture sector. They represent 33% of the agriculture labour force and 48% of the self-employed farmers (Himanshu, 2018). While the numbers paint a good picture of women employment, COVID-19 has only widened the gender disparities as more and more women lost their jobs across the world. A UN Women report titled From Insights to Action: Gender Equality in the wake of COVID-19 suggests that the pandemic will push 96 million people into extreme poverty by 2021, 47 million of whom are women and girls (Azcona, et al., 2020).

Fig 3: Global Gender Gap
Source: Feminism in India

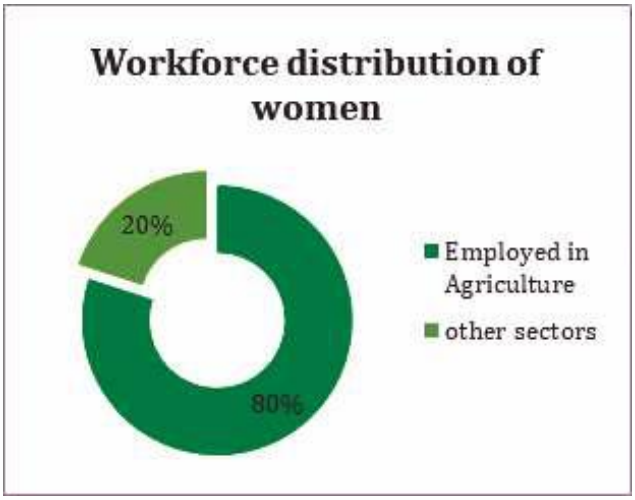

Fig 4: Workforce distribution of women.
Source: Oxfam India Inequality Report 2018

Regardless of their large contribution women continue to remain invisible in the rural economy of India due to lack of resource ownership. It results in them having to live in extreme poverty as a result of earning less, saving less and their vulnerability to job loss. Bina Agarwal, in In a Field of One's Own argues that women's command over property is the single most important factor in women's economic empowerment. This ownership and control should ideally lie in both- the private and the public domain resources (Agarwal, 2013). Asymmetrical division of labour, limited and depleting resources and limited rights over these assets and resources coupled with their low participation in decision-making processes render them vulnerable to discrimination.

A more sustainable way to bridge this gender gap is by creating more natural assets and focusing on habitat regeneration. Pushing for the development and enhancement of natural assets especially in the forestry related sector comes with a plethora of opportunities. Promotion of small and medium enterprises that employ local communities and use locally sourced materials can be a good way to increase employment opportunities and realise livelihood security. According to the FAO article titled Creating forestry jobs to boost the economy and build a green future, investments in forest regeneration, forest activities, and environmental services generate more jobs than most other sectors. An annual outlay of US$1 million in forest management (including agroforestry) could generate from 500 to 1 000 jobs in many developing countries, and 20 to 100 in most developed and middle-income countries (Nair & Rutt, 2009).

All of this would be of immense benefit to the poor households and especially the women who are constrained by social and cultural ties. The lack of access and ownership of resources curtail their freedom to engage in productive and profitable forestry activities. Bound within the household and care work, women pay in terms of opportunity costs (labour and time) thus losing out on monetary

benefits from agriculture based activities. Being an active stakeholder in the decision making process would enable women to become immune to unexpected financial shocks.

A socially inclusive engagement for women must consider the fundamental decisions for a gender-equitable outcome. It should entail control and use of land and the distribution of costs and benefits. The process of natural asset generation and enhancement must also incorporate women's restoration approach and their priorities. An activity like women led community forestry can help achieve numerous socio-economic-ecological benefits like biodiversity richness, carbon sequestration, optimized ecosystem services, enhanced rights and livelihoods as they put their traditional knowledge to application. These can also allow women to create more entrepreneurial ventures for themselves and their communities like building small businesses based on local natural products like weaving, sale of certain types of edibles, handicrafts, agro-based high value products like tea, mushroom etc. and hence reclaim their status within the social structure.

Fig 6: Secure Community Land Rights for Indigenous & Rural Women Contributions.
Source: Rights and Resources Initiative

Eastern Himalayas including the North-Eastern states of India due to its diversity are rich in both-natural resources and indigenous skills. Women in the rural communities who over the years have accumulated knowledge on management of these resources must be roped in and their skills must be used to create/enhance natural assets and restore habitats. This can be corroborated with studies which have found that incentivizing and encouraging women's participation can enhance the effectiveness and sustainability in forest management (Haverhals, Ingram, Elias, Basnett, & Petersen,

2016). It goes on to show how the process of natural asset creation can have a chain reaction as it deals with the issue of gender equity by creating economic opportunities for women while regenerating the landscape thus reducing the vulnerabilities women face due to degrading natural environment.

The local Joint Forest Management Committees (JFMCs) and the Eco-Development Committees (EDCs) across the North East represent an opportunity to create spaces for women to be active stakeholders in natural resource management. To do so requires active intervention through engagement and focus groups with both men and women, to lay the groundwork for women to be brought into committees and be given an equal platform in decision-making. The Balipara Foundation, for example, found that to bring women on board in these committees and open avenues for their voices to be heard required interventions with both men and women - to change male attitudes towards women being on committees and to identify women who could play this role on committees. Through work with the Bogijulee JFMC in Balipara Reserve Forest, women have taken up leadership roles and their representation has had an impact in moving toward gender equity in agroforestry based business activities - though the process has been an onerous and long-term engagement.

Securing Livelihoods – Natural Capital Economies

To check the continuous depletion of natural capital assets like forests, water, fish stocks, minerals, biodiversity and land is a mammoth challenge for world leaders. This degradation is a threat to the aspirations of achieving poverty reduction and sustainable development objectives. A World Bank publication titled The Changing Wealth of Nations 2018 suggests that the most affected amongst all would be the developing countries as the low-income countries depend on natural capital for 47 percent of their wealth (Cantrell). But these countries are faced with the dilemma of development vs. conservation. Both remain equally important as they share synergistic relationships with each other. And yet, in several of these countries, natural capital is being destructively depleted, resulting in a drain of natural and human wealth. And since the women are at the frontline because of their traditional roles, they have to bear the costs of this degradation which impacts their economic freedom, their ability to provide and care for their families, their free time, their health and their overall wellbeing.

The current social structure often excludes women from land inheritance, access and ownership to land. This gendered construction of resource management almost always puts women in a

disadvantage. Women contribute 70% of total labour in gathering, processing and storing, utilizing and marketing forest products. Even afforestation can have a negative impact on women, as species are chosen primarily to serve men's mainly commercial endeavours, while the ones that women need for subsistence and market oriented activities are ignored (Rani, 1999). They are engaged in subsistence and household activities but they are not allowed to make decisions with respect to resource management because of lack of ownership.

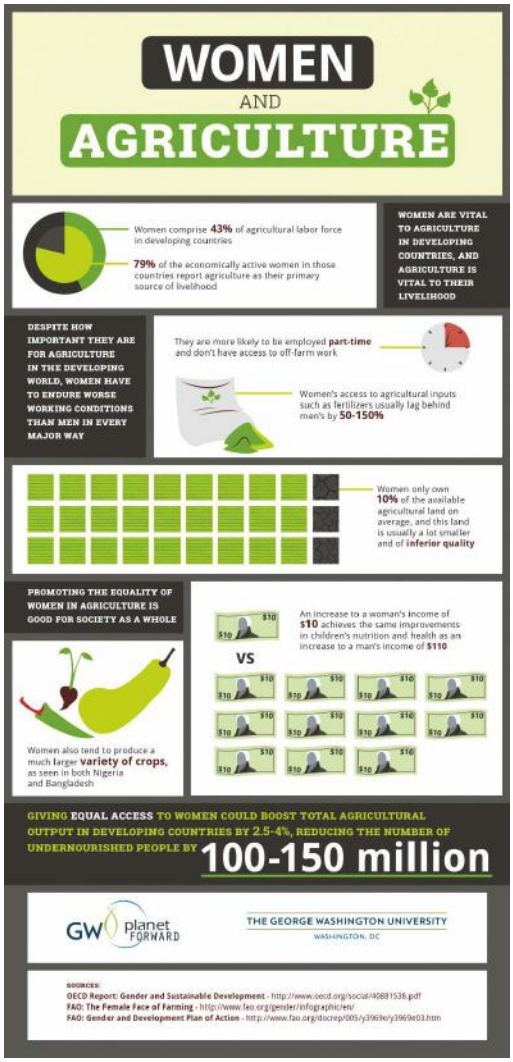

Fig 6: Towards Gender responsive forest restoration. Source: Alliance of Biodiversity International and CIAT

As a consequence, women have to pay in terms of lack of financial autonomy, limitations on the kind of ventures they can take up, psychological costs and degrading health amongst others. Securing livelihoods through natural capital generation is definitely the future of the world economy. A more gender equitable natural asset generation process must ensure women have the right to own, manage and reap the benefits stemming from the ecosystem services from these natural resources. With a circular rural economy in place and women being handed the ownership to land and other resources, will mean more diversified socio-economic benefits for the households and the communities as a whole. Giving women their land rights will help them productively use and develop these natural resources, including access to credit and other forms of inputs needed to transform and process raw resources into marketable products (Stork, Travis, & Halle, 2013).

The onset of COVID-19 is a perfect place to start in the direction towards a more equitable society that acknowledges the rights of all genders and does not create discriminatory social barriers. To reduce such future risks, the best alternative would be building a natural capital based economy. It would not only create a buffer between different living forms but can also help in economic and social recovery

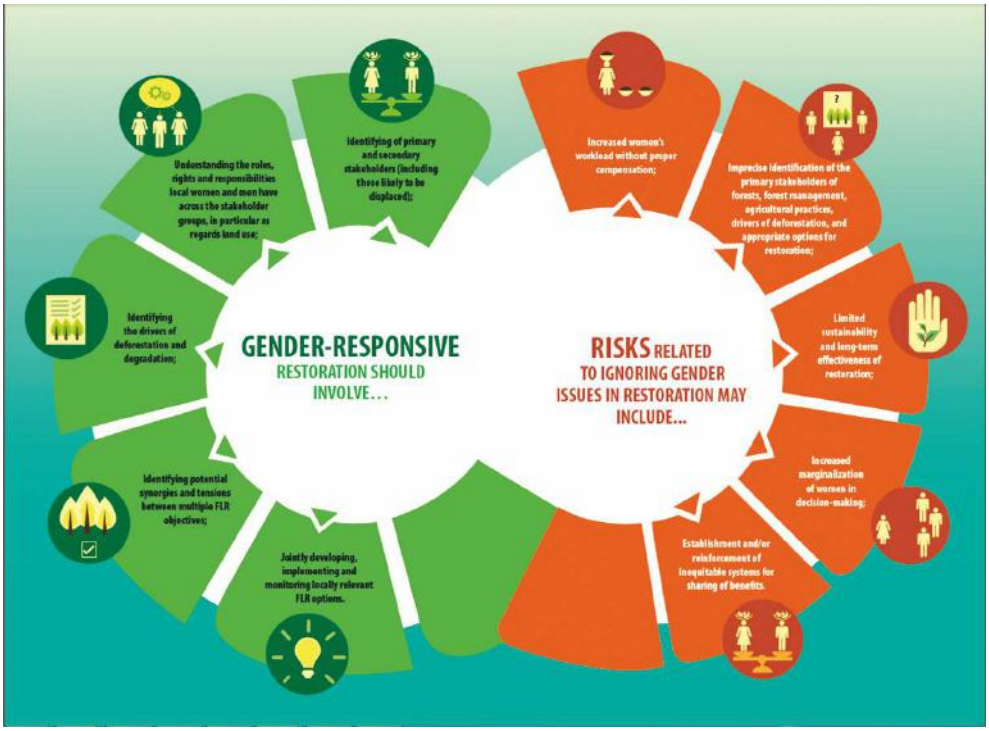

Fig 7: Towards Gender responsive forest restoration.
Source: Alliance of Biodiversity International and CIAT

efforts especially in a post COVID world when the whole world is looking inwards for development and India has also initiated the "vocal for local" campaign. Abundance of land in the region could be tapped in and investments could be made to create multiple income sources for women. Production and practices like developing bio-fertilizers, organic cultivation, handicraft industry etc. will secure livelihoods for the communities' thus ensuring food security and give them the perfect platform to build a sustainable future.

For instance- North East India has a great diversity of bamboo resources that occur naturally here. Communities use bamboo for different purposes- from cooking to tool making. But bamboo also has great scope as an agro-based product. Several studies have also pointed out how bamboo based agroforestry can help restore the local ecosystems and enhance the services flowing from them. Jha and Lalnunmawia (2003) reported that intercropping ginger under three fertilized edible clump forming bamboos was beneficial for both the components under degraded soil condition of NE India. In North-East India, Singh (2002) suggested cultivation of bamboo along water springs as an agroforestry intervention for enhancing farmers' income (Tewari, Banik, Kaushal, Bhardwaj, Chaturvedi, & Gupta, 2015).

The Expert View: Nurturing women entrepreneurs

By Hasina Kharbhih

Founder & Managing Director - Impulse Empower

Societies have traditionally limited the role of women as mere participators rather than action doers. As discussed in the previous sections, their freedom of control and access to resources has been curbed by structural constraints and they have to bear the major share of burden from environmental degradation. But with growing sensitization and push towards women taking administrative and leadership roles, gendered roles are slowly changing. Research suggests that communities in India with gender quotas for local village leaders had more public goods overall than communities without quotas, and female leaders invested more than male leaders in public goods linked to women's concerns (Duflo & Topalova, 2004; Chattopadhyay & Duflo, 2004; Beaman, Duflo, Pande, & Topalova, 2011).

Evidence also suggests that women leaders' investments led to improved human development outcomes and women's entrepreneurship (Iyer, Mani, Mishra, & Topalova, 2012; Pathak & Karen, 2017; Lori, Duflo, Pande, & Topalova, 2012; Ghani, Kerr, & O'Connell, 2014). While women have been involved in management spaces as a result of creating more gender equity in the decision making space, their mere presence in institutions is not enough to overcome deep-rooted disparities.

As per the statistics by Ministry Of Statistics And Programme Implementation in July 2018, women constitute just 14% of the total entrepreneurship in the country (Market, 2016) . The sorry state of women entrepreneurs is further corroborated by the MIWE (2018) where India ranks at a low of 52 out of the 57 participating countries (Mastercard Index of Women Entrepreneurs, 2018). This huge disparity could be bridged by providing market access to women and help them find solutions to economic challenges, allowing them to be leaders within their own communities.

Traditional knowledge systems and indigenous skills have been poorly capitalized in strengthening women leadership. The richness of indigenous knowledge systems in the Eastern Himalayas could be tapped in to build a sustainable future for the region. Identification of women champions who possess an understanding of the human-environment-culture relationships who can be promoted as eco-entrepreneurs. Their knowledge can play a vital role in building resilient futures through systems like irrigation systems for agriculture, preserving native variety of seeds, identification of essential medicinal plants, and documentation of the evolutionary knowledge of their surroundings. Through their understanding of the human-environment interactions, they can help boost entrepreneurship opportunities within the rural

landscapes. For instance - they have a deep understanding of the bio-resources they use on a daily basis. These bio-resources could be converted as a product and sold in the markets like the clothing materials made out of cotton and other organic sources. Similarly, natural dyes have received a significant attention in recent past. Such dyes are made out of plants leaves and other parts. Producing such dye can help women set up entrepreneurial and skill building labs as a part of process of community hand holding.

An enhancement in the locally produced and sourced raw materials is required to balance supply chain at the local level which would help minimize cross border or state dependency. Another key aspect is the need for a consistent marketplace for locally created products in promoting women entrepreneurship and their economic empowerment. This would help achieve the much needed rural circular economy and would act as a push for more women entrepreneurs to provide independent goods and services.

Impulse Empower, through their work in driving livelihoods for women through skill based work (through key trainings and exposure) in the North East, has found that helping women capitalize on traditional skills coupled with environmentally friendly products is the key to building a niche and credible market for themselves. This has opened up the potential of economic empowerment in the bigger market, building assurance for big businesses to invest in rural entrepreneurship programs and promote women led businesses and brands.

Building local businesses which also rely on locally sourced materials has a significant advantage over depending on imports from outside. COVID-19 has demonstrated how the increasing dependency of markets on each other can disrupt supply chains and slow down the recovery process. Such natural and man-made shocks leave ample room for the policy makers to re-shape the existing policies and re- think local production and consumption which would be largely immune from any sort of negative external shock and would help revive the local circular economy.

Nurturing women leaders

According to the UNDP Human Development Report- Sustainability and Equity, women are naturally inclined to support leaders who care about the environment and tend to support policies that are environmental friendly. Evidence from 25 developed and 65 developing countries indicates that countries with higher female parliamentary representation are more likely to set aside protected land areas. A study of 130 countries shows that women are also more likely to ratify international environmental treaties (Klugman, 2011). The data signifies how women have internalised nature and environment as an extension of their existence and use their wisdom to protect it.

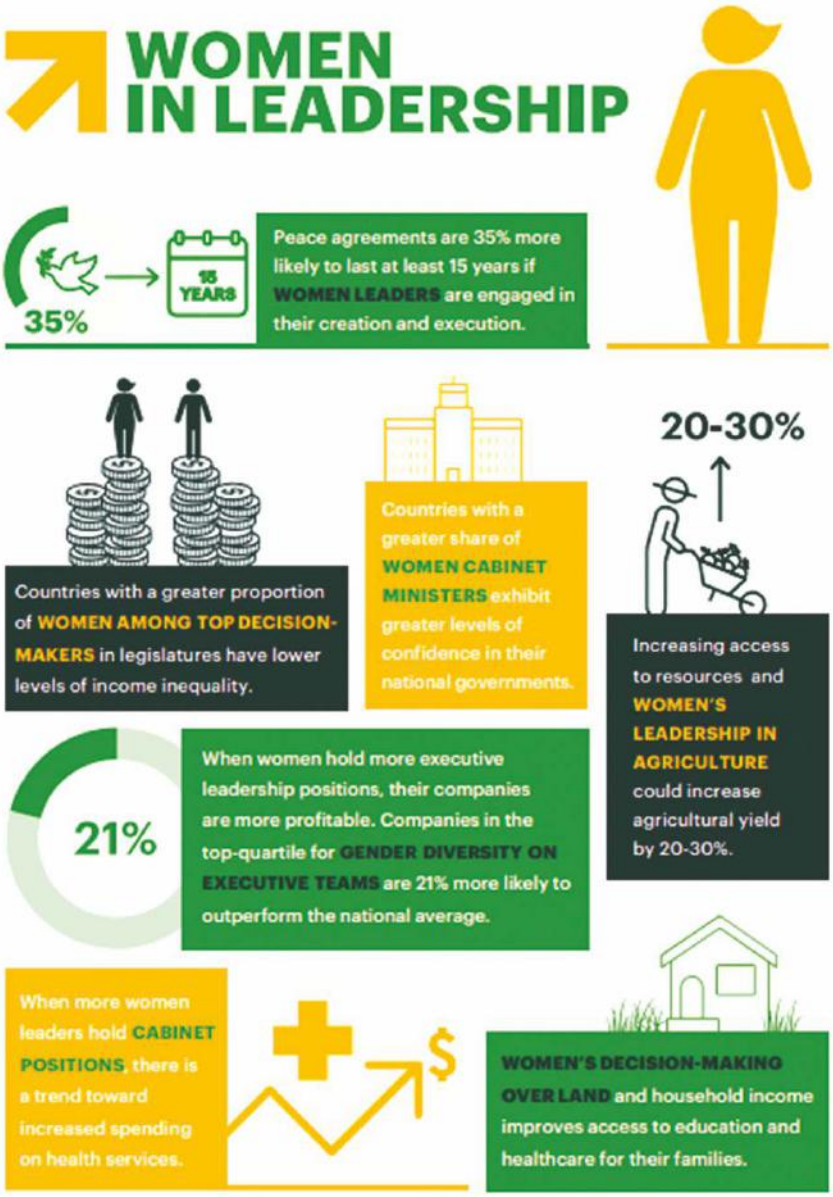

Fig 8: Women in leadership, Source: Women Deliver

Changes at the institutional level are needed to ensure that women can participate effectively in decision making. A recently published study of community forestry institutions in India and Nepal found that women's proportional strength in forest management committees has an impact on the effectiveness of their participation. The more women on the management committee the greater the likelihood that they will attend committee meetings, speak up and become office holders (Klugman, 2011). The shift must be supported with a proactive stance, generating new regulations and policy

interventions that mainstream gender equality and women's empowerment. This could be done by giving them active leadership roles, having their equal representation in the management and decision making processes, aiming to reduce and end the gender pay gap.

Fig 9: Women & Forests. Source: UN Women and Asian Development Bank

With an increasing involvement of the communities as the leaders in conservation programmes, there is an urgent need to bring women to the forefront of conservation practices by empowering them as decision makers. Formation of Self-Help Groups in the forest fringe communities will help women's voices to be heard and recognised by masses. Collective women action is important if we wish to see them as leaders of the conservation movement at the grassroots level. Acknowledging the contribution made by women for their role in conservation is necessary to encourage women to take up independent efforts.

The Biodiversity Act, 2002 is designed to encourage women to play a bigger role in conservation but the policies remain limited to paperwork. Rule 22 of the Biological Diversity Rules, 2004 states "every local body shall constitute a Biodiversity Management Committee (BMC) within its local area jurisdiction". The rules give importance to the equitable participation of women in the mechanism of biodiversity conservation, by mandating a minimum of 1/3rd representation of women in the total membership of the BMC. Further, a minimum of 18% reservation in the total membership of the BMC is made for persons from the Schedule Castes/Schedule Tribes.

The Biodiversity Act 2002 also mentions the need to identify Biodiversity Heritage Sites (BHS) and the

BHS committee needs to have fair representation from the marginalised sections and women as they play a vital role in the conservation and sustainable use of biological diversity (S.Kannaiyan, 2002). Better structures need to be put into place to execute these policies on ground as well. Things as basic as household functioning in rural areas needs to be re-assessed in terms of considering women decision making power. Targeted sensitization programmes with men are critical to change attitudes around women in leadership roles - to foster both acceptance and to open spaces where women are able to better participate.

Naturenomics™ Policy - Putting Women Front & Centre

- Women's ownership, access and management rights of forests resources needs to be ensured and enhanced, through official recognition of collective ownership systems and documentation of women's access rights to forest resources and other natural capital

- Greater representation on decision-making institutions, especially at local governance levels. There is a need for policy makers to realize that decision making still lies mostly with men and this form of 'shadow management' hurts women's economic and social well-being. Women's representation and their right to be heard within the decision making process should not just be rhetoric but should be a functional policy. A more gender sensitive approach to policy making is the need of the hour for women's emancipation from traditional gender roles.

- Invest in identifying, supporting and building women leaders across communities, both as leaders in formal decision-making institutions and as informal leading community voices

- Investment in women-owned livelihoods and businesses for rural communities to strengthen women's financial autonomy. These livelihood opportunities need to be designed gender-sensitively, creating access to both markets and finance for their businesses, rather than burdening them with extra responsibilities. Women led rural markets can be a great way in pushing women leaders and entrepreneurs.

- Development policies and programs must incorporate socio-economic-cultural inputs from women of the rural and indigenous communities. Women's Traditional knowledge must be incorporated in shaping development policies.

- Women from local communities who have been working for conservation need to be brought to the forefront as ambassadors or champions. They must be provided a platform to share their insights of the best practices.

- Targeted interventions, education and awareness with men to shift attitudes towards women in leadership positions and generate acceptance for including women's voices, as well as their access and ownership of land, natural resources, business ownership and financial independence

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Rural Futures for Natural Capital Economies

– Saurav Malhotra
Expert views from –
Dr. Bremley Lyngdoh

Out of the 7 billion people in the world, 3.4 billion live in rural areas but why is it that 97% of the world's wealth is physically located in urban hotspots? 1.6 billion people directly depend on forests for their livelihoods – this isn't a problem. The remaining 5.4 billion+ people in the world indirectly depend on forests and rural areas for all essentials like food, building material, clean water and technically, also for the air they breathe. The unsustainable, carbon-fuelled and over extractive use of our forests and other natural resources to drive standards-of-living is where the problem arises.

The case here is not only of biodiversity conservation but also of equity & social justice & the opportunity is to bring wealth 'back' to where it belongs – to the forests. It is essential to emphasize here on 'back' because long before agriculture, forests, including the great Amazon rainforest – were large mixed crop farms and historically, humans have helped enhance the biodiversity of the amazon basin through various farming and agroforestry practices. (Ross, 2017)

Building An Inclusive Economy

The current pandemic that we are living through, has brought significant attention to the benefits of rural local economies and their inherent resiliency – albeit in unfortunate circumstances. It is this resilience that the Rural Futures framework builds on, to drive natural capital values back into rural economies and build strong feedback loops to regenerate natural assets. This process begins with the value chain of rewilding, which the current extractivist, linear economy has undermined and needs to be enhanced and strengthened from the first step all the way through.

This means making rural & indigenous communities the primary stakeholders and drivers behind the complete value chain of rewilding – from seeds to nurseries to reforestation and creating livelihood incentives through agroforestry. The first step in enhancing this chain is involving communities in the process of habitat restoration - building community-led programme for restoring local habitats and strengthening local governance systems, while building greater autonomy for communities. The initial steps involved in rewilding enhance the natural capital of the region. Coupled with strengthened local governance and leadership systems, communities improve both income and food security - rewilding and agroforestry optimises the value of farm land and enhances household incomes. Through better governance of natural resources, communities access better opportunities for sustainable businesses and better infrastructure and local support systems for developing sustainable business opportunities.

This community owned and autonomously governed natural capital will be able to drive the delivery of social assets such as access to water, energy, healthcare & education – ultimately leading to an increase in the upward growth of social & economic mobility in the Eastern Himalayas. In India's North

East, an estimated investment of $6166.69 per household provides coverage for water access, energy, healthcare, education & sustainable low carbon housing. With the natural capital earnings on restoration of 4.2 million hectares of land, this would mean coverage of 6.4 million households or nearly 60% of the total population of the North East.

This new nature-centred economy is the only way to bridge the disjointedness that has grown between humans, forests & wildlife and a way forward towards symbiosis.

This framework will create socio-economic mobility in the following three ways of varying outcome lengths:

1) Direct & immediate economic-mobility through stipend-based reforestation – this begins from the early stages of the programme and provides the community with the impetus to partake in the programme by providing a steady income stream through afforestation activity

2) Direct/Indirect & medium-term socio-economic mobility through alternate businesses – local communities would require a certain set of skills to be able to kick-start these businesses and this learning-phase requires approximately 2-3 years based on our experiences across the Udalguri and Sonitpur districts of Assam. Once initiated, these businesses add to the economic mobility initially triggers by afforestation stipends and have the capacity to provide social assets and/or services that are most critical at any given point in time and could also provide for a community fund-pool for use in emergencies or as insurance. The businesses that have worked best in these areas include homestay based tourism, agricultural and allied sectors & indigenous weaves and crafts but the key is to ensure these businesses are wholly community owned & led.

3) Direct/Indirect & long-term socio-economic mobility – this refers to the long-term gain upon natural asset maturation and onset of the sustainable use programme. This has the potential of large & continuous gains for the community provided that its sustainably managed and enhanced.

Natural Capital Employment for Indigenous Youth

A lot of the aforementioned programmes must be led by indigenous youth. With COVID-19 driving a wave of return migration for young people to rural areas, there is an opportunity to build local natural capital economies that generate employment for young people - making them the leaders of the movement towards a rewilding economy. Experiences in the field have shown the Balipara Foundation that indigenous youth hold the power to positively influence and change community dynamics and

their involvement has been critical not only for programme initiation and success but also for exit planning through the creation of youth-led organisations and systems for governance/management.

At the field site under the RuFu lab programme in the Baligaon Miri & Sikom villages, the Balipara Foundation observed that the indigenous youth group that was formed to assist in the implementation of agroforestry initiatives across homesteads, in turn, became ambassadors for the propagation of the model and were key in the scale-out from Baligaon Miri to Sikom. It is groups like these that have the capacity to ensure that impacts not only last but also grow well beyond standard programme durations and without assistance from external factors. This youth group is now officially registered as an entity authorised to independently carry out work in the community - demonstrating the opportunity for youth to be employed in rural communities, while being involved in natural capital regenerative activities.

To build on this opportunity, we need to focus on empowering the youth with the skills that they would require to ensure this continuum. The RuFu programme equips young people with critical skills in citizen sciences, accounting, management and also GPS/GIS mapping. Skills in biodiversity monitoring, data collection and analysis, remote technology management (e.g. drones), ethnobotany techniques and traditional knowledge documentation are other technical skills that youth in rural communities need to be equipped with to power this shift to a natural capital economy. Rural Futures strives to empower indigenous youth to collectively lead the path towards reconciliation of ecology & economy towards socio-economic mobility.

The Expert View - Innovating Adaptation & Mitigation for Communities

Dr. Bremley W.B. Lyngdoh

Founder & CEO - Worldview Impact Foundation

What is the biggest challenge facing rural Eastern Himalayan communities today?

Land is the key factor for sustaining life and creating livelihoods for humans on Earth. The restoration of land is important for achieving the United Nations Sustainable Development Goals because the trees, which grow in soil, are the basis for food, they capture and store excess carbon produced by humans and also contribute to our supply of clean water. The recent global pandemic of COVID-19 has highlighted to many of us how far-removed we are from our food sources, with at least 75% of global supply chains having been disrupted. Land degradation in drylands due to natural processes or induced by human activities, also known as desertification, is one of the biggest environmental challenges of our times, especially

impacting people living in the high deserts of the Eastern Himalayan Region.

Recently, a price tag of $300 billion was advocated by the United Nations Convention to Combat Desertification (UNCCD) as a way to stabilize carbon emissions for 15-20 years, giving the world time to adopt critical carbon-neutral technologies. To put this into context, this is equal to the world's military budget spending every 60 days, to save the majority of the world's critical ecosystems and food producing lands.

What Do We Need To Do?

One of the most effective tools we have for combatting desertification is restoring forest ecosystems and their ecosystems services. Successful, quality ecosystem restoration requires: improved rate and efficiency of mapping, planting and monitoring using appropriate technology on the ground land management, administration, education, community engagement and monitoring by local partners; and the development of an ecosystem service assessment and evaluation standard which supports an ecosystem service marketplace that incentivizes long term economic viability.

The Worldview Impact Foundation (WIF) has been building a cross sector partnership between Governments, NGOs and private sector investors to explore what it will take to plant 1 billion trees, and the role of Nature Based Solutions (NBS) to certify the environmental outcomes, for indigenous communities in India and Myanmar.

However, the successful expansion of the two projects requires further financial incentives. To this end WIF has been working with Earthbanc to design, develop, and implement a new ecosystem service assessment, evaluation standard and using blockchain Distributed Ledger Technology (DLT). This standard will ascertain the annual economic value of ecosystem services delivered by the forests that are restored, which has potential to greatly increase the sustainability of the programme and incentivise reforestation and continuous forest stewardship. The cross sector blockchain and climate change partnership will be addressing the challenges of total ecosystem collapse from serious land degradation that local indigenous communities living in northeast India and southwest Myanmar are facing before the DLT can be replicated in North Africa, and the Sahel Region. These issues are important given that these vulnerable communities face food insecurity and lack sufficient resilience to climate change impacts.

This is just the beginning. Explorations are also underway to enable refugee camps across Africa to offer work to refugees participating in large-scale ecosystems and land restoration, and supporting bioregional regeneration of agriculture and horticulture. The relationship

between land restoration, climate change abatement, and human security are now increasingly recognized in the mainstream discussion around climate. To reverse the cycle of environmental and social destruction globally, there is a need to invest in land restoration and communities at the very local level by adopting NBS. As a benefit all will experience more robust supply chains that provide the food, feed, and fibre we depend on.

What Can The Technology Do?

The mission of Earthbanc and its partners is to create land regeneration at scale by financing the planting of the equivalent of 1 trillion trees in order to stabilise our climate for generations to come. As a company with first-hand knowledge and experience in land restoration, Earthbanc understands the social and financial incentives that support regeneration at the local level. Investors – small and large – are becoming increasingly earth-conscious. Earthbanc connects investors and underserved borrowers in emerging markets that need access to capital, and have the capacity to green our supply chains. In short, Earthbanc is a one-stop-shop to help global capital flow into land regeneration efforts in a way that deeply respects both people and planet.

Earthbanc's solutions address climate change by restoring degraded ecosystems rapidly on a large-scale basis while working with local indigenous communities to rebuild peace, ensure that forests remain intact while building a robust green economy that the communities can be a part of. Earthbanc is uniquely positioned to be the world's first blockchain banking platform to measure and bank soil carbon, and to connect those working the land with fair compensation through data-powered carbon sequestration, measurement, and verification services. Imagine local farmers being able to 'bank' their carbon (stored in the soil and trees of their land) within a banking platform that financially rewards them for their land stewardship and restoration activities. By taking part in Earthbanc, anyone can actively play a role in regenerating the planet, supporting communities, enabling local producers, and empowering ethical financial organizations to expand their impact.

How does this help communities?

Earthbanc's innovative financial solutions create a regenerative economy that restores livelihoods through financial inclusion whilst restoring the planet's critical ecosystems. The model builds collaboration for the design and development of a business model to enhance the rate, scale and economic viability of ecosystem restoration in affected areas in India and Myanmar adopting NBS thereby improving and protecting the Natural, Human and Social Capital value of the target ecosystems. Only active participation and discussion with all

concerned stakeholders on the process for measuring the economic benefit of the ecosystem services generated by ecosystems in the target communities in India, Myanmar and elsewhere can unlock the full potential of this programme.

To help prevent future disastrous ecological collapse, reverse the trend and provide significant economic benefits to local communities, this collective approach will bring synergetic benefits to vulnerable indigenous communities in India and Myanmar, who have been suffering the impacts of climate change and conflicts for years:

1. Provide better food security with restored and secured breeding habitat.
2. Sequestrate CO2 from trees and reduce escalations of climate change.
3. Create high value-added livelihood opportunities to disadvantaged indigenous communities by reducing poverty especially among women by raising orchids, collecting Non Timber Forest Products and bee honey, and providing other new sources of revenue.
4. Save lives and improve environmental health for thousands of people via adaptation to climate change.
5. Contribute to social and economic development of a peace building process in the target countries.

Connected Interconnectedness

Rural futures is about re-scaling the economy back to a human level. We must be able to envision a community in which the goods required are produced locally wherever and whenever possible. This does not only have a positive impact on the economies of local communities but also creates systems that are self-reliant and do not suffer from disruptions in global supply chains. This of course also reduces communities' dependencies on carbon-heavy products that stem from materialism and not from need. An important point to note here is that rural & local does not mean isolation but rather inclusive, self-sufficient & one that can proliferate without being completely dependent on factors outside the specific region. (Localization, 2020)

This does not mean eliminating trade, but rather fostering the needs of the region towards increased self-sufficiency. This means investing in building local economies and markets and creating access to these markets across demographies - from young people to women. With greater socioeconomic mobility and diverse agroforestry livelihood options, communities local demand strengthens, further opening up local markets for communities to sell their produce: meeting their own needs as well as turning a profit by selling to other communities.

For this change to really happen at an impactful scale, it will have to be supported through international cooperation driving a global movement to enhance community autonomy & wealth, build local governance structures and curb the accumulation of wealth and concentration of investments in urban centres. The Balipara Foundation's indigenous communities and community run enterprises (eg. medicinal plants, mushrooms, textile, among others) have shown that a more sustainable & equitable way forward is possible - and that this really is the best solution not only for the planet but also for people!

A Naturenomics™ Policy - The Way Forward:

- Indigenous communities must not only be stakeholders in conservation programmes but own them. Policies changes should ensure that communities own and/or have rights to harvest from forest land for successful long-term efforts in natural capital enhancement and subsequent UBA delivery.
- Policies must allow for and promote bottom-up systems of autonomous governance of natural resources – by and for indigenous communities. This does not mean complete isolation and removal from state or national government regulations but rather a micro & sub-state level system of governance which is cognizant of indigenous cultures & values.
- Policies for agriculture must promote agroforestry/agroecology practices as the sustainable way forward by incentivising it through subsidies & setup research centres to promote dynamic customisation of models based on geographies.
- In the era of integrated policies, we must ensure that rural areas receive differentiated importance and customized policies/action plans.

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Business Unusual

– Ankit Jha
Expert views from –
Shankar Venkateswaran

Nature Based Solutions in the Eastern Himalayas

The scale at which current conservation efforts have been happening is very small and scattered and hence the scale of the impact is not as significant as it needs to be, to halt declining biodiversity and shrinking ecosystems. An up-scaling of restoration and conservation efforts calls for advanced approaches to ecological restoration, nature conservation, and addressing the issue of resource equity (Cohen-Shacham, et al., 2019). Implementing the **Natured based Solutions (NbS) framework** is the right step towards bolstering the conservation and restoration efforts. According to a 2019 report from the Food and Land Use Coalition (FOLU), by 2030 Nature Based Solutions (NBS) could account for as much as one-third of the solutions to climate change. IUCN defines Nature-based Solutions (NbS) as "actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits" (Conti, et al., 2018). In simpler terms, NbS are solutions for nature and inspire from nature that aim to enhance socio-economic-ecological well-being.

NBS can be categorised into five broad categories:

i) Ecosystem restoration approaches

ii) Issue-specific ecosystem related approaches

iii) Infrastructure-related approaches

iv) Ecosystem based management approaches

v) Ecosystem protection approaches

Fig 1: Nature Based Solutions. Source: IUCN

Such varied approaches help ecosystems achieve their natural health which consequently optimizes their service provisioning. NbS aims to address issues such as food security, climate change, water security, human health, socio-economic development and disaster risk and develop long term sustainable solutions.

The Himalayan region is prone to various natural disasters like earthquakes, floods, extreme climates, mass wasting, soil erosion, forest fires due to its geography (Khawas, 2007). An increase in the development initiatives across the Himalayan belt has affected the carrying capacity of the region's

fragile ecosystems. The Eastern Himalayan (EH) region is the most affected by climate change, habitat loss, species loss, and infrastructure expansion. As a consequence less than 25% of the Eastern Himalayas' old forests remain intact, with some 163 native species considered globally threatened (WWF). Building of dams, melting of glaciers, yearly floods, loss of habitats and livelihoods are some of the recurrent issues and have an adverse impact on the communities living in the region.

While the fact that Eastern Himalayan region is a rich biodiversity hotspot is often celebrated, it is equally alarming as this means that certain species of flora and fauna endemic to this region if once lost can't be brought back. Nbs is the right stepping stone to conserve and enhance the already existing natural capital within the region. The Eastern Himalayan region could adopt the **infrastructure related approach** that incorporates existing or restored natural landscapes, such as floodplains, wetlands, and forests. Such projects typically involve thinking above and beyond the traditional conservation approach of "protect and preserve" for a more integrated practice of "ecosystem enhancement".

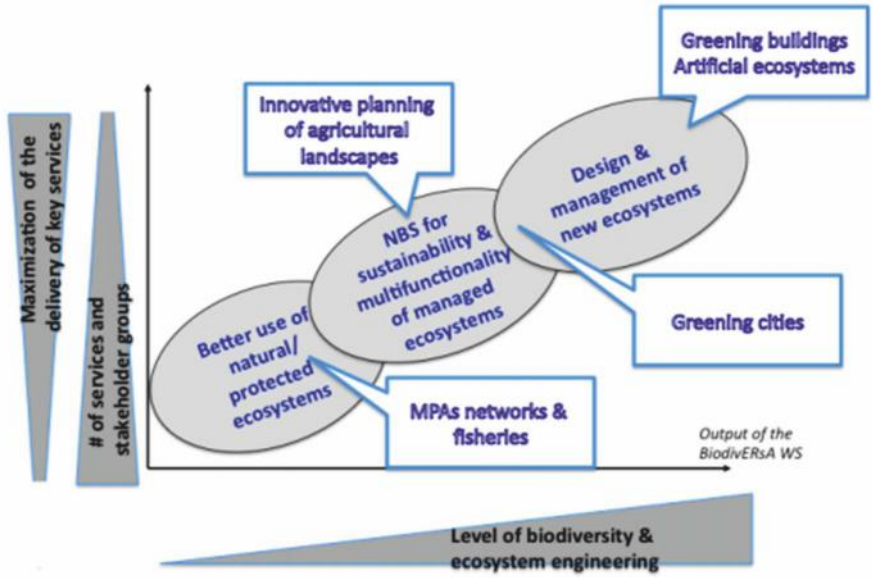

Fig 2: NbS located within different landscapes (Balian, Eggermont, & Roux, 2014)

Managing landscapes such as a forest or wetland strategically provide wholesome benefits such as carbon sequestration, flood control, or water filtration that help achieve the overarching goal of ecosystem optimization (Conti, et al., 2018). According to a 2019 report from the Food and Land Use Coalition (FOLU), by 2030 NBS could account for as much as one-third of the solutions to climate change.

The fundamental principles of NbS are also the driving force behind India's Nationally Determined Contributions (NDCs) under the **Paris Agreement** as they focus on adaptation and mitigation efforts.

The ecosystem restoration approach in the Himalayas like cultivating valuable medicinal plants instead of wild harvesting them and restoring ancient water management systems could be an effective strategy. Similarly, maintenance of the coastal ecosystem through mangrove conservation will help reduce the impact of increased storm surges and sea level rise as a result of climate change.

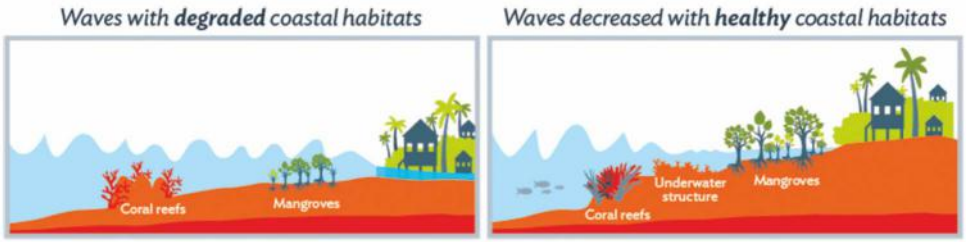

Fig 3: Impact of NbS on coastal health

Evidence in mangrove reducing the inundation area (in percentage) from India (47%), Bangladesh (15%), Vietnam (54%), Pakistan (58%), China (84%) illustrate the importance of careful review of the site selection for mangrove plantation in reducing the storm surge (Blankespoor, Dasgupta, & Lange, 2017).

The North East is blessed with natural wetlands that act as a water filtration system and reduce the risk of flood. NbS for the protection of natural wetlands and the introduction of constructed wetlands in appropriate areas will help improve water quality, drainage and help protect the biodiversity of these wetlands. This will also prove to be a boon for the region which is primarily agriculture dependent which provides livelihood support to 70 % of the region's population (Patel).

Some NbS business entrepreneurship models for the Eastern Himalayas -

1) The North East region is rich in traditional Sericulture practices because of the suitable climatic conditions for the production of popular silk types viz. Mulberry, eri, oak, Tasar and Muga. The region can utilise NbS practices like habitat enhancement through afforestation for sericulture practices as the blueprint for developing socio-cultural entrepreneurship models. Sericulture is known to be an agro-based labour-intensive industry. It can help generate employment opportunities and lead to economic upliftment of the local communities. Promotion and growth of sericulture is closely tied with the handloom and handicrafts industry as well which finds its place in the rich culture of the region. Making apparel products like saree, shawls and garments have tremendous potential for economic growth as these exotic products have a good demand in foreign markets.

2) The Eastern Himalayas have a huge reservoir of bamboo resources. India is only second to China in bamboo production and about 66% of the growing stock is concentrated in the North Eastern states of the country (Adkoli, 2002)[1] . Bamboo is one of the most abundant and environmentally-

[1] Adkoli N.S. (2002). Indian bamboos in early 21st century. In Bamboo for sustainable Development. Edited by Kumar, A.; Ramanuja Rao, I.V. and Sastry, C.B. VSP and INBAR, 17-25.

friendly and sustainable resources available in the NorthEast Region, which is not being used to its full potential. NbS solutions to promote bamboo based entrepreneurship can go a long way in ensuring environmental and economic security for the region. With growing awareness regarding carbon footprint and sustainable lifestyle choices amongst common citizens, there is an increasing demand for more durable alternatives to plastic. One of the main replacements has been everyday use products made out of bamboo. The region can very well fill in the demand with its bamboo surplus and focusing on bamboo based industries.

3) The scope for expanding tourism within the region is another important feature which needs to be projected as a sustainable business model for the region. With beautiful landscapes and picturesque locations, NE region is popular amongst tourists from around the world. Sustainable tourism can act as a regenerative industry if it is based on the principles of NbS. Community managed landscapes that utilise NbS principles can be perfect tourism spots for enriching cultural and environmental experiences. 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. 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.

Business, Indigenous Communities and Nature in Interdependence

According to IBEF, India is home to about 650K villages, with a total population of about 850 million. These consumers make up for about 70% of the population and contribute to around half of the country's GDP. The potential of rural innovation has for long gone untapped because of a lack of the right platforms for rural entrepreneurs to showcase their innovation. Realising the vast potential in rural India, many stakeholders are slowly shifting towards pushing innovation and entrepreneurship in local markets. Looking at the changing consumption trends and the potential of rural India, private companies are offering large and attractive investment opportunities.

The North East Region is the centre for tea production with tea gardens spread across the region which account for almost 52% of the total tea produced in India every year.

Likewise other industries like the textile and handloom industry dominate the region and home-based weaving is a common phenomenon (NOW, 2020). For instance: Assam has more than 40% concentration of handlooms out of the total handlooms in the North East and contributes to around 85% of global Muga silk production. Similarly, Manipur has the highest number of handicrafts units as well as the highest number of artisans in comparison to the other North East states and has an immense talent pool to be able to expand. The Ministry of Textiles is also implementing projects worth Rs 1050 cr. for Handlooms, Handicrafts, Sericulture, Apparel and Garments etc. which falls under the textile sector in all the eight states of Northeast Region in line with the **"Act East"** policy of the government (TNTNews, 2017). These industries could be promoted and more investments be made in to enhance the human resource and natural capital. Creating a local economy has three benefits upfront- 1) opening up of employment avenues for the local communities, 2) strengthening of the consumer base for the businesses 3) building a robust self-sufficient local economy.

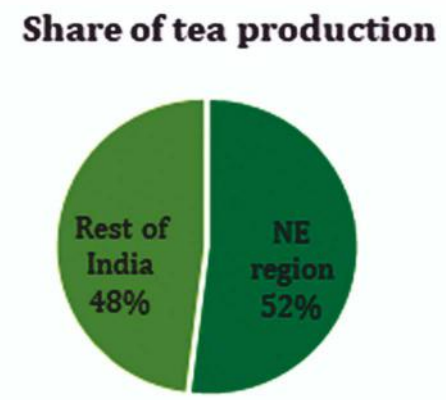

Fig 4: The North East's share of tea production

By liaising with local artisans and local markets, big businesses can track their supply chains end to end, allowing them to build greater sustainability and minimize their ecological footprints. This would build self-sustaining local economies, while reinforcing sustainability across the broader business spectrum. Such a move can help boost employment in the region. With a change in the employment levels, a range of other standard-of-living metrics such as disposable income, increase in consumption rates would change. This could also lead to proliferation of new small businesses thus promoting the spirit of entrepreneurship within the local indigenous communities.

There is a growing trend and demand for locally made goods. Customers find it a way to minimize their carbon footprints, reduce the burden on the environmental resources while also supporting local businesses. Such initiatives could go a long way in further strengthening the brand image of big businesses and in turn helping small businesses prosper. Businesses could work with indigenous communities to apply traditional knowledge, skills and designs in product development. This would help give an authentic touch to the products and would help communities strengthen their identities in the outer world.

For instance- Sericulture has been an age old industry of Assam putting it on the world map for high quality silk since ancient times. The craft of weaving goes along with the production of silk. ***Muga Silk*** from Assam which is renowned for its extreme durability and superior quality can be a game changer

for the local artisans. Promoting smaller artisans by investing in enhancing silk & weaving technologies, as well as creating the pool of raw resources for silk through reviving traditional practices and cultivation, can lead to a more diversified stream of income for communities, while reducing dependencies on imports for materials and building on the cultural strengths of communities for business opportunities. It can also be an effective way to promote nature based tourism in the area where these communities live.

By backing the communities to take lead, businesses can push for more environmentally friendly products in the bigger market and help create consumer awareness towards a sustainable lifestyle.

	Extension of Existing Network	Hub-and-Spoke Model	Local Influencer Model	"Feet on Street" or Village Entrepreneur Model	Piggybacking on or Collaborating with Other Networks
PROS	• Easy to execute • Does not require the creation of new distribution channels • Can launch quickly	• Introduces flexible options for channel structure • Allows opportunities to aggregate demand and stock a wide variety of goods	• Involves little dependence on existing network • Brings elements of trust and local relevance • Distributors become extended brand ambassadors	• Gives deepest reach possible • Creates loyalty in markets sensitive to word of mouth • Can work as a long-term option	• Requires low investment; fixed cost is shared • Ideal for seeding the product in rural markets
CONS	• Requires additional investment from existing network • Existing issues with distribution remain • Incremental approach	• Requires additional investment	• Takes time to become productive • Can pose potential channel conflict • Needs careful monitoring and support to avoid misrepresenting company brand and operations	• Needs a high level of micromanagement • Managing large-scale operations is a challenge • Available talent may be scarce	• Focus gets diluted • Requires aligning company goals with those of partners • Not a long-term option

Involving local communities, entrepreneurship opportunities and promoting artisanal goods, could also lead to industry localisation. This would also help the communities ensure their economic and social well-being as it would create more local jobs. This would also mean a lesser need to develop grey infrastructure as local shops tend to require less infrastructure and need low maintenance.

Localization is in. Even companies that operate on a global level are recognizing the value of local markets and sustainable supply chains. Making the supply chain more sustainable is also a sensible long-term investment as it would not only reduce carbon emissions that might be associated with transportation or supply chain costs, save millions of dollars but also tap into local talent and solutions. In a market largely driven by profit maximization, developing an ethical and sustainable supply chain structure (SCS) is essential. A sustainable supply chain structure for differentiated products impacts the ability of producers in rural communities to profit and therefore contribute to the wellbeing of their communities. Product differentiation can help in ensuring that the producers, not retailers, gain value from agricultural products.

Businesses are slowly mainstreaming sustainable practices along the supply chain from product development to final consumption by consumers. While we have all these sustainability trends like

building green buildings, promoting organic farming, reducing carbon footprint and making conscious choices in picking products, the immediate action should ideally involve investment into restoration and enhancement of already existing natural capital stocks. Agro-businesses should aim to create a more sustainable agroforestry based employment avenues like agri-silvicultural systems, agro-horticulture that are biodiversity friendly and help build micro-ecosystems within farmlands helpful for the overall productivity of the farmlands. It would also solve the issue arising from monoculture plantation and give the land much needed nourishment and time to regenerate and optimize to its natural state.

Fig 6: Benefits of a sustainable supply chain
Source: Accenture Analysis

Businesses that are natural resource dependent, such as, the agri-food sector and water-intensive industries are highly vulnerable to natural shocks. As a result of frequent extreme weather conditions, business operations get disrupted which further affects global supply chains across the economy. Such risks also threaten the equity of rural communities. COVID-19 has demonstrated why we need to promote local businesses and keep a check on human resource drain from the region as urban centres couldn't take the burden of the migrants and they were left lurching in panic and hunger. With business localization, we can minimize the climate risk, enhance resilience and help the communities create an economic buffer for them.

The Energy Revolution Towards Net Zero

Today, fossil fuel companies are the biggest polluters, producing and selling fossil fuel products and degrading the fragile ecology of the Eastern Himalayas. They use inhumane techniques to extract resources from the mining process. Rathole mining is a popular but a deadly means of earning livelihood for the communities living in Meghalaya. Children are sent inside these illegally constructed mining sites and they risk their lives to earn a few bucks. As a result of blooming oil and gas drilling in the Northeast region, the ambient air quality has been deteriorating and has come under scrutiny by environmentalists and local communities. Release of contaminants in air and water has been a persistent problem for the region since the times the oil and gas fields were found here. This extraction has come at the cost of the loss of forest, floral-faunal species and polluting of natural water bodies.

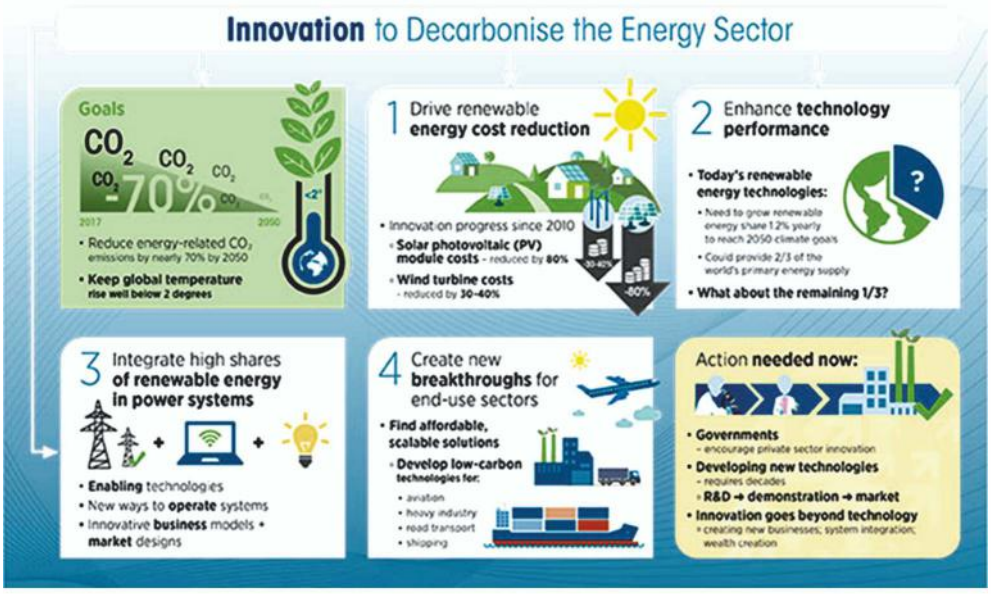

Fig 7: Innovation to decarbonise the energy sector. Source: IRENA

While countries have at numerous occasions signed and agreed to environmental treaties aimed at a collective effort to reduce the burden on natural resources, industries keep polluting and destroying the environment with their unsustainable business strategies. Various agencies, scientists, and climate activists have been advocating the need for a switch to cleaner and efficient renewable energy sources, with a specific focus on hydropower being driven in the Eastern Himalayan region. But trans-boundary natural bodies are one the severely contested issues in contemporary times. A huge dam being built upstream in China or Tibet would deprive the communities living off river water downstream in Assam and Bangladesh. It affects the lives and livelihoods of these communities. And the control over a river also leaves the communities prone to untimely floods as seen every year across Assam. There is a multidimensional loss for these communities as their agricultural lands get eroded, cattles drown, fishing communities have to risk their lives to practice their profession. Similar has been the tragedy of the ethnic Kachin community of Myanmar who risk losing their ancestral land due to China proposing to restart the $3.6 billion dam building on Irrawaddy River. It would significantly affect the agricultural, fishery industry which is the lifeblood of millions dependent on the region.

Under the Act East policy, there have been efforts to bring more and more developmental projects in the region and convert the region into an industrial hub. This would mean a greater demand for power which would come at the cost of already fragile ecosystems in the region. The Eastern Himalayas relies heavily on hydroelectric power and the countries aim to take advantage of this resource. But,

creation of dams without due environmental impact assessment has caused widespread protests in the region especially by the local indigenous communities. The reason for such a huge uproar has been the loss of livelihood due to the submergence of arable lands and loss impact on the local biodiversity.

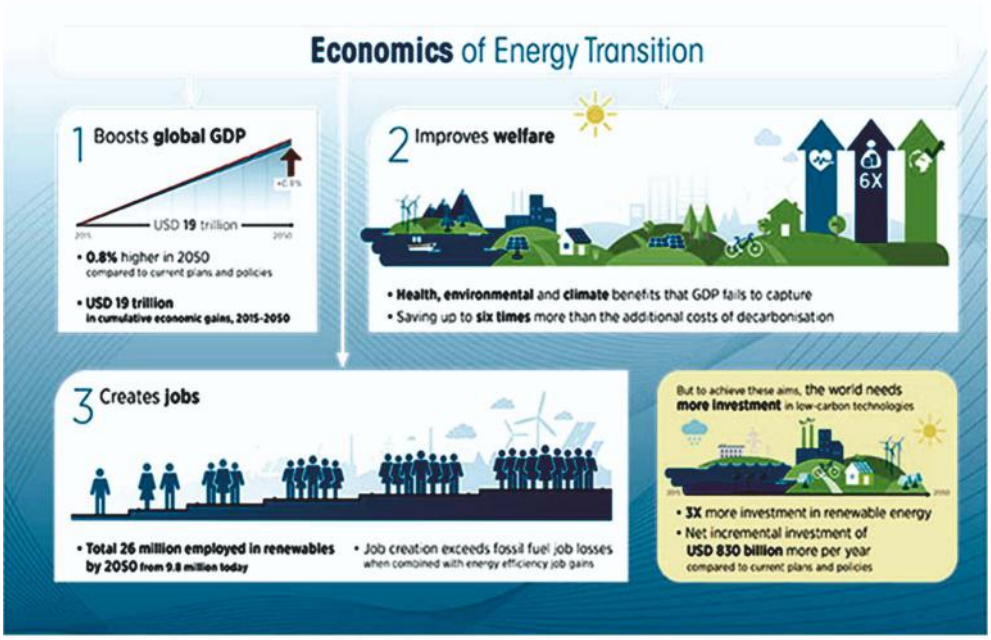

Fig 8: The Economics of Energy Transition. Source: IRENA

With COVID-19 causing unprecedented disruptions in our lives, we need to think of adopting even more green strategies. As the Indian economy faced the brunt of the lockdown, the energy sector was severely hit with industrial activity falling to a historic low. It was only as a result of integrating variable renewable energy into the power system that the grid stability could be maintained despite the large scale energy usage halted on 5 April 2020. But the learning from the incident needs to be taken seriously and focus should be on promoting green growth and lowering carbon dependency. This should take centre stage in the policy and planning processes.

As part of the Intended Nationally Determined Contribution (INDCs) under the U.N. Framework Convention on Climate Change, India has committed to increase its share of non-fossil fuel based electricity by 2020. As a part of this commitment, India intends to achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030 with the help of transfer of technology and low cost international finance including from Green Climate Fund (GCF).

INDIA	Summary of pledges and targets	
PARIS AGREEMENT	Ratified	Yes
	2030 unconditional target(s)	33% to 35% below 2005 emissions intensity of GDP by 2030 [413–445% above 1990 by 2030 excl. LULUCF] [146–161% above 2010 by 2030 excl. LULUCF]
	2030 conditional target(s)	Non-fossil share of cumulative power generation capacity 40% by 2030 [371–373% above 1990 by 2030 excl. LULUCF] [126–127% above 2010 by 2030 excl. LULUCF]
	Condition(s)	Transfer of technology and low cost international finance incl. from GCF
	Coverage	Not specified
	LULUCF	Additional (cumulative) carbon sink of 2.5–3 GtCO2e by 2030
COPENHAGEN ACCORD	2020 target(s)	20–25% below 2005 emissions intensity of GDP by 2020 [216–245% above 1990 by 2020 excl. LULUCF] [52–66% above 2010 by 2020 excl. LULUCF]
	Coverage	Excluding agriculture sector
	Condition(s)	None
LONG-TERM GOAL(S)	Long-term goal(s)	Per capita emissions never to exceed those of the developed world

Fig 9: India's pledge and targets as part of the Paris Agreement.
Source: Climate Action Tracker.

While the call to reduce emissions and keep the temperature below 1.5 degree rise over pre-industrial levels seems aspirational, India plans to reduce its emissions intensity by 33 - 35% between 2005 and 2030. It would be safe to say that this is an optimistic turn moving into the next decade as the world witnesses unprecedented rising temperatures, raging wildfires, super cyclones etc. Achieving a global net zero is a critical step towards mitigating the effects of and adapting to climate change. The North Eastern Region and the Eastern Himalayan Region can play a significant role in helping achieve this target because of the vast wealth of natural resources it is blessed with.

Accessibility and efficiency of cleaner energy is a key factor for development and improving the quality of life. The North East has the potential to be a power-house of renewable energy for India and our neighbouring countries. As of September 2020, the Northeast region of the country had a total installed capacity of 4637 mega-watts (MW) for electricity generation. Fossil fuels constitute the majority of this usage at around 56% of the installed capacity of which coal is 770.02 MW, gas is 1776.96 MW and diesel is 36 MW. The renewable energy constitutes 44 percent of which hydro is 1685.50 MW and other renewable energy sources are 368.53 MW (Authority, 2020).

While the number suggests that there is a considerable amount of energy being derived from renewable sources, it will take a lot of work to go completely fossil independent and use renewable energy for meeting the energy demands. But harnessing the power of hydro resources can be a potential game changer for the North East as it will decrease the region's dependence on fossil fuels and the need for energy import in line with the INDCs. In terms of hydro power, the North Eastern Region has the potential of about 58,971 MW i.e. almost 40% of the country's total hydro potential (NEEPCO, 2020). According to the North Eastern Electric Power Corporation Limited only 1,727 MW (about 2.92%) has so far been harnessed as of July 2020. The balance of about 93.17% is yet to be exploited as additional 2300 MW of hydro power are under construction.

Together, Sikkim, Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland and Tripura account for almost 40 percent of the total hydropower potential of the country. But instead of building hazardous mega dams, more sustainable smaller hydro power plants could be built implying indigenous practices and traditional knowledge systems (Vagholikar & Das). In total, SHP accounts for 257.35 MW of installed capacity, or 98 per cent of the renewable energy, installed in the region. According to MNRE, the region has a potential to install 2.3 giga-watts (GW) of SHP plants in around 1,200 sites with the maximum potential in Arunachal Pradesh (Authority, 2020). A coordinated effort from the Eastern Himalayan countries can help in building a more sustainable future for the region. Greater energy connectivity amongst the North East Indian states, its South Asian neighbours will lead to sizable economic, environmental, and social benefits for the Eastern Himalayan Region. Under the Act East Policy, this energy connectivity will play a crucial role in integrating the North East to the Asia Pacific as envisioned paving the way for socio-cultural exchange, economic flexibility, and scope for further economic integration. This cross border energy exchange will be a great opportunity for ensuring the energy security of the region.

Innovating for natural assets

Of late, big corporations across the world moving towards more sustainable ways of doing business has happened primarily because of two reasons-

i) They realise that the resources are finite and the over dependence on fossil fuels to derive energy and run their business won't sustain in the coming future because of price rise, resource depletion and stringent laws. Dependency on limited natural capital also runs the risk of a disrupted supply chain due to degrading natural assets. This is an inevitable truth for the sectors with natural asset based material dependencies. These range from energy to water and oil, gas and mining. Natural calamities like earthquakes, tsunamis and pandemics like COVID-19 disrupt the services emerging from the natural resources and have a significant impact on the business operations and their profitability.

ii) There is a growing trend amongst consumers to look for sustainable solutions to their everyday needs. Businesses that are willing to "go green" and adopt a sustainable business strategy have a better chance of creating a strong impression and acquire a larger share of the market.

Businesses recognize that these factors would be deciding elements for a corporation's longevity in the times to come. Hence, many companies are coming up with innovative solutions to help build a green future. Some of the noteworthy examples are as follows-

Innovation aimed at promoting 'digital conservation': This has seen a growing demand in the

scientific community. The possibility of accessing terrains that have been out of human reach promises to surprise us with information about undiscovered floral and faunal species. It also helps in strengthening the traditional framework for monitoring ecosystem health. For instance- Working along SilviaTerra, an AI for Earth grantee, Microsoft AI deploys satellite imagery and machine learning to assess forests. The algorithm, powered by AI, greatly reduces the need to physically survey forests. Such digital monitoring systems could help derive precise data and enable conservationists and policy makers to chart out better plans to save the wild.

Nature inspired designs to enhance ecosystem services: another ambitious project of a lot of businesses that wish to adopt environmental friendly means to scale up. Walmart, a retail giant worldwide in 2018 transformed the way we have understood the process of pollination by bees. The corporation patented the idea of a Robobee – a self-manned drone for pollinating crops equipped with cameras and sensors. This tool also makes it possible to detect agricultural problems and get more sufficient control over the Walmart food supply chain that, consequently, minimizes food waste.

Carbon capture and storage (CCS): one of the most talked about innovations these days especially within the ambit of Corporate Social Responsibility. It is a means of separating, collecting and dumping (storing) CO2 underground or in the sea when fossil fuels are burnt. One of the examples in India is that of a plant at the industrial port of Tuticorin which is capturing CO2 from its own coal-powered boiler and using it to make baking soda.

Seed dispersal using drones: Swiftly becoming a go to practice for administrations across India. Recently, the forest department of Haryana deployed drones to disperse five lakh seeds in an area of 100 acres. Drones were used to shower seed bombs in the Aravallis before the onset of monsoon. Such drives are conducted using geo-location of blank patches and low-density areas that are mapped using satellite imageries. The data generated is then directly fed into drone software for auto plantation, which is easier and has more precision.

Block chain technology: This new technology can play a transformative role in nature conservation and building sustainable and transparent supply chains. It can help communities by promoting direct transactions and fair prices for the products. Blockchain is a collectively managed ledger in which participants take turns recording information of the product development, movement and consumption. It is monitored through a peer-to-peer network. Any alteration can only be done through participant consensus and new entries change the older entries thus making it almost impossible to change the data. Blockchain automation can help reduce human involvement and the errors and resource consumption that comes with it. Farmers especially from developing countries can greatly benefit from this technology by providing digital payment solutions with zero rates. Encrypted security keys also make e-commerce for farmers possible while reducing their transaction costs.

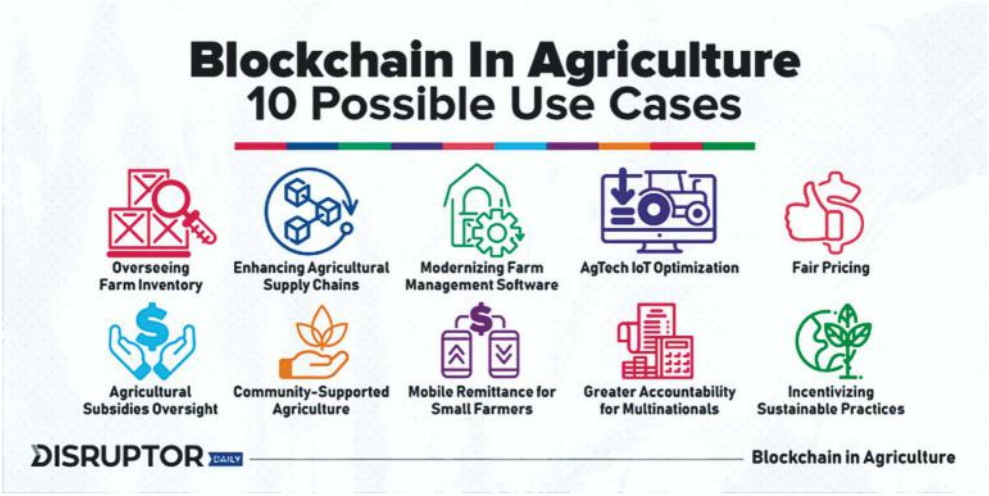

Fig 10: Blockchain in Agriculture. Source: Disruptor Daily.

The Eastern Himalayan region with its significant dependency on agriculture, difficult terrains and dense forests can deploy these innovative technologies to conserve and enhance its natural assets and ecosystem services delivery. Businesses can help communities learn essential skills pertaining to digital conservation in mapping resources and sustainable resource extraction for subsistence purposes. MSMEs can use blockchain technology to enhance their production and delivery capabilities and ensure transparency and profitability. Carbon capture can be a way for communities to earn livelihood by conserving the old growth forests and afforestation activities as part of the Debt for Indigenous Rights principle. This would be beneficial for the ecology as well as the society as they re-develop a healthy synergetic relation.

The Expert View: Business responsibility index

By Shankar Venkateswaran

Head, ESG Engagement, ECube Investment Advisors

There is increasingly a consensus that as a part of their social contract, businesses must conduct themselves in a manner that not just minimises harm but also positively impacts society and the environment. This is the spirit behind the various terms that are interchangeably used to describe this expectation – Sustainability, Environment Social Governance or ESG (the term preferred by the investor community), Responsible Business Conduct or RBC (my preferred term), Corporate Responsibility, Triple Bottom Line (TBL).

Once one accepts this premise that businesses are responsible for their actions and accountable to their stakeholders, the obvious question is what constitutes RBC? There are several

frameworks that provide useful guidance and directions to businesses on what actions must take to be considered responsible or sustainable. These include India's own National Guidelines on Responsible Business Conduct or NGRBC of 2019 released by the Ministry of Corporate Affairs.

Since public disclosure is a key element of RBC, most of these frameworks also provide a set of indicators and formats that businesses can use to disclose their actions on RBC. There are several global "non-financial" disclosure frameworks such as Global Reporting Initiative, UNGC's Communication on Progress, Integrated Report as well as Focused reporting frameworks such as TCFD and CDP. In the Indian context, there is the just-released Business Responsibility & Sustainability Report or BRSR, based on the NGRBC.

While RBC reports provide information about the performance of a business, it does not say how good or bad this performance is. Users of reports have to come to their own conclusions to determine their actions vis-à-vis such businesses. At present, the financial community – investors, lenders, insurers etc. – are the big users of such reports and they either feed this information (and other publicly available information) into own proprietary assessment frameworks or depend upon third-party rating agencies such as MSCI, S&P, Dow Jones Sustainability Index, Sustainalytics and others to provide such analyses.

It is in this context that the need for another index to measure RBC must be seen. At present, most third-party indices are in the nature of private goods in that they are typically not in the public domain and are available to a user for a fee. Further, the methodologies used to arrive at them are also not disclosed and so a user has to take them as is and cannot tailor-make it. And finally, the coverage of businesses by these agencies is relatively small. So, there is a case for an index that is the form of a public good so that it can help retail customers to who RBC matters to decide whether or not they want to but products of a particular business, communities to assess whether to "allow" a business to operate in their vicinity and government procurement to develop and implement policies that give preference to companies that display RBC.

In the Indian context, the NGRBC and its accompanying BRSR can over time form the basis for an India Responsible Business Index that is available freely and publicly to all users.

The foundations of the NGRBC and BRSR both lie on the fundamental principle that any business entity incorporated with an objective to earn profits has certain responsibilities towards its stakeholders. These stakeholders include business partners, employees, consumers as well as the natural environment which forms the basis for capital accumulation. Businesses operating in and around sensitive ecosystems need to strictly adhere to these guiding principles of NGRBC and BRSR and keep a check on their business

practices from sourcing of raw material to production and delivery of products. The North East houses numerous and some of the oldest coal mining operations, crude oil exploration and petroleum refineries and some of them are located in biodiversity rich regions. Earlier this year, Dibru-Saikhowa National Park and Dehing Patkai Wildlife Sanctuary were in news due to all the wrong reasons following the oil-well blowout and uproar over coal mining within the sanctuary boundaries, respectively - both the result of poor environmental clearances.

If the NGRBC and BRSR guidelines are strictly followed, it would become imperative for the businesses to take precautionary measures so that the natural environment and the communities are not endangered. The more the businesses are made to be transparent; the cleaner will be their operations as the need for transparency would come along with the aspect of accountability towards the law of the land, state, communities and the environment.

Naturenomics™ Policy – Catalyzing Business Unusual

- Private finance needs to be leveraged for investments in habitat restoration and natural capital generation programs. With respect to the Eastern Himalayas, investments need to be made for enhancing the agricultural productivity and community livelihoods through different community based economic models.
- Businesses should aspire to develop a bio-economy framework that accounts for the costs incurred by natural assets within the value chain. Business policies should be stringent on paying equal amount of compensation that needs to be made by the businesses profiting from these costs. Any business dependent on forest and its resources should voluntarily work towards re-wilding the forests to ensure continuous delivery of ecosystem services.
- Reconfiguration of business structures in a way that the end goal also aims to achieve sustainability rather than just profits. Businesses should consider a social value based economy that puts community at the centre while also being able to achieve sustainable growth.
- Moving away from the GDP based parameter of economic growth towards an integrated growth index with ecological and environmental indicators. These ecological and environmental indicators should consider natural capital as an important currency within the economic structure.
- Developing indices to measure responsible behaviour of business and strictly following guidelines like the National Guidelines on Responsible Business Conduct (NGRBC) or Business Responsibility & Sustainability Report (BRSR).

- Incentivize equitable linkages between businesses and local economies to generate sustainable and equitable value for both businesses and communities.
- Better market and business linkages for local skilled artisans, including investment in generating entrepreneurial opportunities and their products need to be marketed at a bigger level.
- Businesses need to incorporate scientific measurement across their value chains and identify and deploy technology to manage natural capital cross-sectorally across their supply chains. Closer linkages with communities and their traditional ecological knowledge, skilling them to deploy this technology can help businesses better manage biodiversity and natural capital, while creating new and quality employment opportunities for communities.
- All forms of development activities within the Eastern Himalayan region should ditch grey infrastructure and adopt more sustainable green infrastructure based on NbS principles. Businesses should adopt greener alternatives to building infrastructure, energy and mobility.
- A simultaneous effort needs to be made with a business's aiming to bringing in policy changes for responsible business conduct and the state pushing for grassroots reforms to empower community on the economy front.

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Designing Interdependence

– Joanna Dawson

Holistic Growth: People, Ecology, Economy

The COVID-19 crisis has reframed the conversation around growth, as countries wake up to the realization that continued ecological degradation will turn crises like these from moments of rupture into the new "normal". The push for net zero emissions has led countries to reconsider growth and recovery plans, with the European Union, Japan, South Korea and China revealing serious plans for decarbonization of their economies and a move towards green, renewable energy and growth.

However, there remain critical gaps even in this conversation about green recovery, green new deals and the global green new deal. Estimates by the World Bank point to the sheer scale of the expansion required to achieve a low carbon transition: to meet the 2 degree goal by increasing the global renewable mix to 44% of total power generation, the world will require:

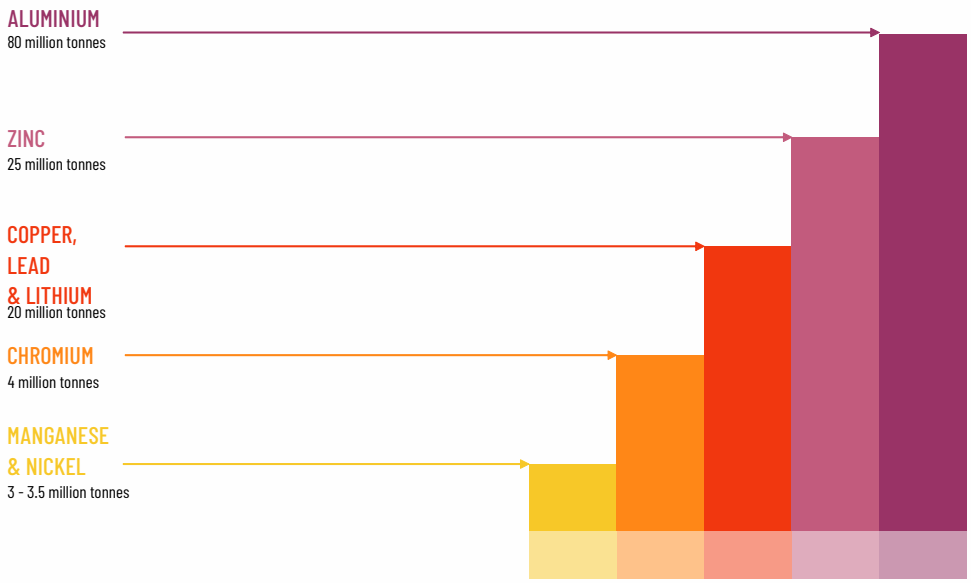

Fig 1: Increased metals extraction
Source: World Bank, The Growing Role of Minerals and Metals for a Low Carbon Future (2018).

With most of these metal reserves concentrated in the global South, the rapid expansion of renewable energy capacity to meet projected energy demands (based on current demands) will drive an expansion of mining across the region. Mining already drives 1% of the world's deforestation, though its overall deforestation impact is estimated to be 10 times larger if areas adjacent to mining-leased areas are also included (Sonter et al, 2017). A large-scale expansion of mining for rare earths to power a renewable transition will increase the pressure on fragile ecosystems across the global South, many

overlapping with its biodiversity rich tropical forests. The recent push towards hydropower in both Sikkim and Arunachal Pradesh, disrupting critical riverine ecosystems and in the case of the Dibang dam, threatening 270,000 trees across 1150 hectares of forest in Dibang valley, are examples of what an unplanned scenario of renewable energy capacity expansion to drive growth might look like for ecosystems.

Beyond the GDP growth paradigm

The drive for growth, defined as income growth, globally has been the key driver in the destruction of ecosystems globally. While various Green New Deals have recognized the need to transition away from carbon, the limited focus on achieving this through infrastructure growth has unintended consequences for ecosystems – dangerous, as the world faces a biodiversity crisis widely accepted to be the sixth extinction event. A growing body of evidence suggests that even current growth will still, by necessity, drive an increase in emissions and that to meet the basic criteria of limiting emissions to the 2 degree rise will require global GDP growth to slow from 1.93% to 0.45% (Schroeder & Storm, 2020) - or similar to GDP growth during the COVID crisis and lockdowns.

Historically, income growth has been tied to improvements in quality of life and standard of living, reflected in indices such as the *Human Development Index* where income per capita at purchasing power parity is one of the defining indicators for tracking socioeconomic mobility. However, this focus on income as an indicator of human well-being limits thinking and action to identify alternate routes to achieving human well-being through effective distribution of resources, particularly in the global North where overall per capita consumption rates and ecological footprints are outsized compared to those of countries in the global South.

Degrowth economists argue that true sustainability can be achieved globally through a reduction in consumption and "growth" while increasing over quality of life. Modelling of green growth, social equity and degrowth scenarios found that while green growth scenarios enable countries to meet climate goals, overall social inequality increases. Only under conditions of degrowth (i.e. reduced consumption and exports, increased wealth tax and increased public spending), coupled with policies targeted at social equity such as a job guarantee or overall working time reduction, could a balance between social and environmental wellbeing be achieved (D'Alessandro et al, 2020). In countries in the global North where waste footprints outsize consumption footprints in the global South, a reduction in overall consumption reduces stressors on the environment while not drastically impacting overall standards of living.

The Cost of Growth

The COVID-19 crisis has shown just how far short GDP measures fall, in categorizing overall human

well-being. The global GDP has grown at an average of 3% annually for the past decade, but this growth has come at a cost. Over 31% of new disease emergences over the past decade are linked directly to deforestation in tropical countries (EcoHealth Alliance 2019) – driven by agribusiness, mining and infrastructure development. In June 2018, the world combatted major outbreaks in six of eight disease categories under the WHO's current definitions. Overall trends suggest that the world has entered a period of increased disease activity over the past decade (WEF, 2019). Meanwhile, climate change is radically altering the spread of diseases and at current business as usual scenarios, an estimated 1 billion new people will be at risk of contracting dengue, zika and chikungunya as temperatures warm enough to change habitat patterns for disease-carrying mosquito species (Ryan et al, 2019). The limitations of GDP growth are evident: despite rising incomes, risks and threats to human health continue to rise because of rampant ecological degradation and the burgeoning climate crisis.

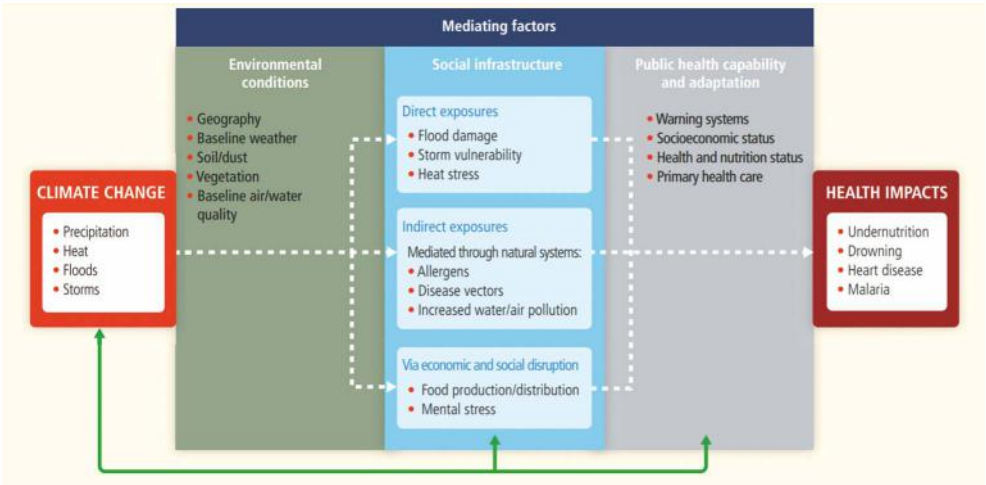

Fig 2: Modelling indicating the three primary pathways in which climate change affects disease prevalence, transmission and human health globally. (Source: Smith et al, 2014)

Income growth can no longer be the only indicator used to define progress on key goals. The Sustainable Development Goals gesture towards this understanding by its inclusion of parameters on responsible consumption, climate action, life on land and life on water. Achieving a true landmark shift towards sustainable consumption and economic patterns that meet the threefold challenge of social equity, economic wellbeing and environmental balance, requires a complete rethink of the widespread use of GDP, to move beyond the limitation of the Human Development Index and integrate ecological indicators into modelling for a truly holistic approach to human wellbeing and development.

Ecology – The Missing Link

The Sustainable Development Goals index complements the Human Development Index and GDP by adding components focusing on natural resource use, biodiversity protection and climate action to drive sustainability action. However, its selected indicators are often contradictory in their aims and measurement, poorly measure the actual phenomena in question (Coscieme et al, 2019) and its use of ecological indicators are limited in scope. Despite its claim to measure sustainability, the SDG index still overwhelmingly centers consumption driven growth (Coscieme et al, 2019). Of its 322 indicators, only 29 relate to the use of natural resources, biodiversity protection and climate action. From these, only 2 pertain directly to absolute natural resource use (versus relative natural resource use) (Eisenmenger et al, 2020). Others have critiqued the SDGs as being, at best, sub-goals towards a broader goal of efficient allocation, fair distribution and staying within planetary boundaries. Costanza et al (2016) propose an additional array of indicators – a Sustainable Wellness Index – to track built, human, social and natural capital flows and which can be modelled into the future under different scenarios (compared to the SDGs which can only track what has already occurred).

Sustainable Development Index

The Sustainable Development Index (Hickel, 2020) attempts to determine the current relationship between human development and ecological efficiency, measured by carbon emissions and overall material resource footprints. Using the human development index against these indicators, it reveals the current ecological impact of global achievements in human development. However, this relationship does not capture the relationship between overall human well-being and ecological health. It also offers little by the way of predictive ability, or broader ecological data that could yield data-driven policy decisions.

Doughnut Economics

Doughnut Economics proposes two narrow boundaries within which development meets basic human needs for education, healthcare, energy, food security, social equity, peace & justice, housing, income & work, while remaining between planetary boundaries – i.e. ecological thresholds on climate, pollution, biodiversity health, land use & ecosystem health. First proposed by Kate Raworth (2012) as a pathway towards a "safe and just space" for people, research by O'Neill et al (2018) drawing on these principles reveals the gap, globally, in walking the fine balance between human development and ecological wellbeing. In their research, European and North American nations which win on human development indicators lose sorely on living within ecological boundaries. According to their data,

countries within the Eastern Himalayan region – India, Bangladesh, Myanmar and Nepal – live largely within ecological boundaries, but fall short on most human development parameters.

While doughnut economics provides a framework for modelling the impacts of potential development pathways, it still formulates growth through the income/consumption paradigm in which natural capital is valued only when it is converted into a commodity. In other words, the doughnut paradigm is useful for reviewing the present growth and driving mitigation and adaptation within current growth trajectories for greater sustainability. But it does not offer a model in which ecology can be fully centred, or a pathway to a model where human development and ecological regeneration can be linked together.

Gross National Happiness Index

The gross national happiness index is perhaps the most comprehensive and rigorous attempt to synthesize people, ecology and economy in an in-depth manner that extends beyond footprint measurements or carbon emissions on the ecology front. In Bhutan, this index has played a critical role as a policymaking tool to drive development decisions seeking to unite ecology, social wellbeing and economic growth for balanced national development. It is also one of the few indices that attempts to include cultural well-being In including ecology in a meaningful fashion, Bhutan remains one of the few countries that has successfully been able to manage its growth in a sustainable fashion, remaining carbon negative.

The index tracks sufficiency across 9 domains of indicators that measure everything from psychological wellbeing, to ecological health, to cultural diversity and community vitality. The cut-off for "happiness" is set at sufficiency across 66% of the indicators used in the GNH index (Ura et al, 2012). However, the integration of ecology, people and economic growth still ultimately drives a form of economic growth that is linked to natural resource consumption. Data from the Happy Planet Index indicates that Bhutan has a far larger ecological footprint than Bangladesh, with considerably less progress on social indicators (2016). Analysis by Climate Tracker shows that Bhutan's dependence on hydropower risks becoming stranded assets as climate change accelerates in the region and further concludes that its commitments under the Paris Agreement are only sufficient to meet the 1.5 degree goal, when viewed from a renewables transition, energy security and natural asset management perspective.

The limitations of ecological integration in the index, particularly in taking an in-depth approach to ecology – particularly in objectively measuring and tracking land use change, water resource use and management and long-term climate risks. The index's weakness in systematically tracking overall biodiversity and ecological changes and risks using objective and scientific measures versus self-

reporting measures, makes it difficult to track and drive a forward-looking systematic approach that centers an ecologically regenerative growth model – i.e. one that restores forests, replenishes watersheds and builds businesses with LEWWAC-driven value chains.

Integrating People, Ecology & Economy

Existing indices accept prima facie the assumptions of development thinking, evolved from the tenets of modernization theory of the 60s. In this model of thinking, progress is still measured largely in terms of consumption – which as noted above, depends on two things:

1. Continuous economic growth in absolute, income terms

2. The continued consumption and conversion of natural resources into commodities

However, this model is no longer feasible when faced with both the biodiversity and climate crisis. The net zero transition still requires restoration of forests and natural assets to compensate for irreducible emissions from aging infrastructure or difficult to transition industries. Powering the renewable transition calls for rapid expansion of mineral extraction which disproportionately impacts natural asset rich nations in the global South and risks becoming as environmentally and socially destructive as coal mining today. A growth and development index which still quantifies growth in terms of limitations on natural asset use versus natural asset restoration will continue to fail biodiversity, ecosystems and the role that natural assets can play in climate change mitigation.

Alternative cultural perspectives such as *buen vivir or ubuntu* offer a fresh way of thinking about human well-being and, specifically, the role and position of ecosystems in overall human well-being. Ubuntu, for example, conceptualizes people as a part of nature rather than as discrete entities as contemporary thinking tends towards. The holistic nature of this approach means that people are seen as part of a complex web of interlinkages with nature and therefore, part of a system of balance, not extraction for consumption. Buen vivir, an idea found across multiple indigenous communities of Latin America, visualize well-being as a question of sufficiency and interdependence with nature: maintaining a relationship of complementarity, reciprocity and integration where growth through consumption vanishes entirely.

The indigenous communities of the Eastern Himalayas have their own traditional practices and knowledge which have been powering interdependence between people and natural assets for the past few centuries. The World Bank, studying traditional forest management practices across Nagaland, Arunachal Pradesh and Tripura found that where communities retained control of the land, forests were healthier and more diverse (Poffenberger et al, 2006). These practices range from community forest management, to the creation and maintenance of sacred groves, to the old

traditions of jhum cultivation – where there still is limited evidence showing that its slash and burn cycles have diminished from 5-7 years to 2-3 years. These traditions and alternate perspectives on human growth and wellbeing the region need to be captured in any metric on human development for interdependent growth beyond just income growth.

A transformative index on these lines would have to capture:

1. Ecological destruction – land use change, deforestation rates, biodiversity loss, land degradation, chemical pollution
2. Carbon – carbon emissions, carbon sequestration, % change in carbon emissions, progress towards carbon neutrality
3. Ecological health – biodiversity prevalence, soil health and fertility, forest health, water quality, air quality, % change in air & water quality
4. Positive biodiversity changes – forest land restoration, overall land restoration, species biomass & prevalence, downgrading endangered species risks
5. Cultural ecological aspirations – access to traditional materials, tenure for traditional land management, security of sacred & cultural landscapes, intactness of sacred & cultural landscapes

Existing evidence from multiple sites around the world indicate a positive relationship between creation of universal access to basic social services and a reduction in natural resource exploitation. Provision of free access to a clinic in a community in Borneo found that overall deforestation reduced significantly, saving over 27 square kilometers of forests and generating $65 million in carbon emissions savings (Jones et al, 2020). In Malawi, introducing an automatic water pump in a community on the fringes of a national park significantly reduced instances of human-wildlife conflict with crocodiles and hippos, while also reducing food insecurity from over 90% to less than 45% of people being unable to grow food for themselves (Allgood et al, 2019).

The interlinkages between natural asset regenerating economies and human wellbeing through access to the basic services and assets for meeting basic human needs are still being understood today. But understanding this relationship, and identifying the possibilities of building regenerative, interdependent relationships between the two will go a long way towards developing a roadmap for greater sustainability. A transformative measure to drive this would have to include:

1. Access to Universal Basic Assets & Services
    a. Food security – nutrition, malnutrition rates, crop diversity, access to food, affordability of food

b. Energy – per household access to renewable energy sources, energy type distribution

c. Water – water quality, water source, distance to water source, universal water access

d. Education – access to schools, students per teacher, functionality of schools, nature based education courses & skills, graduation rates, universal enrollment

e. Healthcare – access to primary healthcare, clinic access, access to doctors, mental health awareness, access to basic mental healthcare treatment (therapists &/or medication), universal healthcare access, transmission of ethnobotany

f. Waste Management – access to plastic recycling facilities, waste water management systems, % waste collected

g. Transformative living spaces – quality of housing, susceptibility to flooding & other risks, carbon efficiency & footprint, sustainability & footprint of materials used, affordability

h. Democratic services – civic literacy & awareness, freedom of speech, political & institutional representation, access to local decision-making institutions, gender representation on local decision-making institutions, natural asset governance mechanisms, common pool resource management systems

I. Cultural freedom – legal/formal recognition of traditional governance, institutional support for traditional governance, freedom to practice religions, access to education on native languages, access to support for cultural arts

j. Human rights – gender equality, child rights,

2. Sustainable Livelihoods & Opportunities

a. Income – nature-based incomes, % increase in incomes through nature-based employment, income security

b. Jobs – access to high quality & low-carbon jobs, employment in sustainable sectors

c. Sustainable Business – number of sustainable businesses, total income of sustainable businesses, type of sustainable businesses/sectors

Including ecological and environmental indicators under these broader headings related to social and economic development can help drive ecological centred-growth across the many different sectors. For the Eastern Himalayan region, which has been shaped by the migration and cross-pollination of cultures across centuries, it is vital to capture the scope and relationship of indigenous communities, their common pool natural resource management practices and their traditional practices and

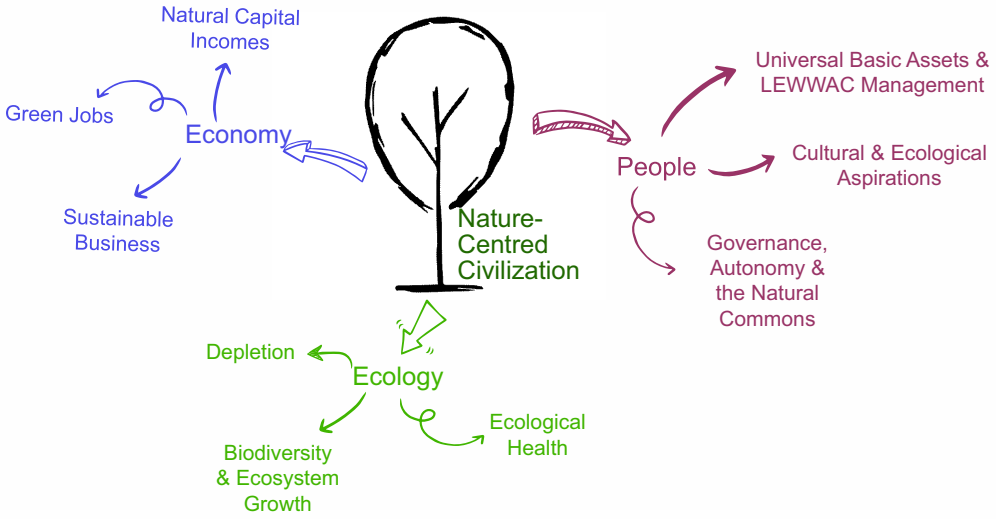

Fig 3: An alternate index for measuring growth
Icon attribution: Tree by Tatyana for the Noun Project

knowledge. For many of these communities, ecological health is tied in to overall wellbeing – from the ecosystems services nature provides for their primarily agrarian livelihoods to their cultural relationships with nature vis a vis sacred groves. The erosion of this landscape is not just a question of ecological insecurity, but one of overall human insecurity. A better index capturing all these complex facets is required to visualize and transition towards an alternative to income-based growth: one which enhances ecological security, while building social, economic and cultural well-being.

Naturenomics™ Policy - A New Index

1. Integrate ecological indicators in all development and growth measures & indices as central driving indicators, not just limited purely to ecological dimensions but including the business-nature and human development-nature interface

2. Incorporate the cultural dimension of human and nature relationships as a formal aspect of human well-being

3. Recognize the interrelationship between human wellbeing and ecological wellbeing among forest-fringe communities and actively invest in building this wellbeing through investment along social development dimensions rather than focusing on the enclosure and eviction model

4. Incorporate alternate cultural visions and aspirations regarding human wellbeing in reformulating a regional vision for growth

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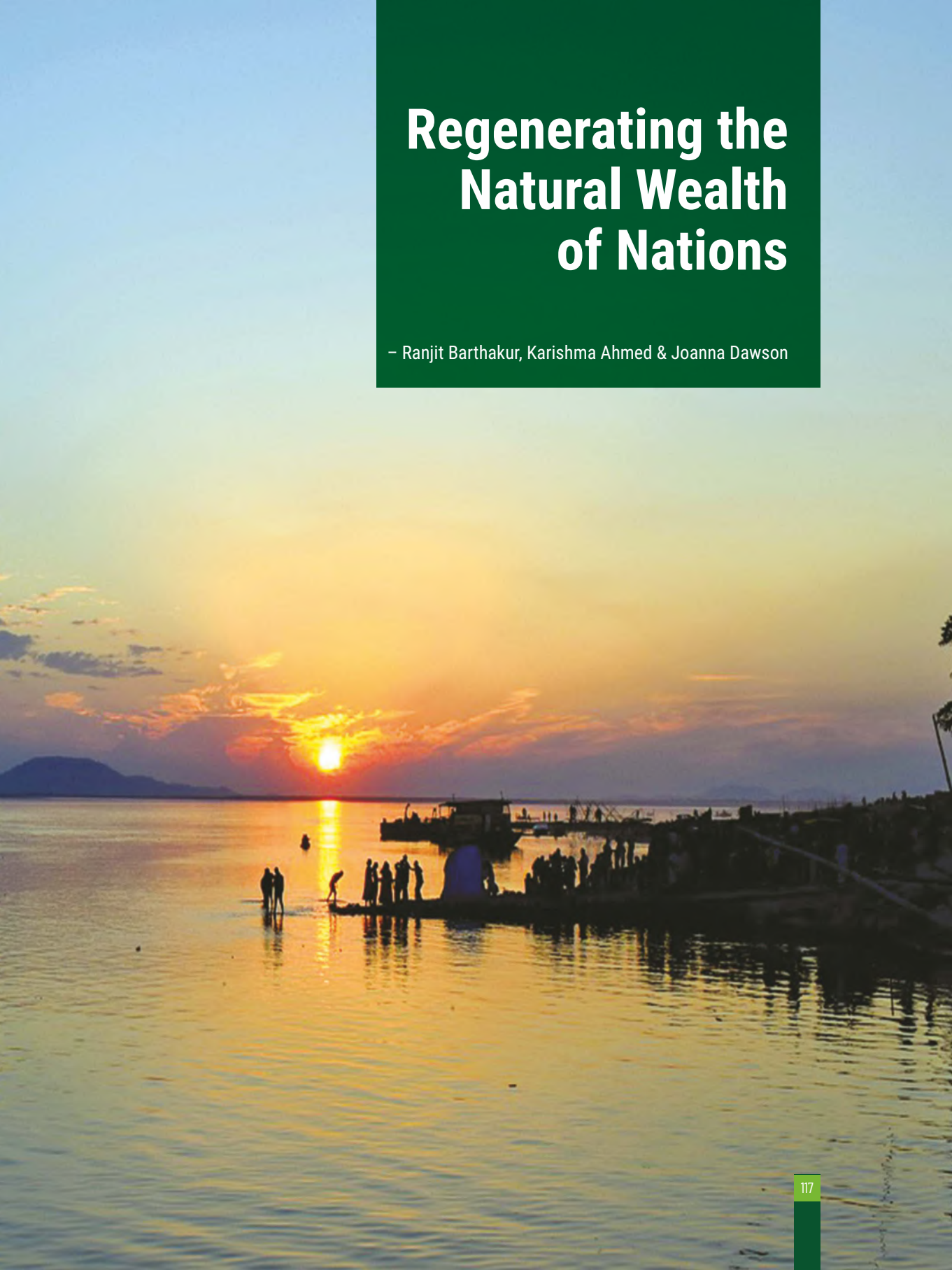
Regenerating the Natural Wealth of Nations

– Ranjit Barthakur, Karishma Ahmed & Joanna Dawson



Adam Smith's celebrated treatise on the economy *An Inquiry into the Nature & Causes of the Wealth of Nations* is widely acknowledged to be one of the foundational texts of modern capitalism today. It presents some of the most basic and accepted assumptions of our economy: the rational self-interest of people as economic actors, the division of labour and the free market coupled with the minimization of the hand of the state in economic affairs.

The theory of economic growth through free markets emerged at a time of privatization and enclosure of the commons in the United Kingdom and the emergence of private property as a key form of capital. In British colonies like India, this principle of enclosure of common lands for profit was instrumental in the development of the forest management systems that still remain the backbone of forest management today. The creation of reserve forests and protected areas, which cordoned off indigenous communities from lands and resources they once freely accessed, is the direct legacy of the imperial need for timber in the expansion of Empire's railways, navies and infrastructure.

However, the fundamental premises of Adam Smith's treatise were formulated solely on the basis of observations of a particular class of people within Euramerican society. By the 1920s, anthropologists around the world had discovered a different motivator for economy in cultures as diverse as indigenous communities in the North Americas to the aboriginal people of the Pacific islands: reciprocity. In this economic framework, economy is one element of a complex web of interdependent relationships between different cultures, kinship groups and ecologies (Hann, 2006). David Graeber in his book, *Debt: the First 5000 years,* covers case studies showing how local economies have historically functioned absent the barter principle, with people directly sharing with each other on the basis of need or through non-formal systems of debt. A mounting body of evidence from behavioural economics and psychology shows that people don't purely behave in their self-interest, but act altruistically or with reciprocal expectations more often than not - the keystone of social cohesion.

A similar mounting body of evidence from archaeology, anthropology and ecology demonstrates the historical role that people have played in creating the forests we see today. Studies in the Amazon, for example, suggest that the Amazon began its life as a giant food forest maintained by historical Mayan civilizations and indigenous communities in the region. The prairie of the North Americas was managed by Native American communities, just as controlled burns by aboriginal communities in the Australian bush created a unique ecology that supported greater biodiversity. Collective land management historically has been linked, therefore, with greater biodiversity and ecological wellbeing.

The neoliberal consensus that emerged during the 1970s built on Adam Smith's classic principles of rational economic self-interest and the free market, birthing the international commitment to liberalization, privatization and globalization. Today, this has devolved into a race to the bottom in the name of profit: subsidies to ecologically destructive sectors including fossil fuels, the enclosure of

public lands and commons to private entities for consumption-based growth, deregulation fuelling degradation and pollution and globalization weakening communities as businesses cut expenses by finding the cheapest labour and the cheapest natural resources around the world to fuel their continued growth and profitability. Rising consumption has fuelled runaway growth, but it has also fuelled the destruction of our planet and its fragile balance for life.

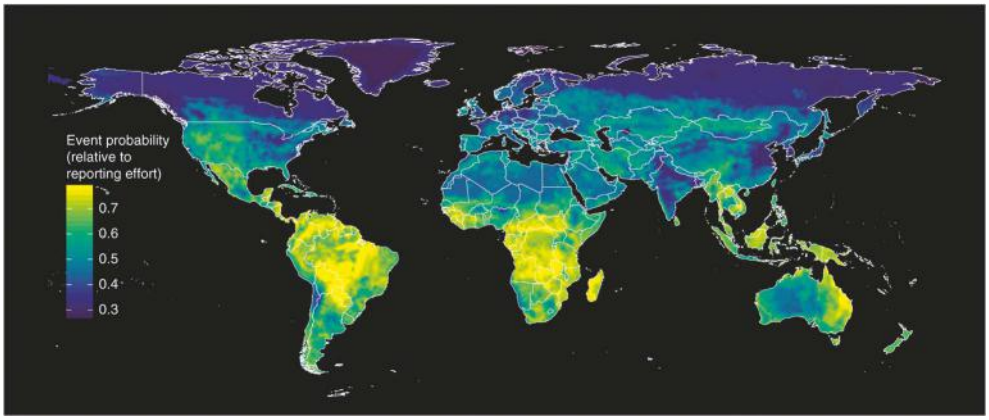
Forests for All

Forests are the key to life on earth today, providing clean air, food and water security, fuel, medicines and livelihoods to billions globally. Indirectly, their ecosystems services are the silent machinery that keep critical economic systems functioning – enriching soil, preventing floods, habitats for pollinators, preventing pathogen spillover, regulating rainfall and keeping the planet cool. For the Eastern Himalayan region, forests are a lifeline for its communities. Over 80% of the region is rural and depends on agriculture or forestry, in one way or the other, for income. Much of this is direct dependence via forest-dependent livelihoods such as non-timber forest produce, timber or fuelwood. In mountainous regions, estimates suggest that over 30% of household consumption expenditure depends on community forests. In total, forests add $4.7 trillion annually to the global economy both directly through its natural resource value, and indirectly through ecosystems services (Costanza et al, 1997).

Despite this, the world is losing its forests rapidly. Since 1990, over 80 million hectares of primary forest have been lost: an area larger than Turkey (FAO, 2020). The Eastern Himalayan region is facing rapidly accelerating forest loss: in 2019 net forest loss in the North East counted for 74% of forest loss in India (FSI, 2019). Degradation and deforestation also contribute to diminishing climate resiliency – the various states spread across India, Myanmar, Nepal and Bangladesh that fall under the Eastern Himalayan landscape are both areas that are most vulnerable to climate change, as well as some of the regions with the least capacity to cope with the challenges of climate instability. Poverty and dependency on natural assets contribute to the vulnerability of communities in the region.

Worryingly, the biodiversity rich region of the Eastern Himalayas also faces increasing zoonotic disease risks particularly as deforestation significantly raises the risks of spillover occurences across the region. Nipah virus outbreaks in Bangladesh have been tied to the degradation of bat habitats, bringing them into human habitats and transmitting directly to humans through contaminated palm sap (Gurley et al, 2017). Bat hunting traditions in Nagaland, similarly, have been linked to Ebola-like breakouts in isolated villages in the region.

The ongoing lives and livelihoods debate raises pertinent questions about the future of the region – and the future of its forests. In the zero sum game of forests versus profit, forests have been on the losing end, despite their role in enriching and protecting lives.



(Source: Allen et al. (2018) Global hotspots & correlates of emerging zoonotic diseases.)

However, this zero sum game framing needs to be rethought in the decade's context of climate change and rising pandemics. A recent study estimates that investing a mere $9 billion annually in protecting existing tropical forests around the globe will effectively mitigate the astronomical economic losses posed by a global pandemic, simply by reducing the risk of virus spillover. At a time where lives versus livelihoods are being debated, protecting and restoring forests presents a simple and cost-effective way of reconciling the two if restoring forests are reframed and understood as an investment for the future.

Moreover, protecting these forests offers unique opportunities to create nature-driven equality, while adapting and mitigating the worst challenges posed by climate change.

The Opportunity

There is an estimated 2 billion hectares of land available for restoration globally, largely concentrated in temperate and tropical countries. Of these, tropical countries face the highest risks for degradation as commercial agriculture for beef, soy, oil palm and rubber expands. 25% **of this land, or 500 million hectares, is suitable for complete rewilding.**

Today, **both the formal and informal forest sector employ over 86 million people globally,** many of them in small & medium enterprises (SMEs) (FAO, 2020). Directly investing in **sustainable forest management globally will create an additional 16 million jobs** by 2030. Broader investments in restoration agriculture can create 191 million jobs through enhanced productivity and restoration of degraded land (WEF, 2020).

Degradation of agricultural land today costs the global economy $6 trillion, or 75% of the total value it adds to the global economy (World Bank, 2019). **Rewilding both forests and agriculture can generate $3.5 trillion in direct business opportunities** through technology for restoration, sustainable timber and sustainable non-timber forest produce.

Natural capital could form the regenerative backbone of the Eastern Himalayan region, however tapping into this opportunity requires a concerted shift towards a nature-positive policy that unites climate and environment, agricultural and business policies for a coherent strategic path forward.

Investing in the future

Evidence from China and Chile showcase the dangers of poorly defined afforestation policies. In both countries, the focus on green cover creation resulted in an overwhelming focus on commercial plantations, often with species that were non-native to the region – disrupting biodiversity and exerting pressures on the overall ecosystem. In Chile, diverse forests were replaced by these plantations, as the plantation trees could be processed and sold at a profit (Heilmayr, 2020). In China, while overall green cover grew by 32% between 2000 – 2015, natural forest cover shrank by 6.6% (Hua et al, 2018). In both cases, the land was turned over to agricultural plantation use, driven by profit.

Similar risks are posed by India's compensatory afforestation policy and its draft national forest policy, both of which privilege the non-specific metric of green cover expansion, carbon absorption and the involvement of private players who lack the incentives to protect existing natural forests. Reliable and independently sourced information on the afforestation undertaken under this policy is scanty. However, the evidence that exists on afforestation schemes in Sikkim and Arunachal Pradesh reveals that funds remain underleveraged and were redirected into plantations that did not exist (World Rainforest Movement, 2019).

Indigenous women in the Eastern Himalayas are the biggest losers in this equation, as the dissolution of community rights in favour of individual landholdings privileges men. Coupled with forest degradation – which increases their work burden as they are forced to travel further to access NTFPs – and the commercialization of NTFPs and forest products – with income accruing to men as they have better access to markets – women face increasing income insecurity.

The expansion of swift-growing monoculture plantations in the name of creating carbon sinks runs counter to the science. The regrowth of natural forests captures carbon significantly better than monoculture plantations do (Cook-Patton et al, 2020). Instead of destroying the region's standing natural capital, we must protect it and invest in protecting it. Vitally, we must invest in rural communities for a real transition towards a Naturenomics™ future with jobs in rewilding, as well as build the support structures enabling them to manage these natural assets effectively - through secure tenure, secure access and recognition of rights to manage traditional landscapes and natural assets.

Increasingly, policymakers are recognizing the role indigenous communities have played historically in managing fragile landscapes. The global call to protect 30% of all ecosystems by 2030 includes a

concerted move to include indigenous biosphere reserves as a critical tool for managing biodiversity. The Eastern Himalayas, though divided by borders, has a storied history of migration and cross-cultural pollination, with communities often having shared norms and practices of managing common pool natural resources. The region also consists of ecoregions that stretch across borders and requires cross-border cooperation to manage them effectively and enhance their biodiversity and natural capital for the future. This site of shared natural heritage and cultural practices offers an opportunity to turn the Eastern Himalayas into a biosphere for cooperative natural asset management for Naturenomics™.

The key is to drive investments in regenerating and restoring these natural assets and away from ecosystem destruction - a fundamental rethink of current investment principles and practices. Vitally, countries across the Eastern Himalayas must come together to collaborate on the shared challenges of the biodiversity and climate crisis. A siloed approach can no longer suffice, whether in tackling a complex problem, or in building community collaborations for managing landscapes in a just and equitable manner.

A Leap Forward - Collaborating Across Borders for Our Commons

The case for collaboration extends beyond the confines of the Eastern Himalayas. The global biodiversity, climate and pandemic crisis has created an imperative for tackling a systematic response for a transition that must be green. The destructive diseases outbreaks demonstrates that radical adaptation and behavioral change could happen in a very short period, and to ensure a planet that is habitable for future generations the step has to be taken now with the understanding that what happens in the next couple years will command the course of history.

While the impacts of the COVID-19 crisis could cause greenhouse gas emissions to fall by as much as 4–7% this year, any respite is likely to be temporary. The road to tackle the climate crisis, and socio-economic consequences, will require a holistic approach to economic recovery, and one that positions countries to take a competitive standing in the global green economy of tomorrow. Already an estimated $199 billion of public money has already been pumped into the fossil fuel industry to keep it afloat during the COVID-19 crisis with no conditionalities attached (Energy Policy Tracker, 2020). A meaningful transition away from fossil fuels will require a complete cut of this kind of subsidy and spending, and a rechanelling of this money into regenerating natural assets.

The COVID-19 crisis has opened a green investment opportunity to reshape economies in line with the goals of the Paris Agreement and create a resilient, more sustainable world. OECD countries have

pledged $100 billion annually in support to less developed nations to combat the challenges of climate change - however much of this support is being driven through loans, not grants, and not all of it is being allocated to the most vulnerable regions of the world. Similar patterns are playing out in the Eastern Himalayan region, where development funding has traditionally been poorly allocated. As a result, the financial burden of dealing with the climate and biodiversity crisis is borne most heavily by the countries and people who have contributed the least to the crisis - in fact, very often it is these people who hold the largest natural capital reserves and by definition, are the very reason that life on this planet is still possible.

This is the time to create a redefined paradigm with ecology at the center-stage, putting people, ecosystems and biodiversity first. The Eastern Himalayas possess the richest standing natural assets and natural capital of the countries it intersects - India, Nepal, Bangladesh, Myanmar, China and Bhutan. Of all the nations, Bhutan has been the only country to take an active interest in investing in preserving its natural assets and regenerating them for the future. However, even Bhutan faces threats today, as it seeks to bring its public debt under control as it graduates from the Least Developed Country category.

The inverted pyramid of valuation, in which natural capital is the least valued item in our balance sheets needs to change: in the new paradigm of the future, Arunachal Pradesh with its lush forests must be valued in natural capital terms as one of India's richest states. Rethinking how we use our natural assets and nature capital, can help us spark a revolution to bring ecology back to economy – the Naturenomics™ vision through our principle of Rural Futures.

Ecology is Economy: From a Degenerative to a Regenerative Future

Surveys suggest that despite the widespread economic plight, the pandemic has increased public consciousness of the fragility of natural systems and their importance for human well-being. In this light, integrating environmental and inclusiveness aspects into recovery and stimulus measures is a mutually beneficial strategy, as it allows governments to progress towards meeting environmental goals and commitments while at the same time boosting economic activity in the shorter term, and reducing inequalities. When well designed and implemented, green stimulus measures can generate income, create jobs, improve well-being for all and build resilience.

According to the World Economic Forum, **transforming the food, land and ocean use system has the potential to create business opportunities worth almost $3.6 trillion and 191 million new jobs over the next 10 years,** if the right policies are put in place. Shifting from industrial to regenerative agroforestry also is immediately feasible and would allow us to sequester carbon in the soil at a rate

that is sufficient to reverse the crisis. Moreover, doing so would turn a profit, enhance economic and environmental resilience, create jobs, and improve wellbeing in rural communities.

Taking a leap forward

The global economy is interconnected, the ecological and financial crisis in one country affects markets not just in another but all around the world. Today the world is more intertwined than it was ever before and requires joint and coordinated action at all levels unseen before this pandemic. The road to recovery with commitment to collaborate and circularity will open the window for dotting the plans and steps in enhancing Ecology in Economy.

But to get there, we must make a path from reality (the broken world) to the horizon (the vast potential of our immense natural capital and a post-scarcity natural capital economy). Global climate commitments to meeting net zero by 2050 and the 1.5 degree celsius limit on temperature rise still condemns whole nations across the equatorial region to suffer inhospitable temperatures, drought and desertification - called climate apartheid by some groups. Global cooperation has to extend beyond miniscule funding that barely covers the costs of a real transition: it means a restructuring of international trade towards greater localization especially in food production systems, the scaling down of excess consumption and waste that drives natural capital destruction and natural capital rich countries, restoration of the commons and public lands for communities, and international regulatory mechanisms for curtailing and halting deforestation and the destruction of biodiversity.

We must make choices and outline goals very clearly with the vision as a compass, with clear, achievable short term actions to fulfill the long-term goal. The quicker we can ramp up our collective efforts to deliver a more sustainable, resilient economy, the quicker we reduce the risk of even more deadly outbreaks. In a nutshell, for structural transformations to happen, coordinated leadership and collaborations across borders to put green recovery at the heart of actions is the need of the hour leading towards creation of sustainable jobs, green investments and restoring the economic power of households and businesses.

Driving the Naturenomics™ Value Chain

The colonial governments of the 18th and 19th century understood the value of an interdisciplinary and scientific approach to their colonies, even if the knowledge they sought to generate was exclusively focused on their ability to maximize value extraction from both people and natural resources. Imperial botanists reshaped landscapes and used their knowledge to further the plantations and policing forces of Empire (Baber, 2016). Imperial anthropologists classified and

documented indigenous peoples, enabling imperial governments to better control their subjects (Asad, 1973). Imperial geologists and geographers mapped, studied and documented the vast resources of the colonial world, identifying new resources and minerals that could be extracted to fuel Empire's thirst for raw materials for manufacture (Stafford, 2017). Economists at the turn of the 20th century in Cambridge were as preoccupied with questions of politics, history and sociology as they were with arithmetics and macroeconomics - essential for a discipline concerned with the vast and disparate societies, classes, histories and politics of the Empire (The Economist, 2016).

Today's knowledge systems are far more fragmentary and siloed, with little transfer of knowledge between disciplines and with each discipline growing increasingly hyperspecific. People are slowly realizing the need for cross-disciplinary exchange as increasingly complex problems like climate change and COVID-19 mount. As global dialogues on the future of our natural capital slowly resume - galvanized by promises for the United States' re-entry into the Paris Agreement - the clock continues to tick as the world seeks to drive a consensus for the future. The COVID-19 crisis has brought countries together on an unprecedented scale, with the European Union now pushing for a union-wide green recovery programme based on common interests. However, challenges remain as countries struggle to put aside geopolitical interests to make common cause for preserving our borderless natural capital from further degradation – and insure our future.

The move towards this green recovery needs more than just the narrow perspectives offered by one field or the other. We need science, but science itself is embedded in the social and cultural sphere. We need society and culture, but society and culture are built around the pillars of the norms of our economy – and our economy in turn is governed by policy, politics and our rich intertwining histories. Imperial governments recognized this, but used this knowledge to dominate and extract, laying the groundwork for the destructive economy we have today. However, an interdisciplinary approach offers liberatory potential too, by valuing the knowledge and practices of indigenous and local communities in the collaborative process of centering ecology in economy.

Restoring our natural capital must be a holistic, collaborative process bringing together perspectives across the disciplines to visualize a sustainable future. Only dialogue across disciplines, sectors and demographics can help us learn from each other and drive the large-scale action needed to effect landscape change. We need environmental sciences to point the way forward for effectively regenerating and enriching our existing stock of natural capital and natural assets. But we need more than that, we need the As to Zs of our global systems of knowledges to redesign the Anthropocene and build the Naturenomics™ Civilization –

Astrophysics – for a world systems understanding of our planet, the depth and breadth of anthropogenic changes to our planet, an understanding of the limits of life and the limits we need to impose on our consumption oriented economy for our future survival

Anthropology – for an understanding of our cultural relationships with the natural world and how we can begin to heal these fracture relationships

Botany – for understanding our natural capital and effectively, scientifically restoring ecosystems in the least disruptive ways

Business – to build the pillars of the new economy by putting sustainability and natural capital regeneration first

Chemistry – for understanding the processes governing changes in our soil, broader ecosystems and planetary atmosphere

Diplomacy – for building the global relationships and collaborations needed to build Rural Futures on a global level and develop management systems for our borderless, shared ntural capital

Development – for building participatory systems with vulnerable communities, to access universal basic assets through natural capital

Engineering – for innovating technological solutions for delivering universal basic assets, creating natural assets and building a Naturenomics™ Civilization

Economics – particularly ecological economics for redesigning our global economy from top to bottom, to put ecology at the heart of it, Naturenomics™ style

Finance – to mainstream and incorporate the invisible value flows of natural capital and natural asset values through our economy, to effectively invest in them for our future

Geology – to understand the trends and effects of anthropogenic activity on our planet over the centuries culminating in the Anthropocene, as well as geological processes and activity that changes our climactic context but which exist beyond our control

Geography – to understand the relationship between space, place and people and their effects on ecology and ecosystems

Hydrogeology – to understand our planet's water systems in relationship to the earth's natural processes, as well as the effects of anthropogenic changes, to protect our water for our future generations

History – to understand the embedded historical inter-relationships governing community stakeholders and their relationship with ecologies and build action strategies that work with these histories to bring communities together for the common cause of building Rural Futures

ICT – to programme the green technology of the future, reinvent our production systems and our way

of living

Law – to create the best protections and rights for managing our natural capital, particularly in empowering local communities to be effective stewards of our natural assets

Mathematics – for differential modelling of natural and economic systems, to generate equations and build models for balancing human needs and biodiversity needs

Psychology – to find the best and most effective ways to change individual behaviours, mindsets and perspectives for regenerating natural capital

Physics – to create the materials and renewable energy systems of the future, to power a green and regenerative economy

Political Science – to understand the politics and political structures governing how we manage our natural assets; and the best systems and structures that need to be put into place, particularly among local communities, to manage natural assets

Sociology – to understand broader social relationships, systems and structures to effect the broader bottom-up social change needed to achieve Rural Futures

Traditional Ecological Knowledge – for a deep and intimate understanding of ecologies, their histories and simple, sustainable strategies for action, building resilience and enriching natural capital in partnership with indigenous and local communities

Zoology – to understand our remaining species and protect our biodiversity, to protect the survival of ecosystems and natural capital

A climate resilient post-scarcity future is possible. But we have to break down siloes and unite our disparate knowledge systems to drive the solutions we need for regenerating natural capital and assets for this resilient post-scarcity future. There is no silver bullet for biodiversity, climate or fragile ecosystems. The answers are interdisciplinary, complex and have to come from every sector of society: our indigenous communities, our rural farmers, our businesses, policymakers, politicians, specialist experts and academics.

The time to act is now, to change the course of the 21st century. Instead of being remembered as the century of destruction, the 21st century could be remembered as a century of hope. Recognizing that ecology is economy is only the first step. The Naturenomics™ future is calling, but only if we can put our heads together and, alongside local, rural and indigenous communities, transform our planet through Rural Futures.

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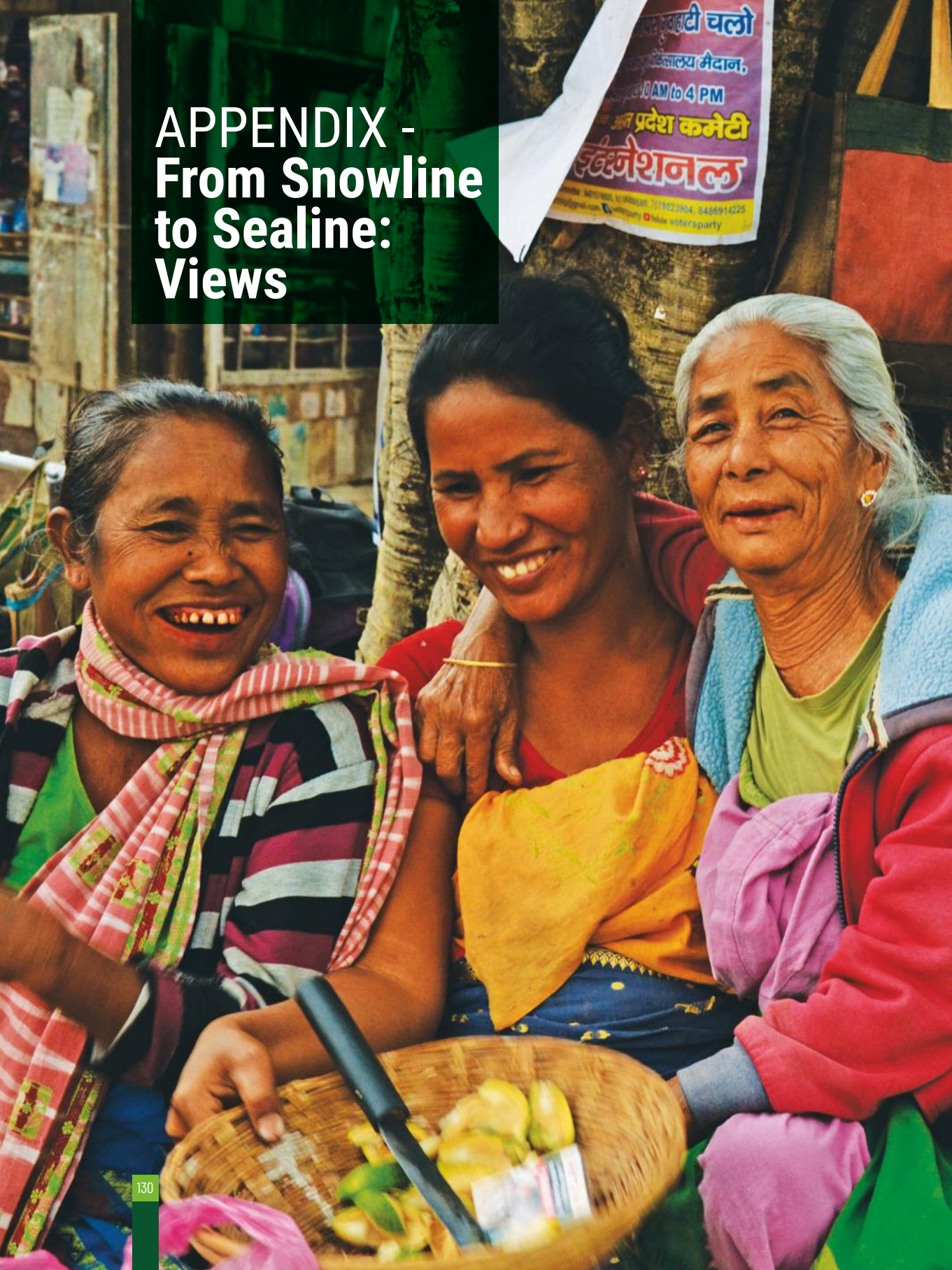
APPENDIX - From Snowline to Sealine: Views



ASSAM
Critical Policy Needs for Biodiversity

– Rituraj Phukan
Secretary General,
Green Guard Nature Organization

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

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

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%

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 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
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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

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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
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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

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

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
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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

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

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**
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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

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.

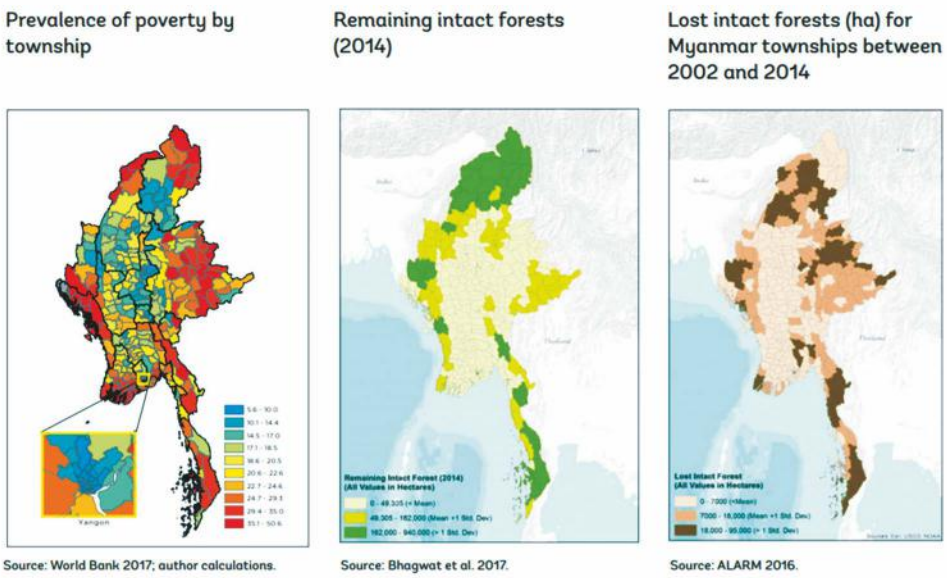
However, forests in Myanmar provide services that extend far beyond the immediate economic benefits it brings to people. Ecosystems services such as insect pollination, mangrove fishery nurseries, water filtering, carbon sequestration and erosion prevention contribute an estimated USD 7.3 billion to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



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

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 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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