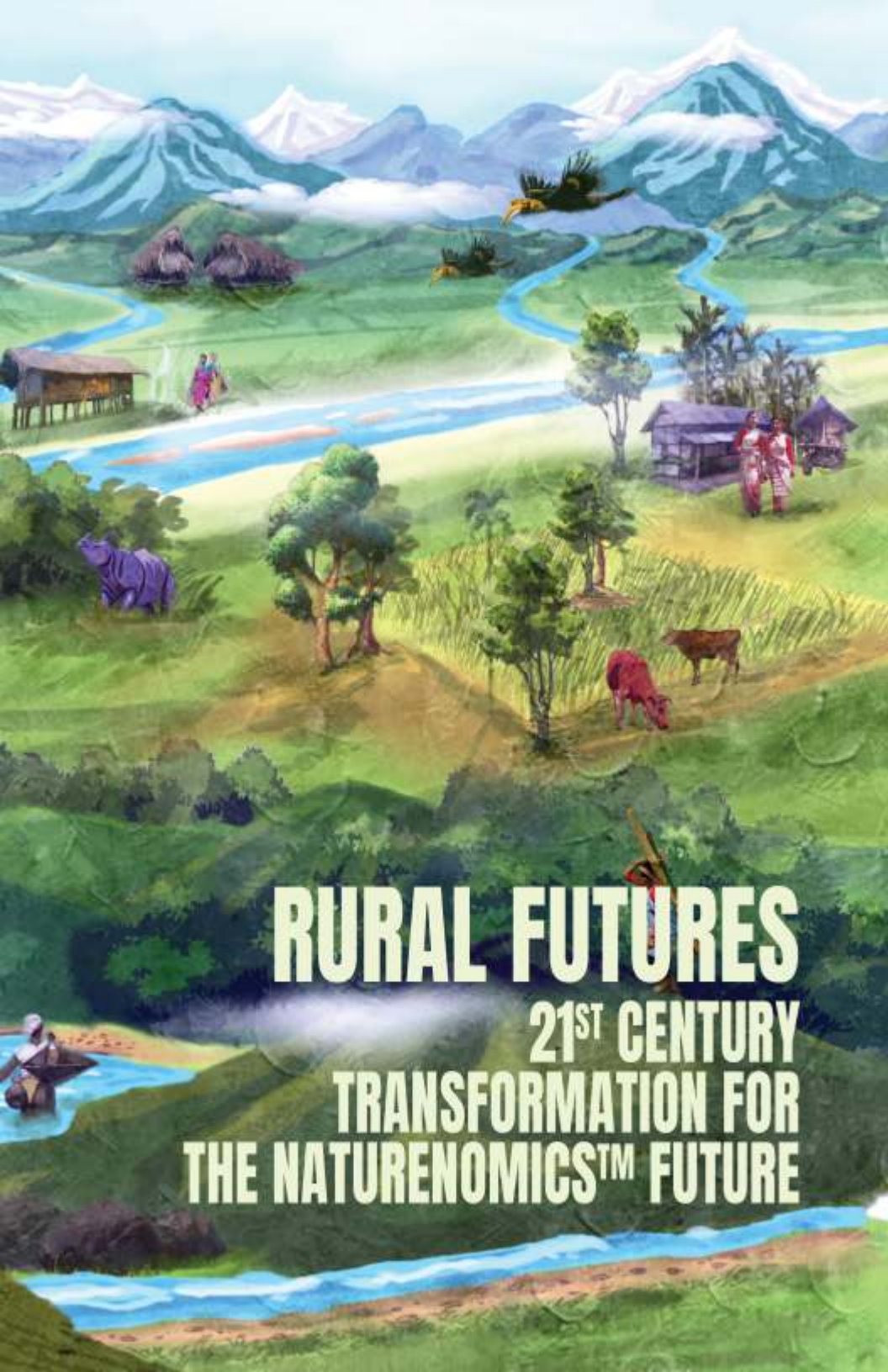
RURAL FUTURES
21ST CENTURY
TRANSFORMATION FOR
THE NATURENOMICS™ FUTURE

RURAL FUTURES:
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Concept & Thought Leadership

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RURAL WISDOM

THE LIVING ECONOMY

DR. VANDANA SHIVA
Founder, Navdanya

The word 'economy' has its roots in the Greek word 'oikos', which originally referred to household, house, or family, its daily operations and maintenance. Economy , derived from Oikonomia is thus the management of the home.

Today, we need to see “oikos” both in terms of our particular homes in particular places, as well as the planet as our common home , and the Earth Family as one family of all beings and people on the Earth.

In 1988 Ernest Herschel, the leading German disciple of Darwin derived the new label 'oecologies' (from the same root word “oikos”) to refer to the science of the relations of living organisms to the external world – their habitat, customs, energies etc. Ecology is thus the science of the earth, her living beings , her ecosystems .

Oikonomia, or Economy, to be true to its name and its roots , should be care and management of the Earth as our home.

Aristotle referred to “Oikonomia” as the Art of Living. As the Art of living, the economy is aligned to nature's and society's life giving processes .

He differentiated “Oikonomia” from “ Chrematistics”, the Art of Money Making.

Today , the Economy has lost its way. It has gone rogue .It has become a brutal money machine that is destroying the homes of the poor , and our common home .It has become a war against people and the planet .

And it needs to be brought home . It needs to be brought back in service of the earth in accordance with ecology , the laws of the Earth .

Today economy run by and for the 1% has been reduced to "Chrematistics", or money making through a Money Machine . Worse, this reduced construction of "economy" that ignores and destroys the real wealth of nature and society has been elevated to the status of a new religion.

The dominant economic model is anti people and anti workers. It robs people of their creativity and meaning, their significance and rights, and reduces them to inputs into an industrial process and an economy of the 1%.

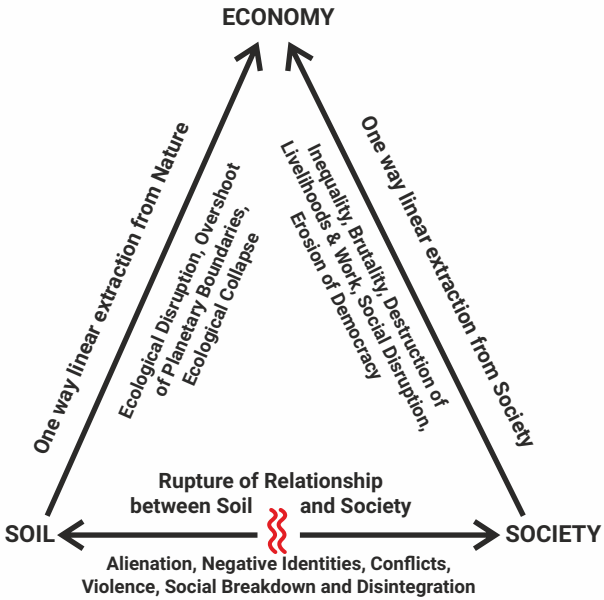
The Mechanical Mind combined with the Money Making Machine is sucking out every bit of life, and real wealth from nature and society . It accepts no limits of violence against nature and diverse cultures, against people's rights and nature's rights , against nature's and people's potential for creativity , for working, for making, for producing .The world the 1% are creating is a world without life based on extinguishing and exterminating Oikonomia, the art of living.

FROM EXTRACTIVE ECONOMIES TO CIRCULAR RURAL ECONOMIES

The linear, extractive logic of greed and exploitation without limits is threatening ecological and social collapse.

Linear extractive systems are at the root of both the ecological crisis, and the crisis of poverty and inequality. The ecological crisis grows through extraction from nature. Poverty, misery, unemployment, displacement, exploitation, exclusion grows through extraction from those who work in the forests, fields and factories.

Small farmers are getting poorer everywhere and being uprooted from the land because vertically integrated corporations are stealing 99% of the value they produce. They are getting poorer because "free trade" as freedom for corporations, promotes dumping, destruction of livelihoods and depression of farm prices.



The linear extractive economy is based on extraction, commodification, profits. It has no place for the care of nature and community. It leaves nature and society impoverished, be it extraction of minerals, or extraction of knowledge through Biopiracy, or extraction of 'genes' through genetic mining, or extraction of data through 'data mining', or extraction of rents and royalties for seed, water, communication, privatised education and health care. It creates poverty, debt, and displacement. It creates waste - waste as pollution, wasted resources, wasted people, wasted lives.

The original meaning of “wealth” is well being and happiness, not money. And money is not finance, definitely not digital finance which is allowing billionaires to make money out of money, while colonizing local self organized economies.

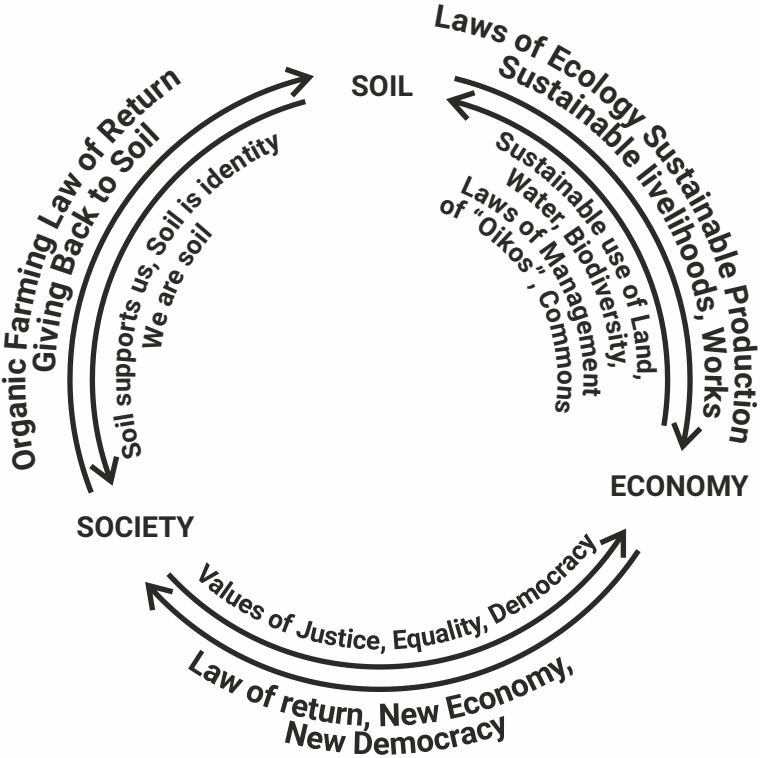
Real wealth is our biodiversity and seeds, our soil and our land, our water and clean air, our food and our health. Our real wealth is to care for the earth, to rejuvenate her potential through our care. It is not property to be owned and traded for profit, it is not raw material to be used and thrown away as garbage and waste, polluting and degrading the planet.

Real wealth is our real relationships and our real communities.

Real wealth is our capacity to create, produce and make what we and our communities need to ensure our well being. Well being is the original meaning of wealth, not money. Work creates wealth. As co-creators and co producers with nature we protect the earth's wealth creating capacities and enhance our own. We create real wealth when we live as Earth Citizens.[1]

The extractive economy gives nothing back to nature and society who create the real wealth. Planetary boundaries are broken, ecological limits are transgressed.

CIRCULAR ECONOMY



[1] *Vandana Shiva, Biodiversity, Agroecology, Regenerative Organic Farming*

"If fresh food is necessary to health in man and beast, then that food must be provided not only from our own soil but as near as possible to the sources of consumption." Lady Eve Balfour

The law of return, of giving back, is nature's law of permanence. This is the basis of circular economies.

The ecological Law of Return maintains the cycles of nutrients and water, and hence the basis of sustainability. For society, the Law of Return is the basis of ensuring justice, equality, democracy and peace.

Regenerative, renewable, sustainable economies that enhance nature's well being and ours are based on the law of return-of giving back in gratitude and deep awareness that we are part of the web of life.

Biodiversity is the organising principle which guides Navdanya's work, from biodiversity of seeds and crops, biodiversity of agricultural systems and knowledge systems, to biodiversity of distribution systems and markets.

Biodiversity based organic farming and biodiversity of markets and economies is Navdanya's approach to rejuvenating the soil, water, biodiversity and the health of all through cooperation, rural economies, circular economies and local food systems.

In the year of Gandhi's 150th birth anniversary, let us build on his vision of "everexpanding, never ascending oceanic circle" of one humanity, one planet, rich in diversity and self organisation.

"In this structure composed of innumerable villages, there will be ever widening, never ascending circles. Life will not be a pyramid with the apex sustained by the bottom... till at last the whole becomes one life composed of individuals, never aggressive in their arrogance but ever humble, sharing the majesty of the oceanic circle of which they are integral units.

Therefore, the outermost circumference will not wield power to crush the inner circle but will give strength to all within and derive its own strength from it" Gandhi, Harijan, 28-7-46, p. 236

The dominant paradigm of the industrialisation and commodification of our food system has degraded the planet, rural economies, and the quality and safety of our food. It has created vulnerability at the

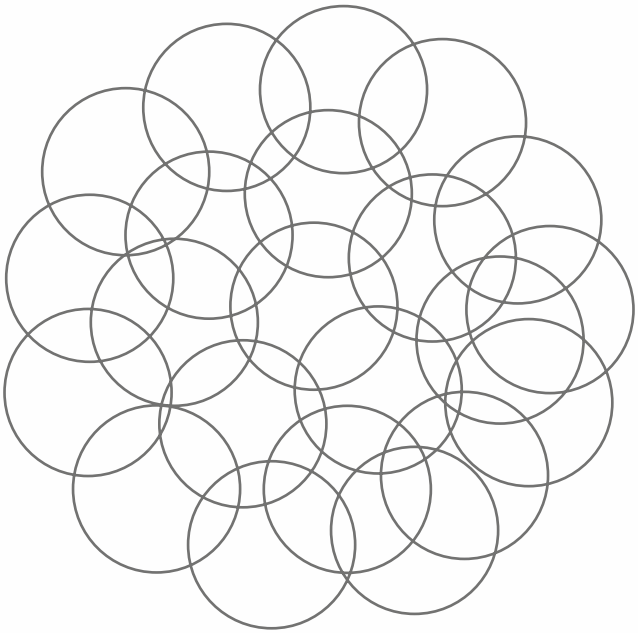
ecological, social, economic and political levels.

The vicious cycle of interconnected degeneration is unraveling the earth's vital life supporting processes and the fragile fabric of our societies. Collapse is inevitable if we continue on the dead end path.

But we have a living, growing alternative of spreading the principles, paradigms and practices that **regenerates, based on diversity and agroecology.**

Biodiversity, Agroecology,
Local-Regional Circular Food Economies

The Ecological Food System Revolution



Ever Expanding Never Ascending Circles of Food Sovereign, Knowledge Sovereign, Economic Sovereign Food Communities

The transition from Corporate Control to Food Democracy, from Vulnerability to Resilience, is not just a possibility. The shift from fossil fuel driven corporate globalisation to localisation of our economies has become an ecological and social imperative. Economic localisation implies that whatever can be produced locally with local resources

should be protected to build a vibrant local economy so that both livelihoods and the environment are protected. This was Gandhi's concept of Swadeshi.

Gandhi defined swadeshi as the 'spirit in us which restricts us to the use and services of our immediate surroundings to the exclusion of the more remote'. Localisation is an ethical and ecological imperative. It reduces our ecological footprint while enhancing our hand print, opening opportunities for creative, meaningful work, producing quality, and enhancing well-being. It fixes the broken circle between production and consumption. It fixes the broken carbon cycle driving climate chaos.

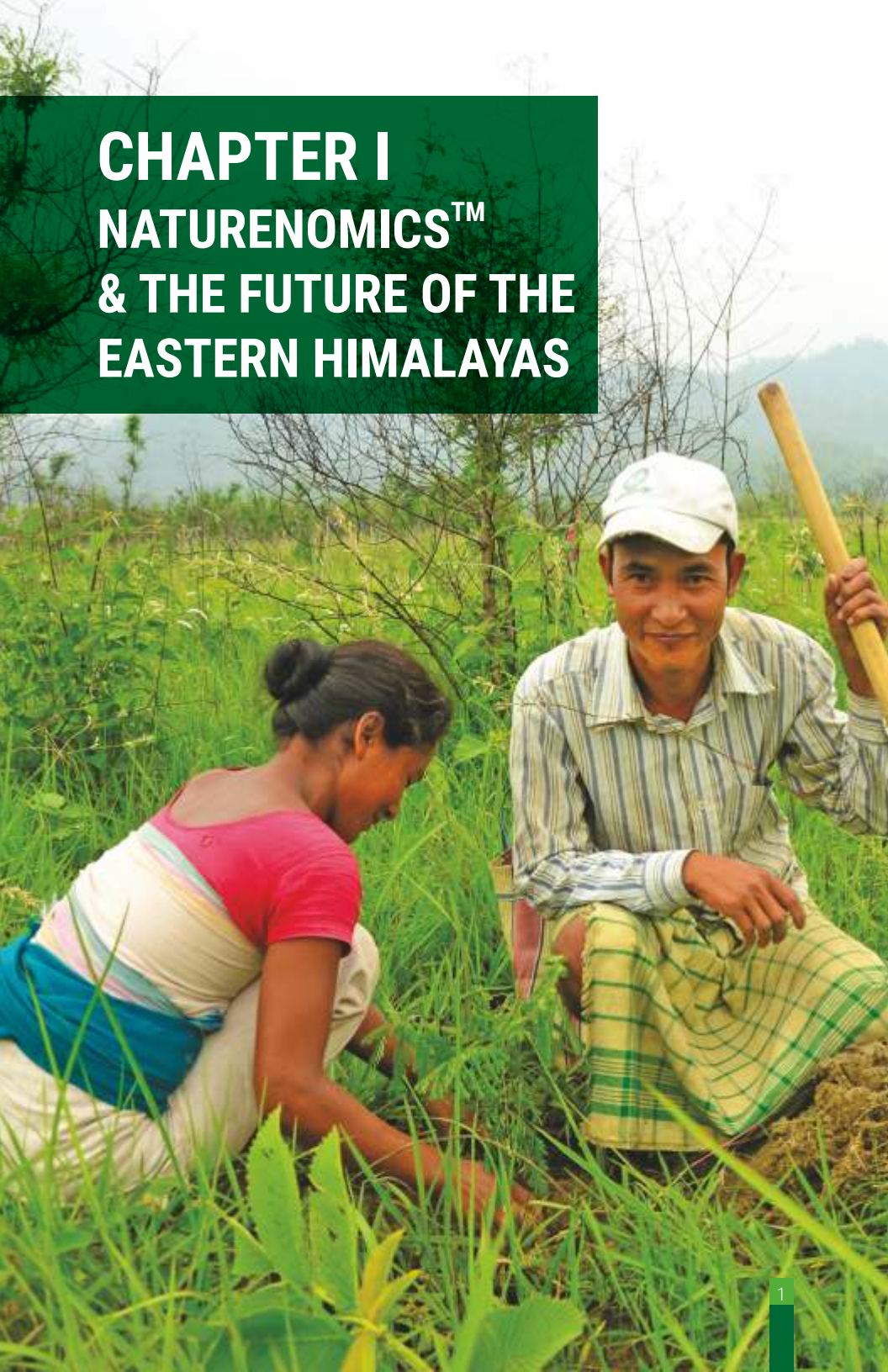
Ecological food and agriculture systems that are fossil fuel free ,and poison free have the potential to address the multiple crisis by working with nature, not against her laws, by working with our hands, heads and hearts to create sacred economies based on care and compassion, not greed and disposability of people, especially farmers and artisans .

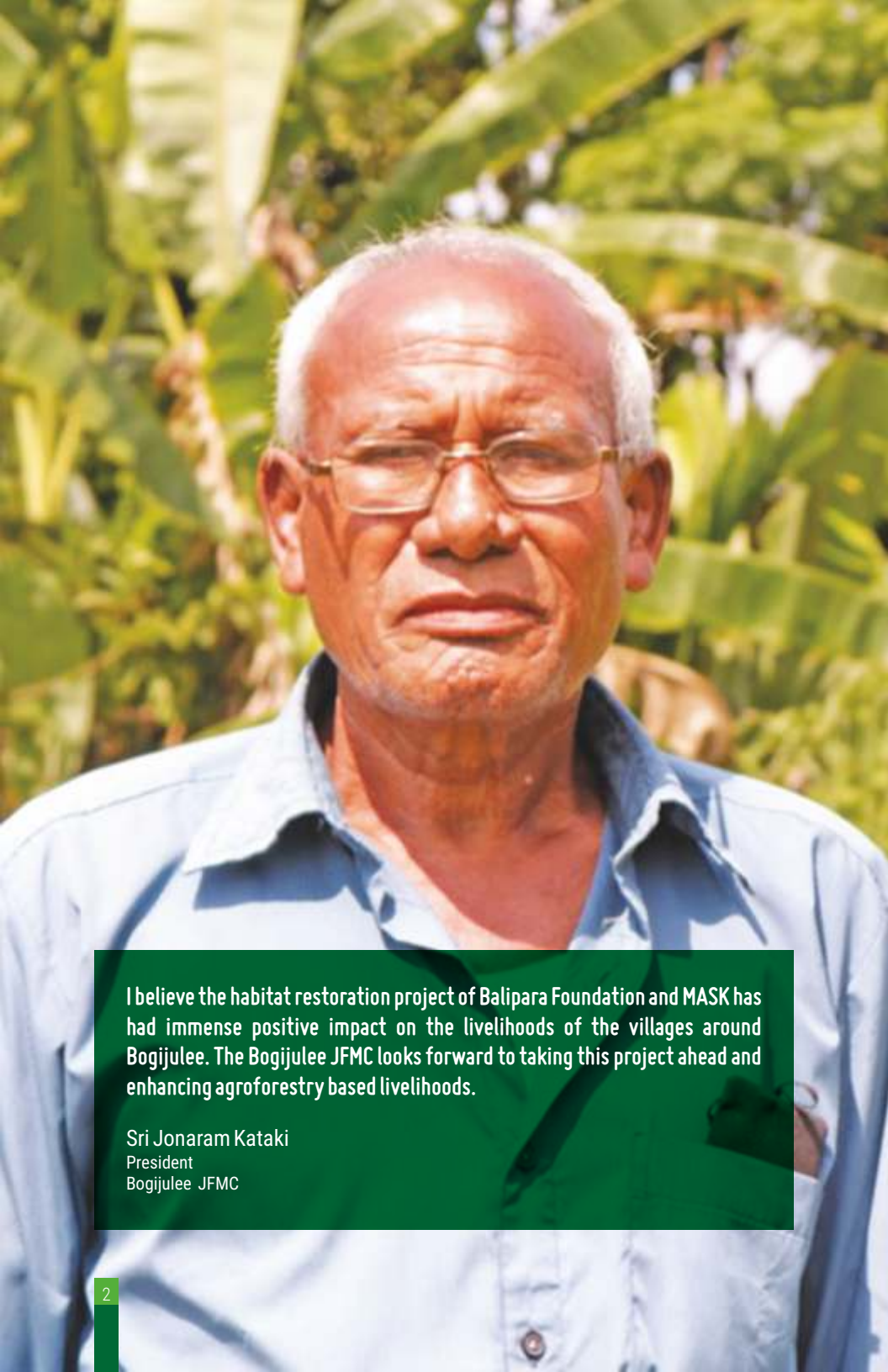
The creation of local ecological economies based on “bread labour” and co creativity with nature is the only way to sustain the earth and human societies through rejuvenation of real work. We are creative intelligent beings given creative heads, hearts and hands. Every human being has a right to be creative to live to their full potential and evolve their intelligence in diverse ways. Creativity cannot be reduced to designing the next algorithm for living in virtual reality. Creativity is above all our co-creativity to join our intelligence with the intelligence of the earth and all beings.

The force of truth is the highest power for change, for freedom from unjust rule, the power to seed our interconnected freedom, and through our freedom, seed the future by seeding a sacred economy.

And creating the “Naturenomics™ Civilization” based on the ever expanding circles of rural, circular and living economies is integral to seeding this future.

CHAPTER I
NATURENOMICS™ & THE FUTURE OF THE EASTERN HIMALAYAS





I believe the habitat restoration project of Balipara Foundation and MASK has had immense positive impact on the livelihoods of the villages around Bogijulee. The Bogijulee JFMC looks forward to taking this project ahead and enhancing agroforestry based livelihoods.

Sri Jonaram Kataki
President
Bogijulee JFMC

OUR NATURAL INHERITANCE

Through the ages we have used nature's capital to surge economic growth. This use, overuse, and misuse of nature have eventually put both of "us"; the "consumers" and the "resources" on the verge of destruction. Beginning in the 19th century, cheap energy sourced through the consumption of fossil fuels, delivered the stimulus needed to grow the global economy to the size it is today. However, the widespread use of fossil fuels and unfettered economic expansionism of the second industrial revolution has led to serious environmental consequences: the destruction of global ecosystems, extinctions culminating in what scientists are now calling the sixth extinction event, with over 1 million species endangered (UN-IPBES, 2019), extreme pollution (UN-IPBES, 2019), declining genetic biodiversity and resiliency among crops (FAO, 2019), exponentially expanding carbon emissions and rapidly accelerating extreme weather events.

Consequent industrial revolutions have only served to further compound this problem. The technology revolution of the 'nineties created a surplus of highly toxic e-waste that countries are now struggling to dispose of effectively (Basel Action Network, 2019) – when this waste is not being exported to countries that lack the capacity to process waste. Built-in-obsolescence and proprietary software licensing have further damaged the ability of individuals to open up and repair devices, shortening their use length periods and forcing consumers to discard electronic devices after increasingly shorter periods of time.

We have paid a high price for the phenomenal economic growth and now are in danger of derailing the same growth if we do not manage our natural assets in a more effective and sustainable manner. Under these circumstances, there is little or no scope for rejoicing over such short term wealth creation, responsible for rampant ecological degradation and the rapid decline of our natural inheritance - driven heavily by externalized environmental costs and the invisibilization of natural capital in our global economy.

The fundamental issue is one of measurement and frame-working of ecological value. Economics has its own theoretical construct based on economic value creation which is measured by market forces in terms of optimal utilization of all available and accessible assets - land, labour, capital and natural resources. A market price is attached to this efficiency in the utilization of assets - the better the utilization of the assets, the higher the market price. This is in conflict with the ecological value framework - ecological value is, in principle, based on factors such as the complexity of the ecosystem, its connections with other ecosystems, the scarcity of the ecosystem, its vulnerability, and its contribution to biodiversity. This implies that ecological value is not based on any market mechanisms; it is based on the ability to sustain ecology through the complex inter-relationships in the ecosystem. Hence, a 'friction factor' is bound to occur at the overlap of these two components - nature and economics, impacting security across all four areas of our living and inheritance - food, water, energy and environment.

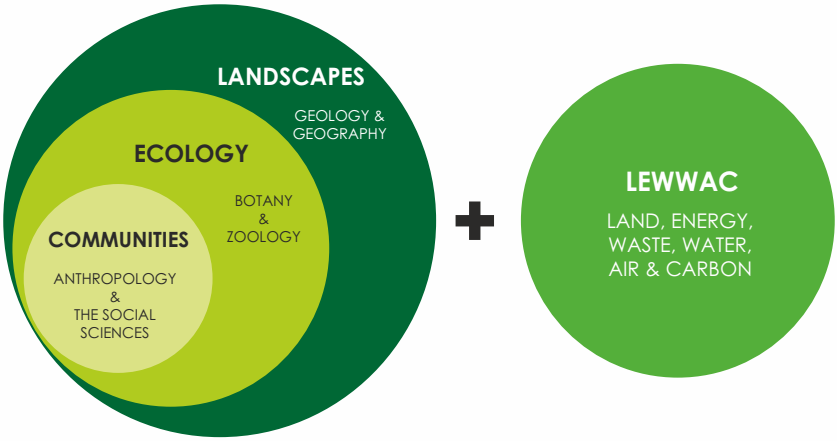
However, instead of focusing on the conflict we envision an emerging interdependence between nature and economics which we call Naturenomics™. Naturenomics™ relates to capital formation for a region or organization through the creation of ecologically 'compliant' assets in a sustainable manner.

There are two imperatives which underlie the principles of Naturenomics™:

- **A major paradigm shift** - adjusting the balance of power by displacing growth through consumption economic imperatives and centering natural capital and natural assets
- **The development of a common system and methodology of valuing nature assets** - just as there are generally accepted accounting principles (GAAP) in economic accounting, and accepted methods like net asset value and discounted cash flows of valuing economic assets, we need to develop a 'green accounting methodology' (GAM) and a Nature Quotient (NQ) - a list of nature parameters to measure ecological value and performance. By rendering visible natural capital flows, this paves the way for creating natural asset use and regeneration plans to achieve sustainability.

The current model of economic development forces us to make a choice between development and sustaining natural resources. However, we believe that this does not need to be a zero sum game of choices, and that in fact we can have economic development through sustaining our natural resources. This is the spirit within which we conceptualized Naturenomics™.

Naturenomics™ relates to capital formation for a region or organisation through the creation of ecologically 'compliant' assets in a sustainable manner. The Naturenomics™ framework of analysis is an interdisciplinary perspective which unites the natural sciences, social sciences and humanities to conceptualize holistic solutions for reintegrating ecology and economy in a meaningful, sustainable manner by securitizing LEWWAC:



The interdisciplinary Naturenomics™ perspective for change

A Naturenomics™ based economy attempts to secure 6 key parameters – land, energy, waste, water, air and carbon. In practical term, this means deriving our food and water needs through effective land and water resource management and not by exploiting these resources, by satisfying our energy needs through hydrogen and solar based fuels rather than carbon based fuels, and satisfying our ever increasing appetite for materials by increasing reuse and recycling and not by increasing extraction.

Building on our common wealth – our natural assets – is the first step in building an economy that is both sustainable and equitable. The Naturenomics™ perspective provides an actionable series of steps building the stepping stones to achieving the UN's Sustainable Development Goals for the eradication of poverty, the creation of an equitable economy with quality jobs for the future – based around principles of and for regenerating natural assets and natural capital.

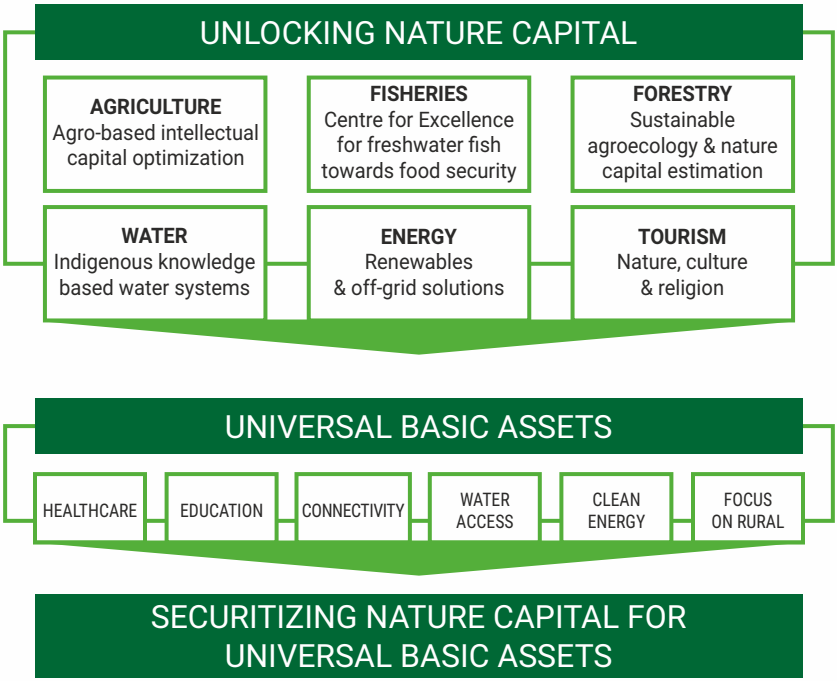
The Balipara Foundation's Naturenomics™ perspective in relationship to the UN's Sustainable Development Goals

MIGRATING TO A NATURENOMICS™ BASED ECONOMY

The performance of an economy or organisation is currently judged by its ability to achieve growth through optimal and profitable utilisation of its assets - land, labour, capital and natural resources - this value is then reflected in its GDP or market capitalisation. We believe that the true performance of an economy or organisation should be based on its economic value and the value of the ecological decline it has impacted. Unfortunately, in many cases, if we do such a valuation, many countries and organisations will show significant value depletion rather than value creation. Naturenomics™ also aims at

developing a framework for valuing nature assets of an economy or organisation, and to develop a scorecard of performance based on nature based indicators. This can then be mapped with the economic indicators to get a true picture of value creation or depletion.

Naturenomics™ visualizes action beyond the purview of ESG guidelines, catalyzing the jobs and industries of the future by putting ecology back in economy. A Naturenomics™ based economy, therefore, will drive the growth of industries that offer both market value creation as well as natural capital growth. Skills related to these industries will be in increasing demand. Industries like integrated agroforestry, fish farming, biopesticides and bio-fertilizers, organic cultivation, etc will ensure our food security, and industries like hydrogen generation, fuel cells, wind turbines, etc will ensure our energy security. Industries not consistent with the principles of Naturenomics™ must face the consequences of the value depletion currently being offshored onto public institutions and vulnerable communities, declining till they reform into ecological competitiveness or else disappear.



Naturenomics™ action strategy for the future of the economy

Successful securitization of core natural assets (food, water, energy and environment) would result in the creation of nature capital, which will fuel the growth of the economy. Nature capital can be created through:

- **Agriculture** - creating the next green revolution by optimising the economic value add of land through agroecology, and developing agro-based intellectual capital
- **Fisheries** - centre of excellence for freshwater inland fish
- **Forestry** - planned utilisation of resources
- **Water management** - creating a water driven revolution
- **Clean energy** - harvest and reduce wastage of the abundant resources in the region for energy
- **Tourism** - creating destination for discerning travellers through a 3-pronged nature driven approach

Each of these industries will support symbiotic industries which will create the multiplier effect in the regional economy. Investment in nature capital is critical to restore, sustain and expand the ecosystem. In addition, to support these verticals, investments would need to be made in infrastructure, both hard infrastructure (urban / municipal infrastructure, power, transportation, telecommunications), and social infrastructure (population planning, health, education).

WHY THE EASTERN HIMALAYAS?

The Eastern Himalayas lie at the center of South Asia and East Asia, connecting two of the world's largest economies: India and China. The strategic value of this region cannot be overstated, from its centrality as a water source for India, China and Southeast Asia, to its importance as a global biodiversity hotspot.

The Eastern Himalayan Region

The region is endowed with rich natural capital which

remains largely untapped and underleveraged, viewed either as an impediment to economic growth through a developmentalist lens, or else viewed as a battleground for increasingly embattled, endangered endemic species. Both views obscure the aspirations and rich cultures of the region's indigenous and local communities, most of whom still depend heavily on the region's natural capital for their livelihoods, albeit at a largely subsistence level.

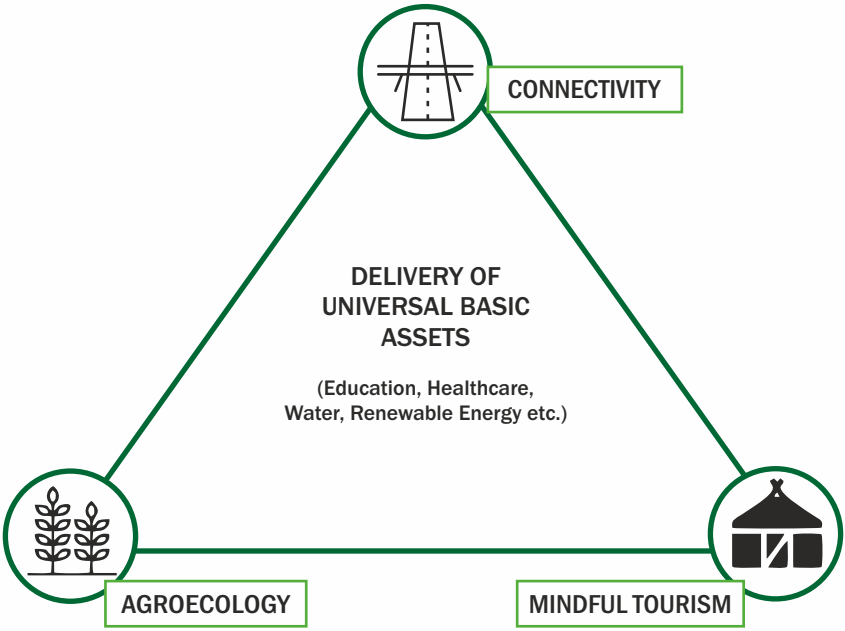
Today, the region lies on the brink of crisis as rising temperatures in the mountains have caused glacial melt, creating volatility in water access and adding further stresses to an already geopolitically tense area. Over a quarter of the land in the region is degraded – the result of rampant deforestation and severe flooding. Despite shared interests for development and economic growth opportunities, the region remains divided by geopolitical interests. As a result, communities have few livelihood opportunities and many look for better socioeconomic mobility by migrating from the region.

In India's Northeastern states, this migration has led to escalating inter-community tensions and the rise of ethnonationalism. In an unfortunate tragedy of the commons-like situation, spurred by economic desperation and conflict, much of the region's rich natural capital has been severely depleted by rampant deforestation and overexploitation. In turn, this has led to some of the highest rates of human-elephant conflicts in the world, with hundreds dying annually during elephant incursions and attacks.

Despite this dire outlook, the action opportunities for this region are immense. At the confluence of 2 billion people, it has a young and ambitious demographic and its rich cultural diversity supply a plethora of rich perspectives and traditional knowledge yet to be tapped by scientists and policymakers, for developing sustainable livelihood opportunities.

And in spite of the depletion of its natural capital, the region is still home to 12,000 species of flora and fauna and new ones are being discovered every year. A quarter of India's carbon stock lies in this region and while deforestation is a serious problem, it is still occurring at a slower rate than compared to the rest of the country. Its intact forests will become a

vital resource as India's largest carbon sink in the coming years – and with careful resource management and natural capital regeneration, could unlock great value for its communities.



The pillars of the Naturenomics™ economy in the Eastern Himalayas

Strategic Opportunities	Strategic Challenges
From Snowline to Sealine, connecting India & China ➲ Covers: East Nepal, Myanmar, the Western Chinese mountains, Northeast India, West Bengal, Bhutan, Bangladesh & the Sundarbans and the Tibetan Plateau ➲ The thriving economies of India, China & South-east Asia	**Glacial melt & declining water security** ➲ Temperatures rising four times faster than anywhere else in Asia ➲ 247 sqkm. of glaciers lost annually ➲ Asia's water supply in danger
Asia's Lifeline: Water for Billions ➲ A vast network of glaciers in the Tibetan Plateau ➲ The source of Asia's largest rivers: the Yangtze, Ganges, Brahmaputra, Indus and Mekong	**Natural capital loss through deforestation & land degradation** ➲ >600 sqkm. of forest lost annually ➲ Nearly 25% of the land under degradation ➲ Poor climate resiliency and adaptive capacities among communities
A Global Biodiversity Hotspot & 25% of India's Carbon Stock ➲ 3 out of 34 global biodiversity hotspots ➲ 300 animal species, 900 bird species & 10,000 plant species ➲ 163 endangered species ➲ 25% of India's total forest area & a vital role in country's ability to offset climate risks	**Poverty & limited livelihood opportunities** ➲ 60% of the population are below the poverty line ➲ 60% of the region are farmers ➲ 80% of these farmers subsist on less than an acre of land
Cultural Diversity ➲ 200 distinct ethnic groups in India's Northeast ➲ The Balipara Foundation has relationships with the following: Garos, Bodos, Mishings, Nyishis, Nepalis, Adivasis, Nepalis, Bengalis and Bhutanese.	**Migration & related tensions** ➲ Since 2005, migration out of India's Northeast has increased 12-fold ➲ Immigration from nearby areas has contributed to rising tensions in the region

NATURENOMICS™ & RURAL FUTURES IN THE EASTERN HIMALAYAS

The Eastern Himalayas are unique in today's global economy. 70% of the region still depends on agriculture as its primary source of income and industrialization is not as pervasive feature of the region's economy as it is in the rest of India, or globally. While this has meant lower levels of economic growth, this also presents a unique opportunity as industrial processes are not so deeply entrenched in the region's economy as to prove disruptive to the region's growth in a transition period.

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. The global tendency towards increasing urbanization as economies ascend the income ladder has proved to be increasingly unsustainable in recent years – 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). A significant proportion of this strain on the environment is driven by continued migration to cities as perceived hubs of economic growth – India's North East has seen urban populations grow by 30% in recent years.

Naturenomics™ seeks to tackle the twin problems of ecological preservation and human development at the root cause – in the rural regions of the Eastern Himalayas. Income insecurity among smallholder farmers – 80% of all farmers in India's North East – has become an increasing driver behind deforestation and migration, as families seek to improve their socioeconomic mobility. However, the Eastern Himalayas' rural regions are rife with ecologically-centred growth opportunities. The region is natural capital rich – an estimation puts the value per hectare of a forest in the region at approximately INR 713,272. Using Naturenomics™ to drive livelihoods, communities in the region could build a strong economy based on agroforestry and mindful tourism – the latter being one of the fastest growing industries in the region.

Natural capital is the backbone of our economy, but building on it effectively calls for two key things: firstly, we need to be able to understand the ways in which natural capital values (including the values provided by essential ecosystems services) drive our economy from end to end, and secondly, to build strong, sustainable economic

models that mainstream natural capital regeneration processes as their central pillars.

BIBLIOGRAPHY

Balipara Foundation. (2007). *Naturenomics™ Vol. 1: Nature and Economics, Nurturing Interdependence.*

Puckett, J., Brandt, C. & Palmer, H. (2019). *Holes In the Circular Economy: WEEE Leakage from Europe.* eds. Palmer, H. & Johnson-Dubytz, *K. Basel Action Network*. Retrieved from: http://wiki.ban.org/images/f/f4/Holes_in_the_Circular_Economy-_WEEE_Leakage_from_Europe.pdf.

FAO. (2019). *The State of the World's Biodiversity for Food and Agriculture*, J. Bélanger & D. Pilling (eds.). FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. 572 pp. (http://www.fao.org/3/CA3129EN/CA3129EN.pdf) Licence: CC BY-NC-SA 3.0 IGO. Accessed: 03/07/2019.

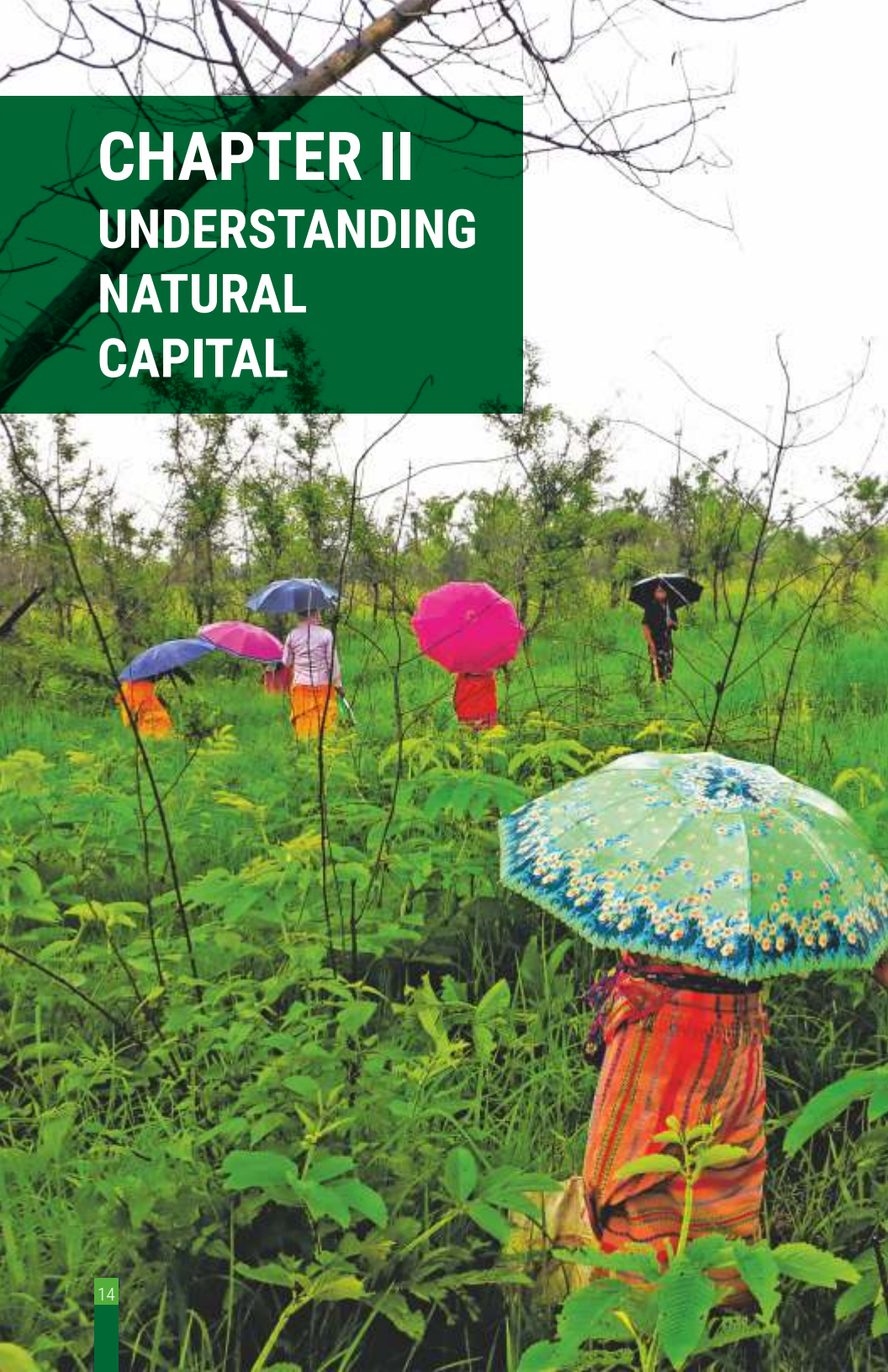
Jiang, L; Hoepf Young, M & Hardee, K. (2008). "Population, Urbanization, And The Environment". World Watch. 21 (5): 34–39.

Kaza, S; Yao, Lisa C.; Bhada-Tata, P & Van Woerden, F. (2018). *What a Waste 2.0 : A Global Snapshot of Solid Waste Management to 2050*. Urban Development;. Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/30317 License: CC BY 3.0 IGO. Accessed: 07/10/2019.

UN-IPBES. (2019). *Nature's Dangerous Decline: 'Unprecedented'; Species Extinction Rates Accelerating.* Retrieved from: *https://www.ipbes.net/news/Media-Release-Global-Assessment*

World Bank. (2019). *Urban Development: Overview.* Retrieved from: *https://www.worldbank.org/en/topic/urbandevelopment/overview.* Accessed: 07/10/2019

CHAPTER II
UNDERSTANDING NATURAL CAPITAL

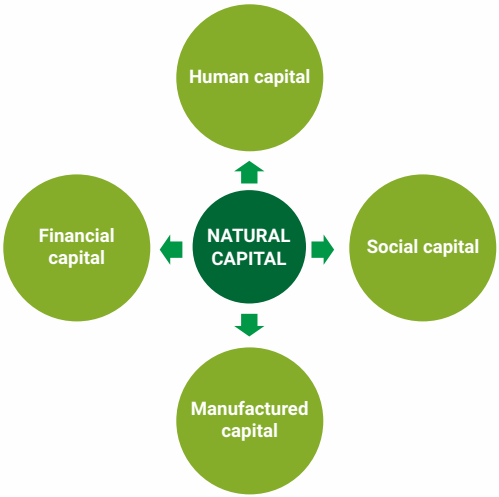


The youth of Bogijulee have been trained in the basic science of the forest, photography and collecting GPS information. We are happy to be completely involved in the project from the ground up.

Chakra Basumotary
Worker
Balipara Reserve Forest Habitat Restoration project

CONTEXT

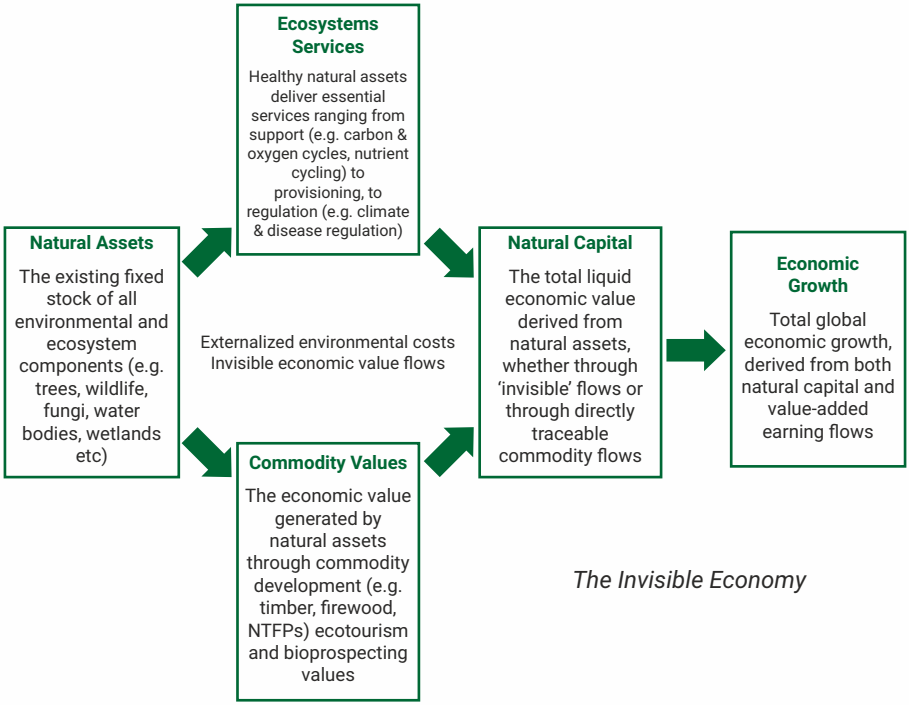
In recent decades, the importance of environmental systems in determining a country's economy and its society's well-being by providing resources and services has been recognized. A very strong narrative has developed around the need to conserve and restore the existing banks of 'natural capital'. A growing body of literature and various socio-economic and scientific studies have been advocating the fact that natural capital forms the basis for the development of other forms of capitals i.e. **manufactured capital** (e.g. machines and buildings), **human capital** (e.g. people, their skills and knowledge), **social capital** (e.g. trust, norms and institutions) and **financial capital** (money). These trends reflect the kind of awareness that has grown within citizen groups, civil societies and policy makers. However, despite such a great degree of awareness, we hardly see natural capital being accounted for in nations' wealth accounting systems. This is where the idea of valuing the natural capital and the ecosystem services emerging from them comes in. Naturenomics™ is directed towards the integration of Ecology and Economics. It does so by assigning value to natural assets and building an economy around the present stocks of natural capital which is one of the ways we can build a sustainable economy.



Natural capital acts as the basis for the development of all different forms of capital

WHAT IS NATURAL CAPITAL?

First coined by E.F. Schumacher in his book Small Is Beautiful (1973), the concept and idea of natural capital has been ever evolving. It is a concept central to economic assessment and valuation of ecosystem services. This concept revolves around the core idea, that it's the natural stock of biotic and abiotic resources that produces goods and services for life to thrive on planet Earth. Thus, natural capital is extremely essential for the economy to exist and sustain. A landmark study in the British journal Nature, published in 1997 by economist Robert Costanza estimated the value of 17 ecosystem services at US$ 36 trillion on average compared to a Gross World Product (GWP) of US $39 trillion. These ecosystems included atmospheric regulation of gases (US $ 1.3 trillion), assimilation and processing of waste (US $ 2.3 trillion), nutrient flows (US $17 trillion), storage and purification of water (U.S. $2.8 trillion), marine systems (US $20.9 trillion), terrestrial systems(US $ 12.3 trillion) and forests and wetlands (US $ 4.7 trillion each). Of these studied ecosystems, the



The Invisible Economy

highest value per acre was for estuaries, not only as a food source but for their nutrient recycling services. The researchers then estimated the amount that would need to be deposited in savings accounts to accrue an annual income of $36 trillion, using an interest rate of 7.2%, arriving at a figure of about US $ 500 trillion in savings deposits for equivalent earnings.

So, what exactly does the term Natural Capital refer to? Natural Capital is popularly understood as the world's stocks of natural assets which cover the whole range of living and non-living components except for the ones produced by humans themselves. It comprises of every biotic and abiotic entity within the biosphere i.e. geology, soil, air, water and all living organisms. Natural capital is the most important and the most fundamental form of capital since it provides the basic conditions for the possibility of life by delivering food, clean air and water and basic resources and consequently the development of other forms of capital.

One of the key roles natural capital plays is by providing a continuous flow of inputs to human beings with free goods and services, often called ecosystem services. Some of the most important yet extremely undervalued ecosystem services include food, clean water, fuel etc. Apart from these, there are certain other invisible ecosystem services such as climate regulation, carbon sequestration, flood control, water purification provided by forests. However, with population explosion, resource depletion-degradation, environmental changes, many aspects of natural capital such as biodiversity, clean air, land, and freshwater have been exploited to the point of vulnerability. Since these are finite resources and can't be replaced or reproduced, they face a significant danger of extinction, consequently putting a question on the survival and sustenance of life on earth.

WHY IS IT IMPORTANT? WHAT IS THE NEED TO PUT A VALUE TO IT?

It was in 1972 that the UN's first major conference on international environmental issues, the United Nations Conference on the Human Environment (UNHCE) took place in Stockholm. It was here that the idea of 'Sustainable Development' was introduced, focusing on the need to conserve and restore the ecological fabric of the planet keeping in mind the value it holds for future generations.

The world's natural assets are undergoing gradually escalating depletion-degradation and in economic terms, this depletion will prove

to be far more costly in the long run because it will shift the true burden of cost to the future generations. Is it possible to calculate the cost of an inadequate clean water supply fifty years from now? We pay hidden/indirect costs in terms of health deterioration due to the polluted air we breathe. How do we compute the cost of polluted air on future generations? Eventually, this cost would become immeasurable because of increasing scarcity. Hence natural capital becomes crucial for the survival of the current generation and also future generations as called for in the UNCHE.

Natural capital is self-regenerating, but only to a certain level. Conservation of natural capital has become a growing issue of concern because we have been drawing excessive stock from our natural environment without taking measures to ensure these stocks have enough time and resources for recovery. Natural systems have been abused because their true cost is not properly valued, being priced far lower than human capital and financial capital, making it the cheapest factor of production.

But how do we know its price is lower? A lot of this devaluation is the result of limitations in our accounting systems, where we only have debit and credit columns for visible products and services. Conventional forms of accounting do not accurately measure the cost of using natural resources. For example, the income statement of a company producing packaged drinking water does not reflect the cost of maintenance of forests and other ecosystem services responsible for water purification and regulation; neither does it include the environmental costs incurred during the manufacturing process. So, the services are free and what we are actually being charged for is the technology and the human capital which is used to manufacture and market these water bottles. Now, since the full value of natural capital is not reflected in economic choices and policy making, there is a mismanagement of natural capital. The invisibility of nature results in poor management of our natural assets doesn't only affect the ecology but also becomes a socio-economic liability. Uninformed choices and decisions have a huge impact on all levels of decision-making i.e. from microeconomic to macroeconomic.

According to the United Nations, business activities degrade nearly 30 million acres of land every year at a cost of USD 40 billion to the global economy. Using a scientific approach to rebuild hydrology of a region and replant native floral diversity in order to restore natural capital is possible. But bringing businesses and other stakeholders on board calls for a clear economic case for action, most easily provided by measuring and accounting for the value that ecosystems provide.

LINKAGES BETWEEN NATURAL CAPITAL AND ECOSYSTEM SERVICES

WHAT ARE ECOSYSTEM SERVICES?

There is no agreed upon definition of ecosystem services yet but broadly speaking, ecosystem services are the flows of benefits to people from ecosystems. The categorising of ecosystem services generally varies but the Millennium Ecosystem Assessment (MA) framework is widely accepted and is seen as a useful starting point. These are commonly divided into the four categories: **provisioning** (wetlands provide flood protection), **regulating** (rainforests regulate the climate of the region), **cultural** (sacred groves provide spiritual fulfilment) and **supporting services** (fresh water bodies provide food and clean water). The Economics of Ecosystem and Biodiversity (TEEB) defines ecosystem services as "the direct and indirect contributions of ecosystems to human well-being". Human wellbeing and economic prosperity depends on the sustainable use of ecosystems. Most of our ecosystem services are overexploited, as the result of myriad factors: a globalized diffusion of responsibility over environments, perverse economic incentives for action, atomized ownership and in many documented cases - active disinformation campaigns by unsustainable business interests. Since their economic value is not properly accounted for, they continue to be overly depleted or polluted, threatening our long-term sustainability and resilience to environmental shocks.

Linkages between natural capital and ecosystem services

VALUATION OF ECOSYSTEM SERVICES

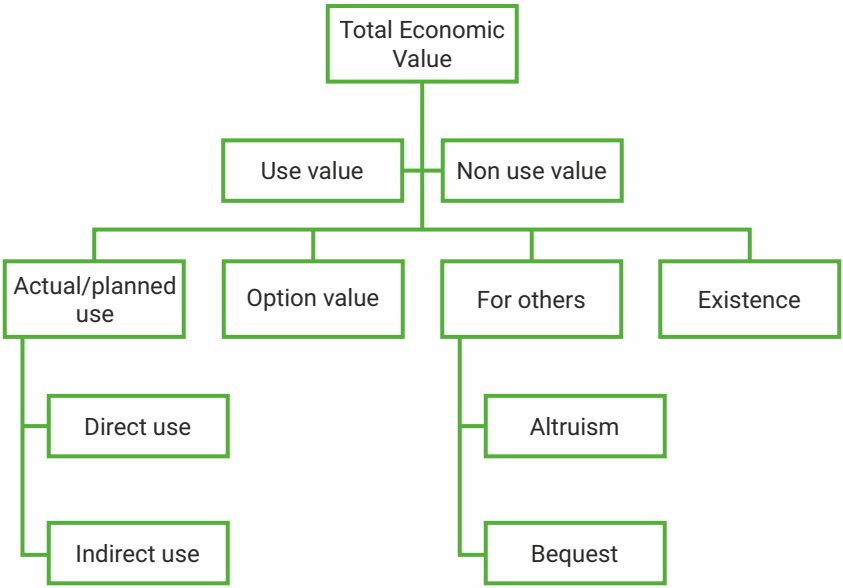
Just like other forms of capital, natural capital and the ecosystems services emerging from them also have an economic value associated with the utility value they provide for human society from their actual or potential use, whether through commodities or through other avenues.

This concept centres the need of human beings thus making it a human-centric approach to conserve our natural assets. This human-centric approach, focusing purely on utility values, is highly limited and fails to capture the broader values afforded by healthy ecosystems and biodiversity - a limitation that the Balipara Foundation's Naturenomics™ approach seeks to overcome.

There are two categories for eliciting the value of ecosystem services:

1) Economic valuation (also known as dollar based methods)

2) Non-economic valuation.



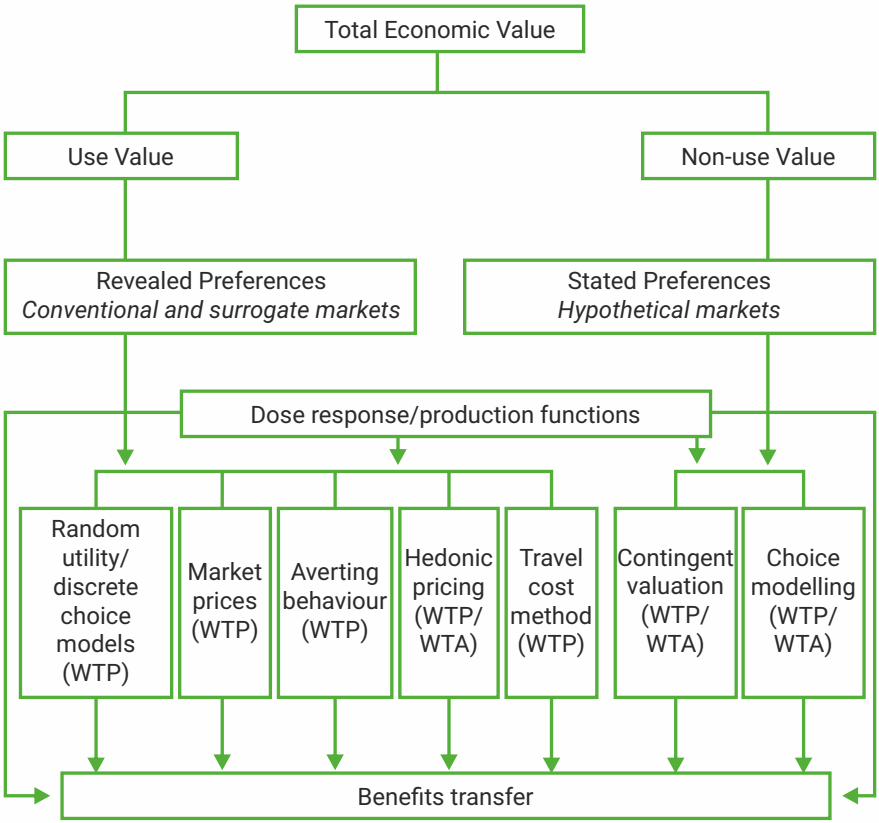
Economic value framework for valuation of ecosystem services

Use value includes direct use, indirect use and option value:

- Direct use value: when there is an actual/planned use of an ecosystem service. Its either consumptive (resources are extracted from ecosystems e.g. food, timber) or non-consumptive (services utilisation without resource extraction e.g. recreation, landscape amenity).
- Indirect use value: These services include key global life-support functions, such as climate regulation, water regulation, soil retention and provision, nutrient cycling; waste decomposition, and pollination. It is one of the most critical use values for the sustenance of life on earth.

- Option value: It provides the option to use a resource in the future even if someone is not a current user.

The value of natural resources is often considered within the framework of Total Economic Value (TEV), and this framework can be used to value ecosystem services. Valuation methods are also divided into willingness to pay (WTP), stated preference (where research participants are asked to value an ecosystem service) and revealed preference (where the preference is discovered, e.g. through measuring how much individuals are willing to pay to travel to a nature park).



Total monetary framework for valuation of ecosystem services

1. Market price method – can be applied to commodities traded on the market, e.g. oil, corn etc.

2. Productivity method – can be used for ecosystem services that contribute to the production of commodities, e.g. fresh water in an aquaculture pond.
3. Hedonic price method – can be used for ecosystem services that affect the economic value of other commodities, e.g. a forest which increases the value of properties around it.
4. Travel cost method – can measure the value of recreational areas by calculating how much people will pay to travel to and visit those sites.
5. Damage cost avoided, replacement cost and substitute cost methods/averting behaviour method – can measure the cost of avoided damage to ecosystem services, of replacing or providing substitutes for those services, e.g. the cost of artificial crop pollination in the absence of bees and other pollinating insects.
6. Contingent valuation method – can be used to elicit the value of any ecosystem service based on asking people to choose between ecosystem services.
7. Benefit transfer method/– estimates the value of ecosystem services based on an already completed valuation in another place.

When it comes to the valuation of ecosystem services, it is difficult to put a value to the kind of services that help a business grow by providing resources. The system of accounting becomes a bit complex as the same services might be used in several forms. But these methods can't stand true for all contexts as they differ for every individual. Bird watching can be an exciting activity for someone and their WTP to conserve bird habitats could be very high while on the other hand there can be people for whom presence or absence of birds is not an issue of concern. While such valuation techniques may help us get close to a number, the universality of these preferences is tough to achieve. However, proper sensitization and key policy formulation can be our first step towards developing a civilization on Naturenomics™ principles.

The valuation of natural capital and the emerging ecosystem services can be done when individuals ask fundamental question to themselves which is: how dependent is their everyday consumption on the health of the natural world and how are their actions impacting nature's ability to provide what they are dependent on?

NATURENOMICS™: PRESERVING NATURAL CAPITAL IN THE EASTERN HIMALAYAS

The Eastern Himalayan (EH) covers a total area of 5,24,190 sq.km, stretching from Eastern Nepal to Yunnan in China and encompassing Bhutan, the North Eastern states and north Bengal hills in India, South Eastern Tibet, and parts of northern Myanmar. Of the four global biodiversity hotspots present in India, it is home to one of the richest biodiversity hotspots- the Indo-Burma Hotspot. The Eastern Himalayas are also the "Water-tower for the 21st century", "The Third Pole", the largest cryospheric region outside the Poles, as 'hotspots of biodiversity' (Sharma, Tse-ring, Chettri, & Shrestha, 2010). The EH region has also been in the spotlight as a part of 'crisis Ecoregions' (Hoekstra et al. 2005), with 15% of the area officially designated protected areas. The EH region intersects 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 (WWF and ICIMOD 2001) (Sharma, Tse-ring, Chettri, & Shrestha, 2010).

States	NSDP (million rupees)	Change in dense forest cover between 2 years (sq km)	Gain/Loss in value(in million rupees) per year	Loss as % of NSDP per year	ESDP (million rupees)	ESDP/ NSDP
Arunachal Pradesh	1439754	-1448	-10108	289.6	67778	3.9
Assam	17395	-421	50382	-58.3	132412	0.42
Manipur	2632253	-2507	-24494	114.5	68731	2.14
Meghalaya	32048	828	36683	124.1	86092	2.24
Mizoram	38423	810	47669	-200.4	-16418	-1
Nagaland	16346	-1448	-32764	66.1	56919	1.66
Sikkim	768878	-1826	-57486	3.2	10720	1.03
Tripura	1367809	-492	-8869	273.7	211541	3.74

State Domestic Product adjusted for environment (Source: GIST)

In the year 2005, the Green Indian States Trust (GIST) did a comprehensive valuation exercise for all the states and UTs in India. The target areas were the forests for the carbon, timber, NTFP and fuel-wood, rendered ecosystems and the valuation of biodiversity within these forests. The previous table from the study shows the monetary value of the services provided by the natural assets of the north eastern states could make to the development of the region.

With such a huge range of biodiversity, the Eastern Himalayas provide a wide range of ecosystem services (provisioning, regulating, cultural, supporting). However, the natural assets of the region are also subject to rampant exploitation as it serves the resource need of two of the most populated countries i.e. India and China.

The current model of economic development forces us to make a choice between development and sustaining natural resources. As a consequence, fragmentation of ecosystems and loss of natural assets has become one of the major concerns in this trade off conflict. Naturenomics™ believes that we can have economic development while sustaining our natural resources. Naturenomics™ as a concept tries to resolve this issue of unsustainable economic growth by putting ecology in the centre of economics.

Over the years, our focus on sustainably leveraging the natural capital of the Eastern Himalayas for community livelihoods birthed Rural Futures – a vision for building natural assets for habitat restoration and improved socioeconomic mobility among communities. Through this, we sought to reframe the conversation on conservation to center communities. By building on their aspirations to drive ecology-centred economic growth and livelihood opportunities, communities are incentivized to protect natural assets: protecting and restoring habitats.

The following chapters in this volume traces the evolution of this idea, from theory into practice and into our long-term vision for turning the Eastern Himalayas into the world's first Naturenomics™ Civilization – leapfrogging environmentally destructive industrialization into 21st century environmentally friendly green growth.

BIBLIOGRAPHY

(n.d.). Retrieved from http://www.naturalcapitalforum.com/what-is-natural-capital

(n.d.). Retrieved from https://naturalcapitalcoalition.org/natural-capital-2/

(n.d.). Retrieved from https://www.eea.europa.eu/soer-2015/europe/natural-capital-and-ecosystem-services

(n.d.). Retrieved from http://www.ecetoc.org/report-125/introduction/protection-goals-risk-assessment-management/evolution-ecosystem-approach/

(n.d.). Retrieved from https://seea.un.org/content/natural-capital-accounting-and-valuation-ecosystem-services-india

(2005). Ecosystem Profile: Eastern Himalayan Region . Kathmandu, Nepal : Critical Ecosystem Partnership Fund (CEPF).

Baglini, N. A. (2002, April). Protecting Natural Capital: An Editorial and Introduction. The Geneva Papers on Risk and Insurance. Issues and Practice, pp. 147-151.

Costanza, R., d'Arge, R., Groot, R. d., Farberll, S., Grassot, M., & Hannon, B. (1997). The value of the world's ecosystem services and natural capital. Nature , 253-260 .

Cowie, R. H. (2003). Terrestrial Ecoregions of the Indo-Pacific A Conservation Assessment by Eric Wikramanayake, Eric Dinerstein, Colby J. Loucks, David M. Olson, John Morrison, John Lamoreux, Meghan McKnight Prashant Hedao (2002), xxix 643 pp., Island Press, Washington, Covelo London. Oryx, 37(1), 119–121.

DEFRA. (2007). An introductory guide to valuing ecosystem services. London : Department for Environment, Food and Rural Affairs, UK .

Guerry, A. D., Polasky, S., Lubchenco, J., Chaplin-Kramer, R., C.Daily, G., Griffin, R., et al. (2015). Natural capital and ecosystem services informing decisions: From promise to practice. Proceedings of the National Academy of Sciences of the United States of America, 7348-7355.

Gundimeda, H., Sanyal, S., Sinha, R., & Sukhdev, P. (2005). The Value of Timber, Carbon, Fuelwood, and Non-Timber Forest Products in India's Forests. New Delhi : Green Indian States Trust.

Gundimeda, H., Sanyal, S., Sinha, R., & Sukhdev, P. (2005). The value of biodiversity in India's forests. New Delhi : Green Indian States Trust .

Gundimeda, H., Sanyal, S., Sinha, R., & Sukhdev, P. (2005). The value of biodiversity in India's forests. New Delhi : Green Indian States Trust .

Kumar, P., Sanyal, S., Sinha, R., & Sukhdev, P. (2005). Accounting for the Ecological Services of India's Forests: Soil Conservation, Water Augmentation, and Flood Prevention. New Delhi : Green Indian States Trust .

Myers, N., Mittermeier, R. A., Mittermeier, C. G., Fonseca, G. A. B. D., & Kent, J.

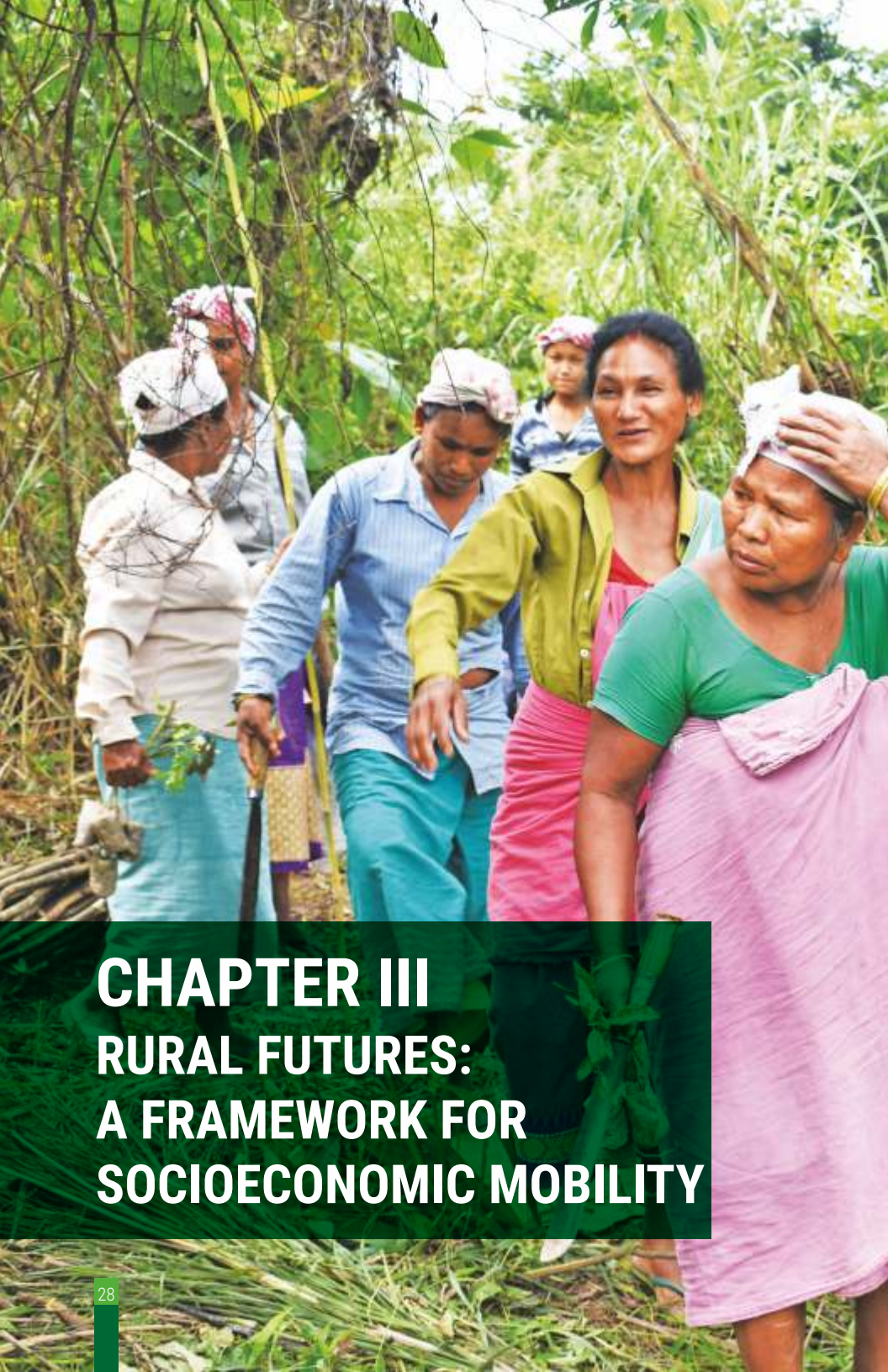
(2000). Biodiversity hotspots for conservation priorities. Nature, 403(6772), 853–858.

Rasul, G., Chettri, N., & Sharma, E. (2011). Framework for Valuing Ecosystem Services in the Himalayas . Kathmandu : ICIMOD .

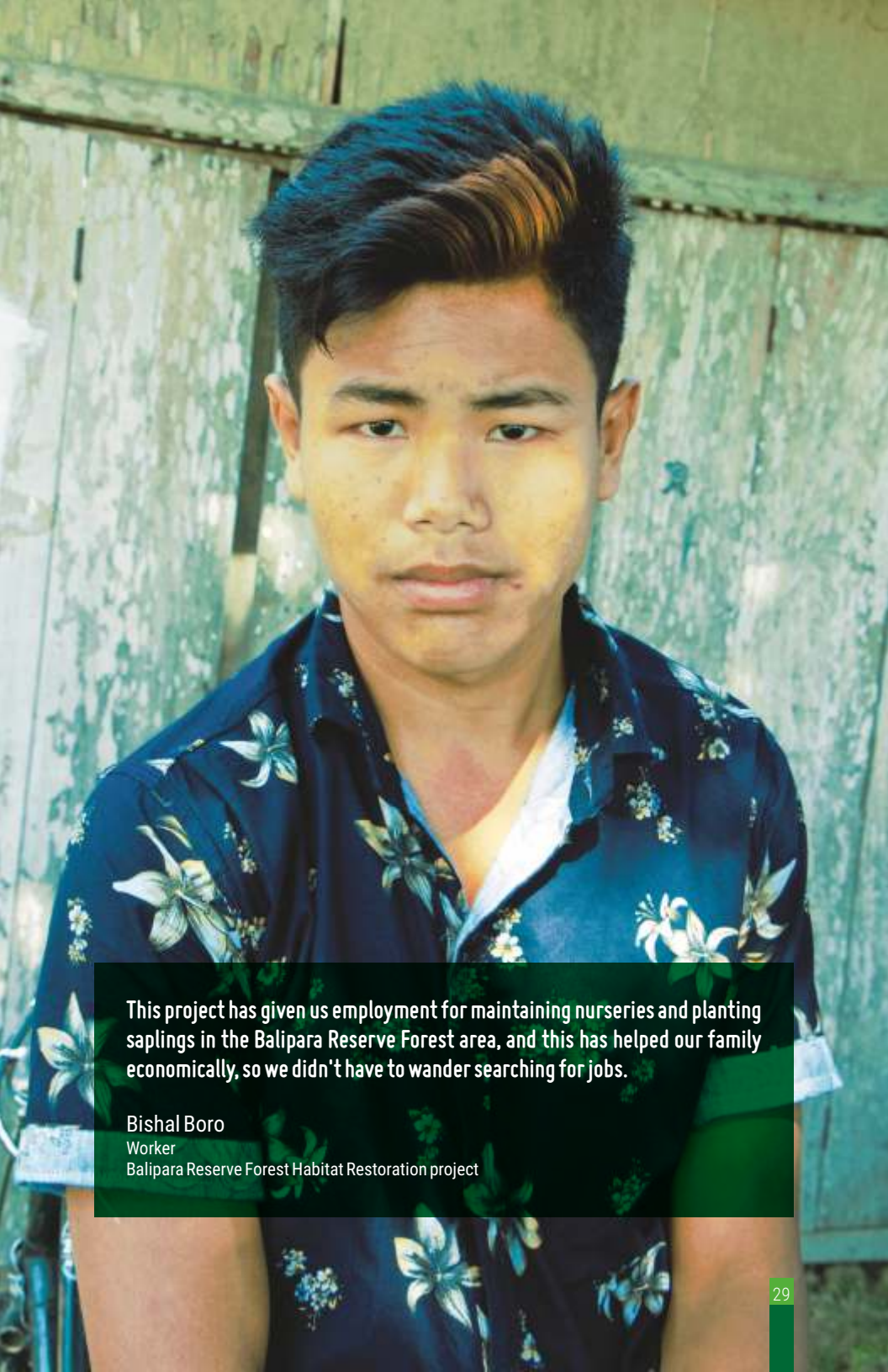
Sharma, E., Tse-ring, K., Chettri, N., & Shrestha, A. (2010). Biodiversity in the Himalayas – Trends, Perception and Impacts of Climate Change. Kathmandu: International Centre for Integrated Mountain Development.

Singh, S. P. (2007). Himalayan Forest Ecosystem Services Incorporating in National Accounting. Nainital : Central Himalayan Environment Association (CHEA).

WALDEGRAVE, L. (2017, July). Retrieved from https://circulatenews.org/2017/07/what-is-natural-capital/



CHAPTER III
RURAL FUTURES: A FRAMEWORK FOR SOCIOECONOMIC MOBILITY



This project has given us employment for maintaining nurseries and planting saplings in the Balipara Reserve Forest area, and this has helped our family economically, so we didn't have to wander searching for jobs.

Bishal Boro
Worker
Balipara Reserve Forest Habitat Restoration project

SOCIO-ECONOMIC MOBILITY – AN INTRODUCTION

Social Mobility is defined as the movement of people, families or other categories of people between different social strata. Inevitably, in the modern age, social mobility is intrinsically linked to economic mobility, which boils down to the basic income of an individual or a household. Various factors have been associated with upward social mobility – most important of which are access to basic amenities (education, water, health) (OECD, 2018). All of these aspects are directly or indirectly connected with one's income. A better education, a key component for social mobility, enables the population to aspire for better jobs and better jobs mean higher incomes. Industrialisation of societies was and is largely associated with large-scale production centres – thereby creating more jobs – and therefore, a higher income and consequent social mobility (Clark et al., 2015).

Conservation projects today categorize local communities as "beneficiaries". It makes sense only over the short-term. Therefore, the objectives of conservation projects & programs will have to include proportionate elements of social mobility together with species protection & habitat restoration. The long-term objective is for these communities to become "owners" of conservation projects.

The ideal form of community participation would be voluntary in nature, rather than being achieved through motivation and predictions of the apocalypse. In the Eastern Himalayas, water, sanitation, health and education represent key hurdles to social mobility for the forest fringe villages, pressurizing them to turn to natural capital destruction as a means to achieving socioeconomic security. Ensuring socio-economic security to forest communities will empower and enable communities to not just participate, but more importantly, contribute towards conservation.

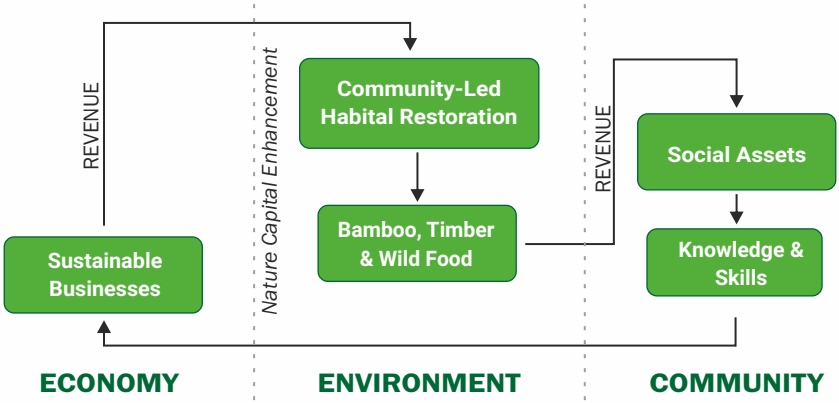
We aim to ensure that each step of this framework leads to economic or social mobility for the local community so as to 'incentivise' this step-wise approach to long term sustainability and ecological preservation. Community involvement in habitat restoration is remunerated using a system of daily stipends and long term revenue generated through this natural assets is used in a common pool system for community benefit and use. The objective of this project is to build sustainable

infrastructure like water access and eco-housing to provide holistic support to the local communities (through nature capital derived revenue for community use & benefit). These hurdles will be overcome by monitoring and facilitating the delivery of investments made by the government for social infrastructure and also increasing ownership and therefore longevity through Information, Education, Communication (IEC) & Behaviour Change Communication (BCC) Programs. In addition, use revenue generated to create new and useful amenities, which would incentivise life in rural areas and therefore, reduce the need to move to densely populated & heavily strained urban centres (desperate migration).

WHAT IS RURAL FUTURES?

The Rural Futures model provides the framework for the actualisation of the Balipara Foundation's vision of building the Naturenomics Civilisation in the Eastern Himalayas. Rural Futures is based on the analytical principles of Naturenomics, which assist in aligning the interdependency between nature & economics, restoring ecologies & enhance outcomes from sustainable businesses.

Through Rural Futures, the Balipara Foundation aims to both strengthen communities and local habitats by creating sustainable livelihoods through habitat restoration projects. With better livelihoods, pegged to the well-being of the natural world, we believe that communities will be better equipped to meet both socio-economic challenges, as well as the future impending challenges posed by climate change.



An action model for the Rural Futures Framework

The Rural Futures framework functions as a positive feedback loop model. Rural Futures entails holistic community development, and the creation of rural ecosystems through optimisation of natural capital & assets. Central to the Rural Futures framework is 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. Further to this, 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. Part I of this project focuses on using funds for socioeconomic & environmental impact to mobilise a community workforce dedicated to restoring degraded habitats through scientific afforestation (trigger for the positive feedback loop).

This initial economic impetus through the first in a series of ecosystem-related services generates upward socio-economic mobility and attracts a downstream value chain (fueled by nature capital liquidation) enhancing social infrastructure services such as healthcare & education. This value chain creates a feedback for further restoration of habitats through ecosystem derived revenue and creates a self-propelling positive feedback loop. Part II of this project would be the extension towards creating a model scenario for rural Eastern Himalayas, in which, ecosystem generated services provide revenue and this revenue will be used to create social & social delivery assets leading to upward socio-economic mobility.

ENVIRONMENT: COMMUNITY-LED HABITAT RESTORATION

This functions as the initiating factor and the trigger for the feedback loop

Central to Rural Futures is the restoration and management of Wild Habitats across the Eastern Himalayas, which, in turn, strengthens the 'Natural Capital' pool of the region. Essential to this programme is ensuring community participation & building a 'bottom-up' strategy for project execution. 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

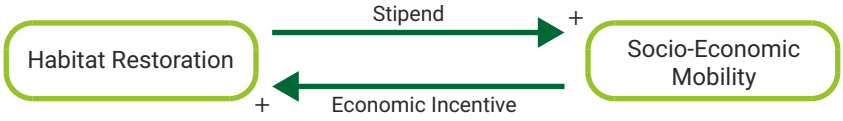
corridors. It is these human habitats that lie on the forefronts of climate change, man-animal conflict and complete lack of social & social delivery assets. We believe that for effective conservation and long-term sustainability of our natural assets, it is imperative that the forest-fringe communities 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.

The habitat restoration process is initiated using the following steps –

I) **Identification of deforested land** – the causes for deforestation range from overgrazing to excessive timber logging and almost always grow in severity with the increase in human population in and around the forest area

II) **Gauging & building community interest towards nature-based livelihood programmes** – forest-fringe communities are amongst the least empowered and have little to no access to social delivery assets. Their land-holdings are small, unauthorized and ability to engage in activities other than agriculture is low.

III) **Afforestation as employment** – The first economic incentive is provided to the forest-fringe communities by launching a stipend-based system for collecting seeds, maintaining nurseries, planting trees & providing citizen-science services.



Stipend-based incentivisation of afforestation creates a mini feedback-loop of intermittent socio-economic mobility which enhances community interest in habitat restoration

COMMUNITY: KNOWLEDGE & SKILLS

Community knowledge plays an important role in allowing for growth in communities' ability to self-organise and create structures of governance, enhance decision-making & allow for evolution in thought to adapt to changing needs and involvement of youth. This serves as an essential intermediate accomplishment (occurs in phases & functions in parallel to enhance outcomes) and is essential towards building long term community sustainability & autonomy.

I) **Integrating indigenous knowledge systems & modern citizen science approaches** – rural futures acknowledges indigenous knowledge systems of local communities and uses modern citizen sciences approaches to enable enhancement of community knowledge towards phenology, germination & plantation techniques to enhance survivability of infant fauna and to build long-term interest in the science of nature.

II) **Financial awareness** - local communities are linked to banks and provided with information of different government and related schemes, the rules to open accounts and the benefits that accrue thereof, facilitating wage payment during the project. This training is essential in building basic financial management skills among communities, better empowering them to manage their own finances and effectively allocate resources.

III) **Climate and environmental awareness** - to understand how forest conservation reduces the effects of global warming, as well as the role of forests in feeding & sheltering animals, birds & insects, maintaining ecological balance and preventing soil erosion.

IV) **Forest Development Community** - Information on forest development community to facilitate effective community decision-making in forest management and land-use.

V) **GIS, GPS and RS Training** - technical training to empower communities to effectively map and monitor habitats & natural capital independently

COMMUNITY: SOCIAL ASSETS

These are factors that enhance upward social mobility of communities & households and can function independently of household/individual income but are dependent on the management of the natural resource pool of the community.

Revenue generation for the local community through a stipend-based afforestation programme creates a strong initial economic impetus towards enhancing community momentum & will. In the long term, we envision that the liquid 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

We believe that 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.

A detailed description of how Nature Capital will be used to provide the aforementioned services is provided in chapter 3b.

COMMUNITY: SUSTAINABLE BUSINESSES

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:

I) **Eco-tourism:** the eco-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

II) **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. We envision a central packaging and processing unit to assist small-holder farms in getting their produce out in the market.

III) **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.

IV) **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.

This leads to a step-wise increase in economic mobility: i) stipends for engaging in nursery & afforestation related activities, ii) stipends for participation in awareness and skill-building workshops, iii) start-up funds & environment for setting up of businesses, iv) revenue/delivery of basic assets from nature capital liquidation towards overall socio-economic mobility.

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

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

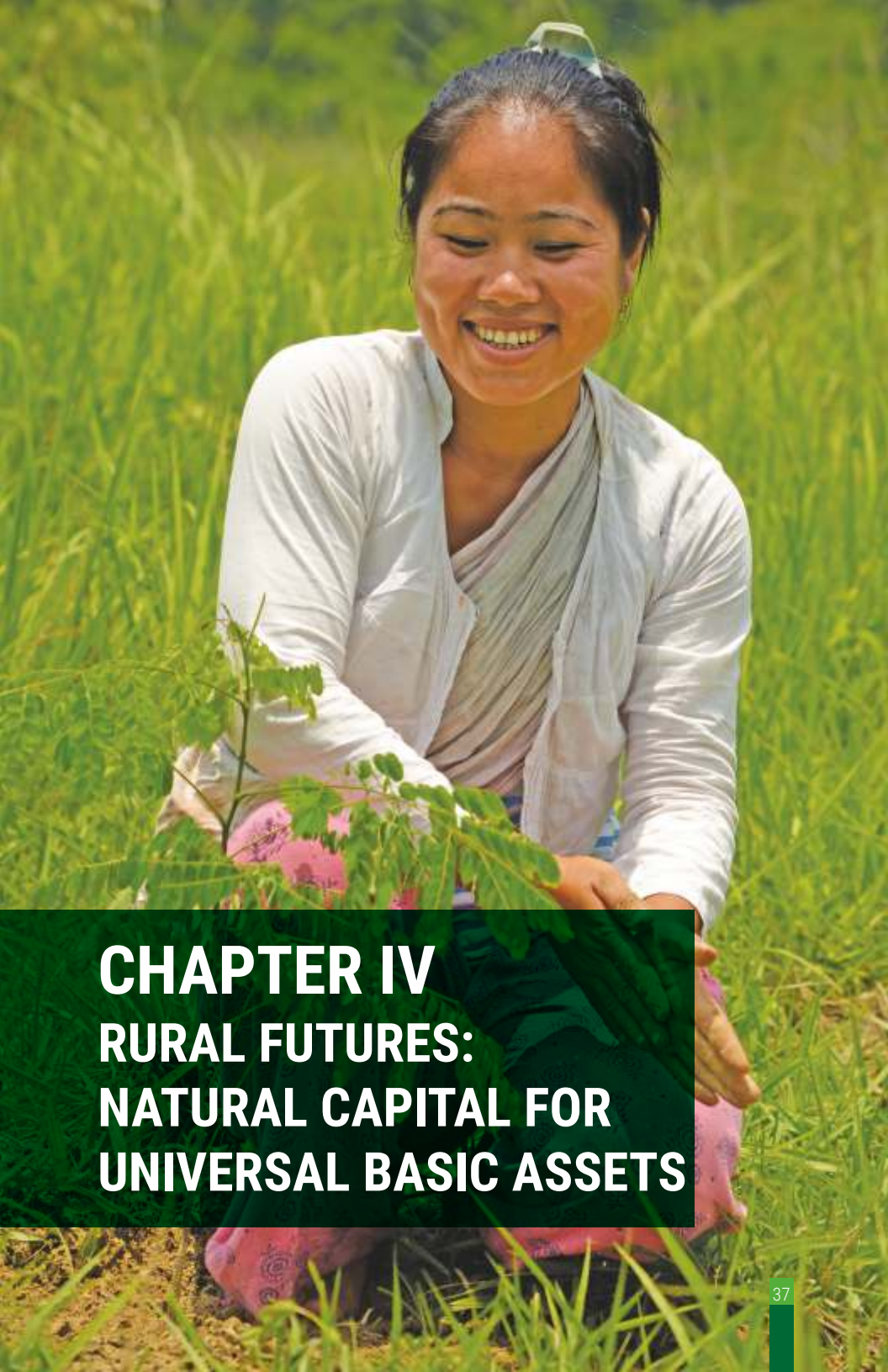
Phase II) Direct/Indirect & medium-term socio-economic mobility through alternate businesses – local communities would require a certain set of skills to be able to kick-start these businesses and this learning-phase requires approximately two years (based on our experience at Udalguri, presented in chapter 5). 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.

Phase III) 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. Details on this are presented in chapter 4.

BIBLIOGRAPHY

Clark, G., Cummins, N., Hao, Y., & Vidal, D. D. (2015). The Son Also Rises: Surnames and the History of Social Mobility. Princeton, NJ: Princeton University Press.

OECD. (2018). A broken social elevator? How to promote social mobility. Retrieved from https://www.oecd.org/els/soc/Social-Mobility-2018-PolicyBrief.pdf



CHAPTER IV
RURAL FUTURES: NATURAL CAPITAL FOR UNIVERSAL BASIC ASSETS

If local communities are meant to be the key custodians of our natural assets, then it is only natural that grassroots organizations that directly represent these communities play lead roles.

Dibakar Nayak
Vice-President
Green Valley Wildlife Protection Society

The concept of natural assets based investments for improved community well-being and wealth is not a new one. Perhaps the most famous existing examples of these today are Alaska's Permanent Fund Dividend and Norway's sovereign wealth fund, both of which use investments and revenues from oil to invest in social infrastructure (Norway) or pay dividends to citizens (Alaska). While fossil fuels are incompatible with the Naturenomics™ vision for economy, there have been other proposals for natural assets backed investments for building community wealth.

Most notable among these has been the work of Professor Guy Standing, founder of the Basic Income Earth Network, who has proposed a commons-backed dividend for the United Kingdom (2018, 2019). Using a mix of taxes on ecologically destructive businesses and earnings on leases for commons, he proposes the possibility of a (largely) unconditional basic income for all citizens of the United Kingdom. Over time, as this fund grows, so too do income dividends to people. In theory, therefore, the commons become an earning asset for the citizens of the United Kingdom, reinforcing their value in the mind of the general public.

Over 400 million people in India live next to or within its forest areas and this has led to massive uni-directional extraction of our natural assets. Through Rural Futures these forest-fringe communities become the primary stakeholders in natural asset regeneration, making them the stewards of the conservation agenda. The Balipara Foundation's vision for the Eastern Himalayas lies in tapping into its rich natural capital and natural assets, to build socioeconomic mobility that extends far beyond the purview of sustainable agroforestry derived businesses. Through natural capital values, we believe communities can create the means for investing in social infrastructure a la the Norway model, but backed by natural capital enhancement and not destruction, to create access to universal basic assets.

NATURAL CAPITAL ENHANCEMENT - A 10 YEAR PLAN

The Balipara Foundation's 10 year plan crosses over conservation, human needs and the theory of Naturenomics™, using natural assets as a basis for building community wealth in the Eastern Himalayas. Under the Naturenomics™ design socio-economic and ecological projects can provide a base for

- Improvement of habitats
- Propagation of sustainable community-managed forestry which serves as a source of revenue & food over time (of at least 10 years)
- The creation of higher value chain businesses such as mindful natural tourism, organic weaves, natural/herbal medicines and sustainable handicrafts

Based on rough, tentative calculations, we believe restored habitats in the Eastern Himalayas will accrue a significant natural capital value that can effectively be used as an economic floor for investing in the future of communities. Using a mix of parameters, including basic commodity values such as timber, fodder and fuelwood and secondary "invisible" values such as ecotourism, carbon storage and soil loss prevention, it is possible to calculate the value of a single hectare of forest in Assam.

Component	Value per hectare (INR)
NTFP	271.20
Fodder	117.20
Timber & fuelwood	164,829.00
Carbon	33,556.00
Ecotourism	410,754.50
Bioprospecting (WTP)	100,760.00
Soil loss	1179.80
Water recharge	436.60
Flood avoidance	1368.42
TOTAL	**713,272.72**

Per hectare forest value in Assam (Soure: GIST, 2006; FSI: 1997, 2001 & 2003)[1]

[1] Values for timber, fuelwood and carbon are calculated against forest cover in 1997; Soil loss, water recharge & flood avoidance are calculated against forest cover in 2003; Ecotourism is calculated against forest cover in 2001 - as per values provided by GIST.

These figures were calculated for natural capital values across 1997-2003, with a per capita average income per annum of INR 203,792 at a baseline of 70 households of 5 people accessing a square kilometer of forest. Controlled for inflation, the values today are likely to be even higher, representing a highly underleveraged form of income for forest-fringe communities. With added ecosystem services values accounted within the natural capital of forests, the base value is enough to easily support forest-fringe communities even in economic terms, if liquidated in a sustainable fashion.

As described in the previous chapter, the Rural Futures plan is geared towards enhancing these natural capital values both through restoring healthy habitats and through agroecology (including agroforestry) to improve yield values of land. In this way, habitats accrue value as they grow, in the same way that assets accrue value by being maintained, improved or otherwise invested in. The emergent economic incentives reshape community paradigms and ease the economic pressures to destroy habitats, to turn them into tradeable commodities.

The initial economic stimulus is essential to give communities the chance to achieve a level of income security. With this added security, they are better placed to invest in entrepreneurial activities and develop higher value chain businesses around the pillars of agroforestry/ agroecology and mindful natural tourism, with natural assets as a base. This creates a self-reinforcing value cycle, further incentivizing communities to invest in enhancing and regenerating natural assets to ensure the longevity and stability of their incomes for the future.

In achieving greater socioeconomic mobility through Rural Futures, communities have better access to essential services needed for human wellbeing, including services such as healthcare, education and connectivity, via an increased capacity to pay for these services. As noted in the previous chapter, the Rural Futures action framework, however, goes far beyond a question of access to hypothesize that natural assets could create a revenue based system for effectively and equitably delivering these services and assets to communities. The natural capital values of these restored assets, if sustainably liquidated, could provide a revenue stream for building the social infrastructure, delivery systems and local capacities - resources and governance based needs - needed to build assets and services to forest-fringe communities.

UNIVERSAL BASIC INCOME OR UNIVERSAL BASIC ASSETS?

Experiments on creating safety nets for communities have recently focused on delivering universal basic income, creating an income floor and giving poorer families much needed income security. Pilot models around the world have been tested with varying degrees of success, the result of many complicated factors. An analysis of "unconditional" cash transfer programmes in Sub-Saharan Africa - a close approximation of universal basic income schemes - indicates that contrary to the common criticisms levelled at universal basic income, people do not spend on tobacco or alcohol, they do use the incomes where they can to establish small businesses, little to no impact on local economies via inflation and little to no dependencies (Handa et al, 2018). Pilot schemes in Finland, India, the US and Germany indicate similar success (Standing, 2019) and globally, political parties are beginning to explore the idea as a tenable option for enhancing citizens' well-being.

There are, however, criticisms of the universal basic income model besides fears of incentivizing poor economic behaviour and shocks to local economies. All the existing pilots have been conducted over a short term period that makes it difficult to ascertain the long-term effects a UBI scheme may have on social, economic and political structure. Most of these pilots have been funded by private entities (i.e. NGOs and multilateral organizations) and in many of them, come with an in-built conditionality where money is distributed to those below a certain income level - factors which contribute to a distortion of results. Coote and Yazici (2019) observe that a universal basic income guarantee does not necessarily guarantee community autonomy or control over decision making and governance processes, particularly among developing nations, and neither do they guarantee continued investment in essential infrastructure and services needed for community development.

Perhaps the most comprehensive test case for a universal basic income style model exists in Alaska's Permanent Fund Dividend, where individual Alaskans have been receiving a yearly dividend/payout from the state's revenue investments in oil and gas since the 1980s. Goldsmith (2011) notes that the model has its positives in providing much needed income for rural Alaskans and indigenous communities who otherwise operate subsistence economies. The dividend also gives poorer income families with the liquidity to make investments in durable consumer goods that improve general quality of life in the long-term.

However, the model has its downsides: the dividend dominates the Alaskan political landscape to the detriment of other policies and infrastructure investments (Goldsmith, 2011; Sundlee, 2019; Zelleke, 2012), entrenches oil and gas dependencies in the economy and has not led to a demonstrable shift in community attitudes towards governance of the resource (versus a vague entitlement to its control) (Goldsmith, 2011).

In the Eastern Himalayas, natural capital could form the base for universal basic income among communities. But with Rural Futures' goal of self-sufficient communities, a truly sustainable model for natural capital liquidation must orient itself away from quick fixes towards long-term solutions. In high income countries such as Germany and Finland, where the existing social infrastructure is robust, a universal basic income serves as an extra social security net that allows people to invest in building their own entrepreneurial businesses. However, in the Eastern Himalayan context, where forest-fringe communities have poor access to basic social infrastructure, building Universal Basic Assets and Universal Basic Services are a far more robust alternative, focused as they are on investments in building social infrastructure with equitable access to all.

Defined as the right to access a larger life, by the Institute for Global Prosperity (2017), Universal Basic Assets and Universal Basic Services are a cluster of services that contribute to meeting three key human needs in a participatory democracy: safety, opportunity and participation. Communities thrive when these three needs are met, empowering them to both better socioeconomic mobility and civic engagement and management. Focusing on services and assets over income halts the increasing commodification of essential human needs, reframing them as essential social components that all people must have the right to access - not just the right to access only if they can pay.

We believe these twin goals of socioeconomic mobility and civic empowerment in the Eastern Himalayas are best achieved through the delivery of Universal Basic Assets over universal basic income, via Universal Basic Assets' focus on directly enriching human well-being and delivering basic social security to communities - vital for forest-fringe communities, who lack this basic human right. Equitable access to these basic resources enable communities to thrive socioeconomically: water, education, healthcare, energy, housing & community space infrastructure, natural capital markets and connectivity. We believe by creating access to these basic assets, forest-fringe communities will have a stronger social security net - on par with high income countries such as Germany and Finland - enabling them to use their existing income streams to invest in developing sustainable businesses that will provide for their income security while restoring or

enhancing local ecologies, instead of spending income on accessing basic social infrastructure to meet their basic needs.

Through equitable access to Universal Basic Assets, communities fulfil their key basic needs while freeing up their income to access better opportunities for developing alternate livelihood streams that eliminate the tension between human needs and the natural world. This creates a new benchmark for quality of life indicators, transitioning from consumption related indicators to security and ecology derived indicators that better measure the health of both communities and environments.

UNIVERSAL BASIC ASSETS THROUGH NATURAL CAPITAL

Natural capital, therefore, 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 indicate show us 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.

The delivery of Universal Basic Assets must be developed with a holistic perspective in mind, designed to develop self-sufficiency and food security, while creating equitable access to high quality, eco-friendly infrastructure and universal basic assets. These assets must be delivered in an ecologically sensitive manner, while maintaining state of the art quality. Through this the Balipara Foundation visualizes a complete transition to renewable energy use, the development of high quality low-carbon eco-housing fusing traditional designs & materials and modern technology, clean water access, state of the art healthcare powered by solar energy, holistic educational models with a strong focus on ecology and the development of enriching community spaces for sharing cultures and nurturing young people.

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.

Community based farming spaces aims at recreating the commons, giving communities equitable access to fresh and healthy food sources, while shortening the distance that food has to travel – reducing food wastage and emissions for transportation. This builds self-sufficiency and local food security by reducing dependency on external markets for income opportunities, as well as external supply chains. In time, these value chains and natural capital rich commons can be nurtured into developing the base for alternative eco-friendly businesses that leverage natural assets, rejuvenating local economies.

UNIVERSAL BASIC ASSETS

Renewable Energy

Off-grid solutions via a complete transition to renewables to power both households, community spaces and facilities and the elimination of energy waste

Transformative Living & Community Spaces

Using sustainable materials & processes, blending traditional design and modern technology for low carbon and resilient, living structures and spaces, particular public spaces for facilitating community engagement in civic decision-making

Water Access

Sustainable water access solutions across the community, to ensure that all households have access to clean, potable water and in the future, to develop the capacity for recycling water use to minimize water resource usage

UNIVERSAL BASIC SERVICES

Education

High quality education with a view to developing the region as a hub for

nature learning, developing community skills for agroforestry & natural resource management and becoming a showcase nature university internationally

Healthcare

State of the art healthcare facilities, including telemedicine, powered 100% by renewable energy

Waste Management

Creating a zero waste, low carbon economy by leveraging natural assets for sustainable packaging material, livelihoods and daily use (e.g.bamboo)

Connectivity

Wildlife friendly road & water connectivity, developed with sustainable materials & powered by renewable, clean energy

Civic Engagement/Legal & Democracy Services

Local institutions and bodies for managing natural assets to deliver universal basic assets, empowering communities to effectively allocate resources according to immediate community needs

Information, Knowledge & Technology

Community access to scientific and knowledge tools, to strengthen their capacity to manage natural assets, innovate, develop sustainable businesses and create thriving community governance bodies

SELF-SUFFICIENCY, FOOD SECURITY, LIVELIHOODS

Community-Centred Organic Farming

Transforming kitchen gardens through organic farming and sustainable agroforestry, creating healthy, sustainable & environmentally friendly food, medicinal and commercial crop, while eliminating dependency on field crops

Bioresource Development

Developing the rich naturally occurring bioresources of the region as sources of income, nutrition and medicine through sustainable use

Sustainable Business & Alternative Livelihoods

Through the development of nurseries, recycling & use of habitat management-based residues such as water hyacinths and organic, fair trade traditional arts and crafts

BIBLIOGRAPHY

Balipara Foundation. (2007). *Naturenomics™ Vol. 1: Nature and Economics, Nurturing Interdependence.*

Coote, A. & Yazonic, E. (2019). *Universal Basic Income: A Report For Unions. New Economics Foundation.*

Goldsmith, S. (2011). *The Alaska Permanent Fund Dividend: A Case Study in the Direct Distribution of Resource Rent.* The Institute of Social & Economic Research, University of Alaska: Anchorage.

Gundimeda, H., Sanyal, S., Sinha, R., & Sukhdev, P. (2005). *The value of timber, carbon, fuelwood, and non-timber forest products in India's forests.* New Delhi: Green Indian States Trust.

---------- (2006). *The value of biodiversity in India's forests.* In Green Accounting for Indian States Project: Monograph, 4. New Delhi: Green Indian States Trust.

Handa, S., Daidone, S., Peterman, A., Davis, B., Pereira, A., Palermo, T., & Yablonski, J. (2018). Myth-busting? Confronting six common perceptions about unconditional cash transfers as a poverty reduction strategy in Africa. *The World Bank Research Observer, 33(2), 259-298.*

Kumar, P., Sanyal, S., Sinha, R., & Sukhdev, P. (2006). *Accounting for the ecological services of India's forests: soil conservation, water augmentation, and flood prevention.* In Green Accounting for Indian States and Union Territories Project (Monograph 7). New Delhi: Green Indian States Trust.

Ministry of Environment, Forest & Climate Change. 1997. *Forest Survey of India - 1997.* Retrieved from: http://fsi.nic.in/documents/sfr_1997_hindi.pdf

----------. 2001. *Forest Survey of India - 2001.* Retrieved from: http://fsi.nic.in/documents/sfr_2001_hindi.pdf

----------. 2003. *Forest Survey of India - 2003.* Retrieved from: http://fsi.nic.in/documents/sfr_2003_hindi.pdf

Portes, J., Reed, H., & Percy, A. (2017). *Social prosperity for the future: A proposal for Universal Basic Services.* Institute for Global Prosperity: London.

Standing, G. (2018). *Rentier Capitalism and the Precariat: The Case For A Commons Fund.* In: McDonnell, J. (eds) Economics for the Many. Verso: London.

----------. (2019). *Piloting Basic Income as Common Dividends. London: PEF.*

----------. (2019). What has a year of experiments taught us about basic income? *World Economic Forum.* Retrieved from: https://www.weforum.org/agenda/2019/01/trial-phase-2018-in-basic-income-in-review/. Accesed: 07/10/2019

Sundlee, S. (2019, September 5). Alaska's universal basic income problem. Vox. Retrieved from: https://www.vox.com/future-perfect/2019/9/5/20849020/alaska-permanent-fund-universal-basic-income. Accessed: 07/10/2019.

Zelleke A. (2012) *Basic Income and the Alaska Model: Limits of the Resource Dividend Model for the Implementation of an Unconditional Basic Income.* In: Widerquist K., Howard M.W. (eds) Alaska's Permanent Fund Dividend. Exploring the Basic Income Guarantee. Palgrave Macmillan: New York.

CHAPTER V
NOTES FROM THE FIELD: UDALGURI LANDSCAPE MISSION

Our inspiration comes from the Gethsamane JFMC. We are thrilled at the opportunity and the privilege of being empowered to create our own forest asset. Executing a challenging project such as this brings a community together and gives us a reason to organize & mobilize. It challenges us to plan ahead and opens our minds to many opportunities. I think that is pretty good enough.

Proloy Daimary
President
Dhunseri Joint Forest Management Committee

UDALGURI LANDSCAPE MISSION – IN A NUTSHELL

GEOGRAPHY: Udalguri District – Bhairabkunda

YEAR: 2017 onwards

PROJECT INVESTORS: Axis Bank Foundation, SBI Foundation, GMS

GOAL: Habitat restoration through participatory community involvement, with a view to creating socioeconomic mobility and livelihood opportunities through habitat restoration

IMPACTS: 464,000 natural assets, >300 hectares restored, INR 7.7 million in community incomes, 7105 people impacted

THE CONTEXT

In 2017, the Balipara Foundation launched its first habitat restoration project in Udalguri district as the culmination of a decade of learnings in the conservation sphere. Through our early work, we had begun to realize that while single species conservation tackled a symptomatic problem – shrinking Asian Elephant populations in our case – it failed to deal with the root cause of endangerment: disappearing habitats.

Restoring habitats, however, is a high effort task and calls for a broad coalition of support to make it successful. Many of the regions bordering Asian Elephant habitat corridors are occupied by communities dependent on the forests for their livelihoods and survival. Faced with serious economic pressures and poor incomes, forest-fringe communities resort to unsustainable forest use, leading to rapidly depletion of habitats in the region. In the absence of an economic incentive to cease this deforestation, the communities have no tangible support base to fall back on as a means for generating strong livelihoods.

The Rural Futures model was first developed in the context of this conflict between human aspirations and biodiversity needs, seeking to reconcile the tensions between the two by providing communities with an economic incentive for habitat restoration.

Udalguri district was chosen as a pilot for this project because of its centrality to an Asian Elephant habitat corridor stretching from Assam to Arunachal Pradesh and crossing over into Bhutan. Rampant habitat loss in the region had exacerbated human-elephant conflict, with serious consequences for both communities and for elephants in the region.

But more vitally, long before Balipara Foundation had begun engaging with communities in the region, a coalition of community members had come together to form the Bhairabkunda Joint Forest Management Committee in 2005 with a view to reforesting the Bhairabkunda Reserve Forest. Decimated by flash floods in 1989, the forest had become a wasteland of rubble and boulders displacing the wildlife in the region. The Bhairabkunda JFMC began with the ambitious aim of restoring the forest's 22 square kilometres. Over time, they went on to form six additional JFMCs to carry out afforestation activities across the region. Together, they restored over 750 hectares and planted over 1.5 million trees to create a unique man-made forest. Their self-organized action won them awards and accolades – with justification, for 35 men and women across 29 communities to come together to recreate a mini-forest is no mean feat.

It seemed that the best place for the Balipara Foundation to start was under their aegis, partnering with them to build alternate livelihood opportunities through habitat restoration, organic products and ecotourism. With their help, and with the investment support of the SBI Foundation and Axis Bank Foundation, the Balipara Foundation launched a programme to create 300,000 natural assets and create INR 2.5 million in income for the communities. Upon maturation, this restored forest (of 1500 hectares) would then provide a per capita income of approximately INR 150,585 annually.

As a first project, the learning curve was steep, as we negotiated unfamiliar terrain: social, cultural and even within the conservation sphere. At the end of it, however, of all the learnings we accrued through the ups and downs of the project, a single key learning had emerged –

habitat restoration was a socioculturally embedded process and it was specifically that social and cultural history, here in Udalguri, that had paved the way for the project's highest points.

THE BACKGROUND

Udalguri is one of four districts that fall under the Bodoland Territorial Council. Beginning in the late 1980s, the district was one of several that saw the emergence of the Bodoland liberationist movement. In time, a militant separatist movement emerged. The violence engulfed five districts, with death tolls reaching the hundreds, and displacement of thousands across the area. Nearly some 7 million people were seriously impacted by the movement and the scars of this movement are still write large on this district's economy. 80% of Udalguri still falls under the moderately poor category of the Multivariate Poverty Index, with poor access to healthcare and education (Maity, 2018).

The causes of this conflict and emergent liberation movement are varied and scholars lend weight to different flash points depending on their perspectives: immigration, poverty, poor development, political neglect, land tenure and incoherent government policy (Banerjee, 2011; Misra, 1989; Benedikter, 2009; Misra, 2012; Vandekerckhove and Suykens, 2008). At its most historic root, the Bodoland conflict can be traced down to colonial land use and forestry policy, which disenfranchised Bodo communities access to land tenure and redistributed control to colonial administrators for tea and for commercial forestry. Many of the ethnic tensions in the region today can be traced to the British policy of initially forced movement of Adivasi communities to Assam to work the tea estates as cheap labour, followed by their implicit encouragement of immigration by Bengali communities to the region as a further source of cheap labour.

The colonial enclosure of previously open access forest land, as well as common grazing and farming land for tea estates, marked, in part, the beginning of the decline in incomes and livelihood opportunities for the Bodo community. Denied access to reserve forest land and prevented

from shifting cultivation methods, they were left with few alternate opportunities for building their income security (Vandekerckhove & Suykens, 2008). The carry over of these policies into the postcolonial government, coupled with incoherent and inconsistent enforcement of land tenure policy for indigenous communities - despite promises to create “tribal blocks and belts”, successive governments were seen to have progressed cautiously on the issue, or not at all - contributed to the further alienation of these communities from the broader mainstream (Misra, 1989, 2012).

With the cessation of the conflict in 2003, the Bodo Territorial Council was officially granted sanction over land in the area. However, as Banerjee (2011) points out, although the government granted official rights from 2003 onwards, it failed to undo the mistakes of the past, thought it grants communities the right to prevent settlements in the future.

It was in this context that the Bhairabkunda Joint Forest Management Committee was formed in 2005, in search of agroforestry based livelihoods. Too barren to develop for agriculture - though this was the original purpose of the land, when handed over to the community by the government in 2003 - the community opted to develop a forest and explore agroforestry based livelihoods as they sought to build income security for themselves in the wake of the prolonged conflict.

COMMUNITY SELF ORGANIZATION

The Balipara Foundation has worked with several JFMCs in Udalguri district and in each case, the strong self-organization of the communities has proved vital in managing the distinct challenges of an afforestation project of this scale - particularly in an area where community relationships with forestland have been fraught.

Infact, the beginning of our project and the stellar work of the Bhairabkunda Joint Forest Management Committee were propelled by community drive and will to create a better future with enhanced livelihood opportunities for themselves. During the initial scouting phase for our project in Udalguri, it was obvious that the community felt

neglected not only by the government by also by civil society organisations. The number of NGOs & aid organisations functioning in the Udalguri district have been very low compared to functional numbers seen in, for example, the Sonitpur district of Assam. Any assistance provided to the local communities in Udalguri was not only accepted but welcomed and enhanced by local on-ground efforts and the spirit of partnership towards common growth & development.

This neglect and alienation from mainstream civil society and government bodies spurred the communities in this area to build their own social institutions for self-reliance. Sheer necessity forced these communities to independently self-organize to enhance their wellbeing, create livelihood opportunities and achieve their goals by effectively allocating and utilizing the few resources they had at hand. Part of this also involved being able to build coalitions, to negotiate with the many community and institutional stakeholders – religious bodies, for example – to scale up action in a meaningful way. And it also meant being able to think strategically, estimating likelihoods of future problems, putting in risk mitigation plans and being able to plan ahead and maximize resource utilization, for their future. The Bhairabkunda JFMC was a case in point – having created a forest of 1.5 million trees despite receiving little support from institutional bodies (civil society or government) and negotiating agreements as well as building action coalitions with community members.

The will of the local people, even those who were not members of the JFMC, has been very important towards the success of our project and remains critically important going forward. A big chunk of our efforts have gone into making sure that this self-organisation is supported by a basic skill-set to support community management of habitat restoration work and further, community management of forests. Community training in citizen science end to end projects (GPS, GIS, RS, phenological mapping & germination analysis), accounting, project management & basic information technology skills have been essential in enhancing participatory action, increasing support, ensuring democratic legitimacy & overall growth in decision-making abilities critical to the success of the project.

COMMUNITY ORGANIZATION FOR PROJECT SUCCESS

Though our project in Udalguri launched with a rocky start, strong community action support from the Bhairabkunda JFMC was instrumental in helping us make up for lost time. Through their leadership and organization we were able to distil a few key learnings about community capacities and capabilities that are critical to project success – learnings that we have been able to transfer to our other project site in Balipara Reserve Forest.

A few of these noteworthy self-organisation milestones critical to project success were:

- **Ability of the community to organize and show collective action as a response to Government endorsed policies & structures.** Eg: the Bhairabkunda JFMC was formed based on a structural framework provided by the Government under the Forest Rights Act. But the community in Bhairabkunda took this structure much further, and the JFMC accomplished much more than what has been mandated in the prescribed JFMC hand-book.
- **Ability of the community to develop alternates and/or add-ons to Government plans for development and seek external assistance when required.** Eg: the Bhairabkunda JFMC's self-organisation and leadership led them to develop an alternate ecotourism model in a central cluster to i) generate revenue, ii) provide a platform for their work to be 'displayed' & iii) use this as a base cluster for the growth of alternate nature-based businesses such as ethnic weaves, crafts & processed food.
- **Ability of the community to develop structures of governance and provide leadership for a large community movement.** Eg: the Bhairabkunda JFMC are now in a position to plan governance strategies for the forest patch that they have successfully restored and build nature based and allied businesses for growth of their communities. They have also been instrumental in providing motivation & guidance to other JFMCs that we work with in other

areas of Assam. It is common practice for us to include interactive sessions with the Bhairabkunda JFMC in induction plans for new & budding JFMCs – this has been instrumental in enhancing motivation driven by success & plans for enhancing success in the future.

- **Ability to organize, plan for the long-term & strategise in times of financial distress.** Eg: the Bhairabkunda JFMC have devised ways of ensuring community participation for patrolling & preventing forest fires and this is fully supported by funds pooled in from various community members. Community members who fail to turn up for patrolling despite commitments are fined and these fines are used for further community use or to support self-run insurance schemes.
- **Ability to evolve and prove durability beyond the initial phases of self-organisation & endure the lows after heightened motivation from short-term gains.** Eg: the Bhairabkunda JFMC, has been able to induct youth into the activities of the JFMC (which mostly consists of people aged 35-55), especially activities that required a heightened technological skill-set. This has helped in maintaining durability & allowing for evolution within the team to meet the requirements of changing times.

It is important to mention here that the success of the Udalguri Rural Futures project would not have been possible without the aforementioned abilities of the local community & the JFMC. Many of these skills are recognized as essential elements of building common pool resource management skills among communities – except here, the community has taken the lead in developing their skills for themselves, to take ownership of and manage natural assets for the future. These qualities have ensured that civil society organisations get all the local support they need for research, implementation and long-term sustainability planning. The Balipara Foundation's role, in this case, can at best be described as that of a facilitator: bridging the gap between community needs that could not be fulfilled internally and external institutional resources that could be plugged in to fill in the gaps.

It is this kind of operational model, with the Balipara Foundation serving as a facilitator, as a body for facilitating complex coalition-building

beyond the local level, that we visualize as the most sustainable route to successful habitat restoration and natural capital regeneration. The Bhairabkunda JFMC is an illustrative example of what community ownership over natural assets must look like – as well as the hard work needed to foster that ownership for action. Today, other JFMCs often come and seek the help and guidance of the Bhairabkunda JFMC as an institutional role-model for growth. In the long-term, we believe strongly that this will lead to a multiplier effect in community participation, for building effective community-based action coalitions - essential for building a Naturenomics™ Civilisation.

Rural Futures In Action:
communities carrying out planting activities at our field site in Udalguri

BIBLIOGRAPHY

Banerjee, N. (2011). Tribal Land Alienation and Ethnic Conflict: Efficacy of Laws and Policies in BTAD Area. *Refugee Watch*, 37, 44-54.

Benedikter, T. (Ed.). (2009). *Solving ethnic conflict through self-government: a short guide to autonomy in South Asia and Europe.* EURAC.

Bhattacharya, P. (2012, December 03). Assam, a state of discontent. *LiveMint.* Retrieved from https://www.livemint.com/Politics/J5pha6RaLz6LVfbbaZfzuM/Assa-a-state-of-discontent.html. Accessed: 04/10/2019.

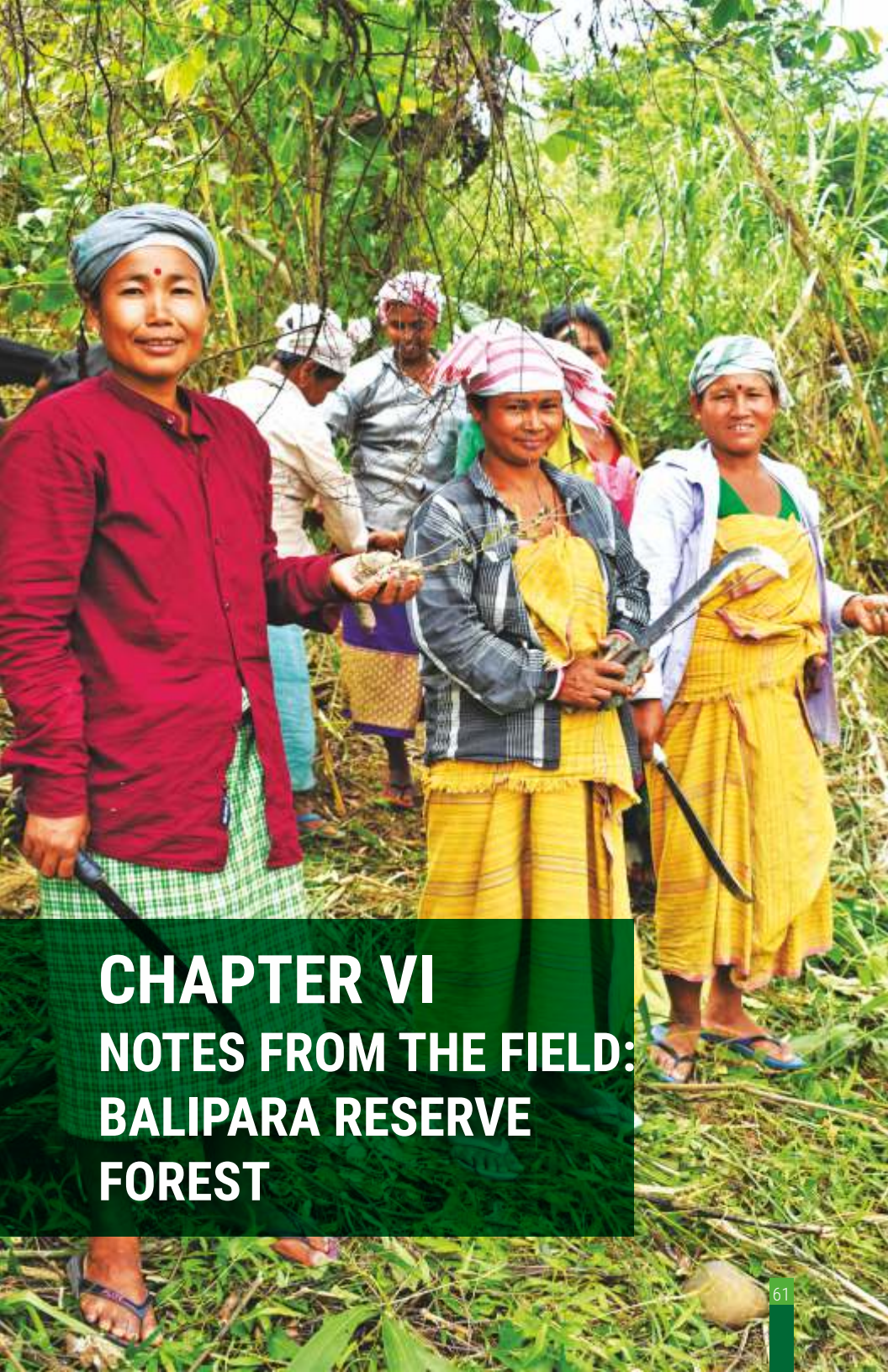
Maity, S. (2018). Multidimensional poverty status of Bodo tribes of Udalguri District, Bodoland, Assam. *Journal of Economic Development,* 43(1), 29-47.

Misra, U. (1989). Bodo Stir: Complex Issues, Unattainable Demands. Economic and Political Weekly, 24(21), 1146-1149. Retrieved from http://www.jstor.org/stable/4394852. Accessed: 04/10/2019.

Misra, U. (2012). Bodoland: The Burden of History. *Economic and Political Weekly,* 47(37), 36-42. Retrieved from http://www.jstor.org/stable/41720137. Accessed: 04/10/2019.

Rogers, K. (2018, November 08). A community-led vision for India's Future. *Devex.* Retrieved from https://www.devex.com/news/a-community-led-vision-for-india-s-rural-future-93796. Accessed: 04/10/2019.

Vandekerckhove, N., & Suykens, B. (2008). 'The Liberation of Bodoland': Tea, Forestry and Tribal Entrapment in Western Assam. *South Asia: Journal of South Asian Studies,* 31(3), 450-471.



CHAPTER VI
NOTES FROM THE FIELD: BALIPARA RESERVE FOREST

Through this project, along with the Balipara Foundation, we have been trying to get the women of the area involved in decision making aspects, with the aim of creating women leaders and entrepreneurs to lead this project.

Eliza Boro
MASK

BALIPARA RESERVE FOREST: HABITAT RESTORATION – IN A NUTSHELL

GEOGRAPHY: Sonitpur District – Balipara Reserve Forest

YEAR: 2018 onwards

PROJECT INVESTORS: HT Parekh Foundation

IMPLEMENTING PARTNERS: MASK

GOAL: Habitat restoration through participatory community involvement, with a view to creating socioeconomic mobility and livelihood opportunities through habitat restoration

IMPACTS: 163,000 natural assets, >153 hectares habitat restored, INR 2.6 million in income, 2049 people positively impacted

WOMEN AS POLITICAL AND ACTION STAKEHOLDERS IN COMMUNITIES

The Balipara Reserve Forest Project (BRF) marks the next launch phase of the successful pilot habitat restoration project the Balipara Foundation initiated in Udalguri in 2017. The project's mission was to identify drivers of conservation and development, with a focus on human-centricity to maintain the region's ecological balance in a sustainable fashion. The early successes of the project in Udalguri lent the impetus for scaling this project up in Balipara, in close proximity to our field headquarters at the Eastern Himalayan Botanic Ark.

Subsequently, the Balipara Reserve Forest Project had a plan to replicate the ULM pilot but with added elements aimed at building alternate sources of livelihoods, agro-forestry and the development of universal basic assets among communities. The expected per capita income of this restored forest, on maturation of the project (i.e. habitat restoration

across 900 hectares) was estimated to be INR 313,297, based on the per hectare natural capital value estimates presented in Chapter 3b.

In late 2018, The Balipara Reserve Forest Project was launched in partnership with the help of the HT Parekh Foundation, with the vision of restoring 9km2 of degraded land, creating natural assets that would provide direct socio-economic mobility in the communities in the forest fringe areas.

SETTING THE TONE: BALANCING GENDER AND CONSERVATION

Women and the role they play in habitat restoration, globally, is increasingly becoming a focal point of interest for conservationists and environmentalists. Around the world, women are involved as some of the primary actors in habitat restoration, however they are denied a seat at the table where it comes to decision-making and holding positions that can influence how habitat restoration activities are implemented, the most desirable outcomes and the most equitable ways of achieving this. This disempowerment from decision-making has serious consequences: many women find themselves burdened with both their domestic responsibilities as well as habitat restoration work, and any other work they may do to supplement their incomes – but have little say over how this work is carried out. Gender-blindness in habitat restoration frequently also has the unfortunate consequence of limiting women's access to land and resources, further entrenching existing gender-based inequalities in the area (Basnett et al, 2018).

Women from forest-fringe communities often have a symbiotic relationship with forests, seeing them as community “banks” instead of income sources ripe for exploitation through commodification. However, their knowledge remains undertapped and traditional gender-blind afforestation has often failed to engage with both their knowledge and their relationship with forests, instead imposing either external

perspectives or approaching men as the main decision-makers and users of the forest.

Silvia Federici writing in 2011 draws a direct connection between the global devaluation of the commons and the continued devaluation of women's labour in the domestic sphere, as the underpinning drivers of economic value flows: their highly externalized cost values propel the economy, obscuring the true cost of our global economic activity. Women, she argues, suffer the most from the continued enclosure and erosion of the commons – enclosure, especially, driven by the parks and fences model of conservation. Yet women have also been on the frontlines of the fight to preserve the commons, as water, land and forest protectors. She also makes the case for the radical transformative power of women working the commons through cooperative models of action, for building alternate, sustainable economies – as visualized, for example, under the Rural Futures model for delivering universal basic assets. Other research bears this claim out. Women's active participation in afforestation strengthens the effectiveness and sustainability of afforestation efforts (Basnett et al, 2018).

Though India's North East has relative gender parity compared to the rest of the country, certain inequalities remain, particularly in the field of political representation and in representation on decision-making bodies. The nominal equality that women do have, however, often results in gender-blind action and little attention to the gendered aspects of interventions and outcomes.

The Balipara Foundation did not originally set out to tackle the question of gender through its project in Balipara Reserve Forest, however its policy of non-discrimination and fairness, diversity and equality across social groups soon mandated that we mainstream the perspective of gender in our work – particularly as we came to terms with some of the field realities over the course of our work: realities outlined in the rest of the chapter.

THE CONTEXT: BALIPARA RESERVE FOREST

The Balipara Foundation initially engaged with 3 Joint Forest Management Committees in the Balipara Reserve Forest area, to gauge community interest in a habitat restoration project along the lines of the project being piloted in Udalguri. Of these three JFMCs, two were especially keen to participate in this experiment of restoration and economy, particularly to see how habitats could be restored while offering economics benefits and income stability to members of the community. Over time and because of external constraints, we selected the Bogijulee JFMC as the committee most ready to take on the responsibilities and commitments entailed by the habitat restoration project.

Sonitpur district has traditionally been a hotspot for NGO interest, with a diverse range of NGOs entering or operating in the region, unlike Udalguri. While many of these organizations do good work, there are a number of organizations which over-promise and under-deliver. As a result, communities have developed a healthy skepticism of NGOs, expecting them to deliver on their promises before they trust them completely. Accountability in Sonipur, therefore, goes two ways, with communities and organizations both holding each other responsible for fulfilling their ends of action agreements.

The Balipara Foundation's engagement with the JFMCs was met with enthusiasm, but with a healthy criticality that birthed energetic participatory dialogues between the Foundation and the JFMCs for habitat restoration commitments. This critical engagement in many ways enhanced the project, helping the Foundation to build a robust approach for action coalition building that enabled us to meet and surpass our habitat restoration goals in the long run.

However, over the course of these engagements, our team noticed that while women would regularly turn up for the meetings – and in not insignificant numbers – they would very rarely participate in dialogues. They were silent listeners and appeared happy to just absorb the

conversations being held, not seeking to express their viewpoints, perspectives or insights. This pattern continued for at least 5 meetings, where even when asked directly to share their views, women abstained and refrained from sharing their thoughts in the public sphere. Women were nominally included in decision-making meetings, but their direct participation was limited. Women personnel from the Balipara Foundation conducting on ground surveys, studies and transect walks around the communities faced similar discreet gender-based limitations – invisible barriers that were enough to cause confusion, discomfort and uncertainty about their authority as facilitators for field work.

In the absence of any real details about material gender-based relations in the area, it was difficult to tell what the origins of the cause of this seemingly voluntary silence on the part of women was. Inclusive-exclusion has been the norm in spaces where women are nominally included in community decision-making entities in India, and Assam is no exception (Deka, 2017; Hazarika, 2006). Though women attend meetings, they may be proxies for male relatives, and those who speak independently are ignored or discouraged from speaking in the public sphere. Though no such extreme instances occurred at the Bogijulee JFMC, it was clear another systematic devaluation of women's views had taken place. Women were almost never asked for their thoughts or comments – a subtle process that had led to a persistent devaluation of their insights and perspectives.

ENGAGING WOMEN AS POLITICAL STAKEHOLDERS

After much introspection, a realization dawned onto the team that it is always easier said than done when it comes to involving women in the entire process of having an equal say including the visibility of efforts being put in by them. There were high chances of the men folk in these communities to leave the project stranded especially after knowing that the women who have been submissive for years on

end are now suddenly being given the opportunity to be at the same standard as they assume themselves to be. Therefore, the need of the hour was a strategic movement of thought in action.

Together, with Eliza Bodo from our local implementing partner, MASK, we reached out to the women in the community and conducted a few engagement sessions with them alone. Through these sessions we sought to identify their specific needs, interests and concerns about their village, their local ecology and their future. Though their participation was limited at first, over time they opened up and began to share a number of interrelated concerns about development – particularly over housing, health, schools, access to water and livelihood opportunities.

On the other side, the Balipara Foundation took active steps to work with the men of the JFMC and participating communities to build spaces for women as decision-making stakeholders. Numerous interactive sessions and JFMC meetings had to be conducted where the delivery of the idea of constantly engaging women in the decision-making and execution processes were brought up. Irrespective of how uncomfortable it made the men or for that matter the kind of risk which the Balipara Foundation team members were taking – it was important to bring this gender parity issue out in the open for people to grasp the intensity of the contradiction of not involving women in restoring our natural resources who are largely seen as “caretakers”.

Through her dialogue with the women of the community, Eliza Bodo encouraged one of the women to step forward and join the JFMC as a formal member and an active stakeholder, participating in decision-making processes on par with the men on the JFMC. This was affirmed by the JFMC members and with no active resistance from the male members of the JFMC. Though this was one small step, its significance in expanding women's voices at the table for afforestation cannot be overstated. The move was also essential in changing the way both men and women in the community conceptualized their roles in decision-making and habitat restoration.

In addition to our move to bring women on board as active stakeholders in the JFMC, the Balipara Foundation also continued to engage with the community on the question of women's work in habitat restoration – and crucially, the question of equal compensation for their work. Our project model is structured as such that the money that goes to community

members who work in the field is distributed to the JFMC. At the initial stage, the JFMC showed a clear bias in how it paid women, paying them a significantly smaller amount than the men who came out to work. As the Balipara Foundation follows a strict policy of fairness and equitability - essential to our vision for Rural Futures - we negotiated with the JFMC members, eventually convincing them of the necessity of paying women equal and fair wages for their work in the field, even if it meant less people being involved in doing the work. Eventually a pattern set into the ways and means of engaging both men and women which led to the execution of the plan to provide women involved in planting saplings a fair and equal wage.

Interactive sessions and workshops involving partner organizations led to the emergence of many other interconnected issues. The interlinked issues showcased the instrumentality of women in taking forward larger ecological and developmental visions for the community, thus reinforcing the BRF team's need to highlight the importance of women's representation in the JFMC. Their perspectives, particularly, have enriched our action strategies and focuses for universal basic asset access to create sustainable development outcomes in villages, as well as helped us identify potential alternate income streams for the community such as handloom use.

By continuously engaging with the women of the community, we managed to build a strong platform for them to raise their specific concerns about the future of their community with increasing confidence. While the women had plenty of insights into what needed to be done, their lack of a platform for voicing these insights had limited their ability to trace a path for collective action to bring about the changes they had visualized in response to what they saw as the key challenges in their community. With a strong platform, however, they were spontaneously able to trace these pathways from thought to action, reducing their dependency and empowering them to become real political stakeholders in their communities.

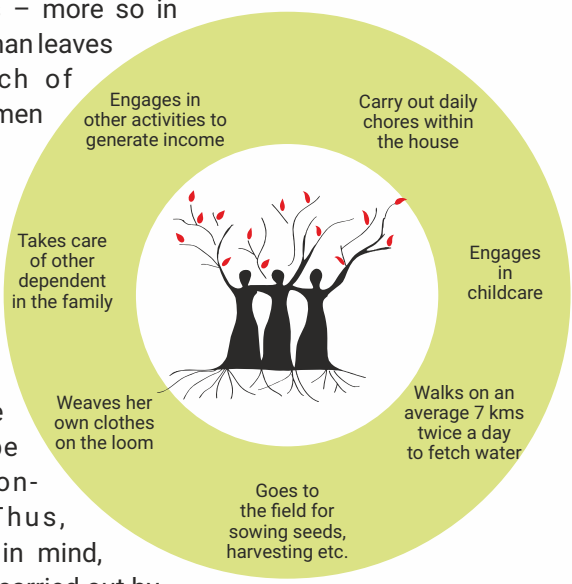
The experiences felt in the on-going project are powerful and transformative. The Foundation envisions to change the presence of only one-woman representative within the Joint Forest Management Committee to at least 50% of it being occupied by them.

The Balipara Foundation's change pathway for making women active stakeholders in habitat restoration

IN THE FUTURE

This representation in the Bogijulee JFMC goes on to show the need for emphasis on the representation of women and the role they ought to play. Numerous studies have found that incentivizing and encouraging women's participation can enhance the effectiveness and sustainability in forest management (Basnett et al, 2018).

Continuing on those lines, the Sustainable Development Goals cannot be kept at bay when it comes to gender equality, empowerment and sustainable development. The situation created is such that women tend to multiple roles – more so in rural areas. While the man leaves the house in search of employability, the women do the following:



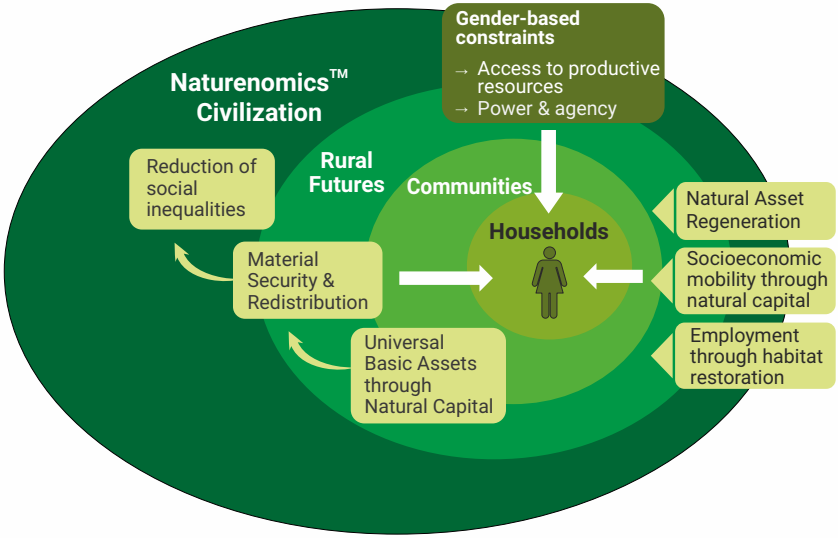
Women's work in Assam

Inevitably, there are many ways in which women must have the right to make decisions as the tasks carried out by women demand the need for them to be involved in decision-making as well. Thus, keeping this context in mind, many field visits were carried out by

the BRF team where women from various tribal communities spoke passionately regarding one major change that was urgently required – REPRESENTATION.

Decision making powers for women have been a persistent challenge in these communities, intimately interwoven as they are with inequalities embedded in the state, within the community, in the household and so on. Though women are the primary caretakers of most of the agricultural land, land is usually held by men, with the result that most economic and other benefits (such as decision-making power related to land control) accrue to men and not women. If in the restoration context, according to Rural Futures as a holistic vision, women should ideally be the stakeholders and take political action in regenerating degraded land.

Historically, women in India have been the caretakers of the forests around them. The best example here would be of the Chipko movement where women came out in large numbers to hug trees so as to protect them from being cut down. Thus, it comes as no surprise that the two important elements in the entire circle of 'giving life' are women and ecology.



Gender justice and equitability through Rural Futures and Naturenomics™. Adapted from the FAO Gender Sensitive Value Chain Framework.

The question then that arises is with regard to how a Joint Forest Management Committee could empower women in making decisions that would turn the idea of natural capital into wealth? Some of the steps from the field to elucidate a selective value chain at the very beginning to heighten women empowerment are the following:

REFERENCES

Deka, A. (2017). Debating empowerment: the 73rd amendment in Assam in *Women, Peace & Security in North East India ed.* Kolås, Å. Zubaan.

Federici, S. (2011). *Feminism & the politics of the commons in The wealth of the commons: A world beyond market and state eds.* Bollier, D., & Helfrich, S. Levellers Press.

Hazarika, S. (2006). POLITICAL PARTICIPATION OF WOMEN AND THE DILECTICS OF 73rd AMMENDMENT. *The Indian Journal of Political Science,* 67(2), 245-260. Retrieved from http://www.jstor.org/stable/41856212

Uche T. Okpara, Lindsay C. Stringer and Mariam Akhtar-Schuster, Gender and land degradation neutrality: A cross-country analysis to support more equitable practices, *Land Degradation & Development,* 30, 11, (1368-1378), (2019)

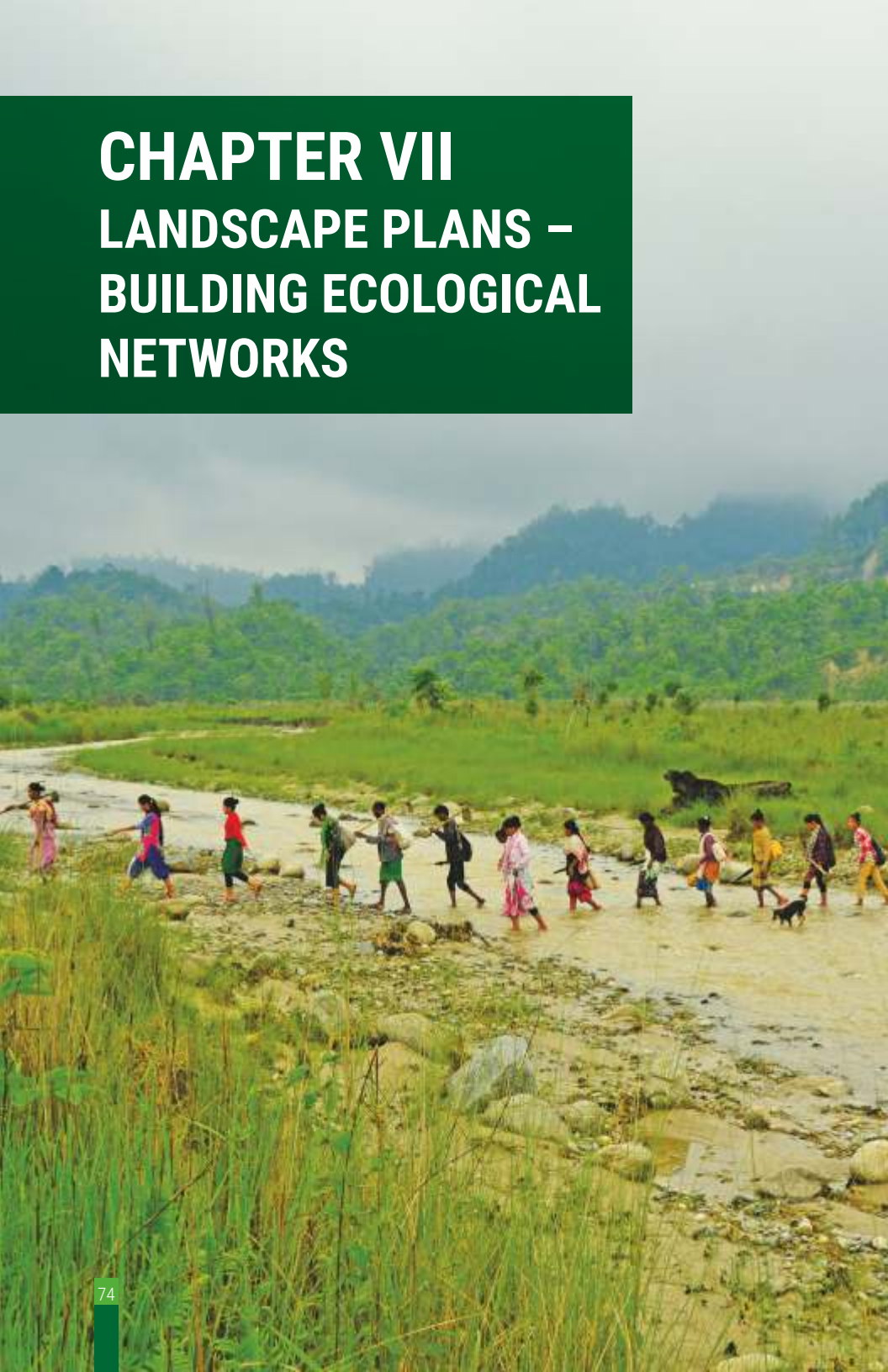
Nicky Broeckhoven (2015) 'Gender and ecological restoration: time to connect the dots', *The Journal of Society for Ecological Restoration*

Haverhals, Merel & Ingram, Verina & Elias, Marlène & Basnett, Bimbika & Petersen, S.. (2016). Exploring gender and forest, tree and agroforestry value chains. 10.17528/cifor/006279.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO) (2018) *Developing gender-sensitive value chains, Rome*

Rural Futures In Action:
communities carrying out planting activities at our field site in Balipara Reserve Forest

CHAPTER VII
LANDSCAPE PLANS – BUILDING ECOLOGICAL NETWORKS



We realize that it will take a lot more than 17 voices for change to happen. And then these voices have to be productively organized too. Over the next 15 months, we intend to increase our Membership to a 1000 voices and build a strong and vociferous grassroots network of change-makers.

Jadu Basumatary
President
AGAN- A Step Forward

ASSAM – FORESTS, THREATS & WILDLIFE MOVEMENT NETWORKS

India's North-Eastern region, along-with the larger Eastern Himalayan belt contain 3 of the world's 34 biodiversity hotspots. The North-East Indian state of Assam, where most of the practical focus of this book lies, harbours a mix of lowland tropical evergreen forests, wet alluvial grasslands, agricultural land, human settlements and one of the world's largest stretches of monoculture plantation industries (Sharma et al., 2012). The forests of the Assam valley once dominated the upper Brahmaputra landscape but less than a quarter of these remain in isolated fragments (albeit of high biodiversity value) (Ministry of Environment and Forests, Government of India, 2017). These large contiguous tracts of forests allowed for thriving populations of large mammals including the Asian Elephant, One-horned Rhinoceros & many large cat species, among others.

The Elephants of north-eastern India were contiguously distributed with Elephant populations of Bhutan, Bangladesh, Myanmar & Nepal but due to forest degradation & fragmentation, these elephants are now confined to small isolated patches surrounded by human settlements and/or agricultural land (Choudhury, 1999; Wildlife Trust of India, 2017). Despite their IUCN-protected status and the noted conservation importance of the region, the survival of Asian elephants in this Transboundary landscape is under threat due to rapid human population growth, expansion of agriculture, unplanned clearance for human settlements, logging and other development activities such as construction of roads and railways, all of it well documented and acknowledged. The severe habitat destruction and fragmentation of the region reduces natural food resources and leaves little room for large-bodied animals like elephants to travel and forage safely along historical migration routes. Elephant herds and lone males (tuskers) moving through a range of environments between their winter (Bhutan) and summer (India) ranges frequently encounter humans and development activities. This situation has led to an increase of reported human-elephant conflict (HEC) incidents and their severity, and this trend is expected to continue unless locally effective, targeted intervention occurs. The Asian elephant population is potentially facing an alarming decline if habitat loss continues unabated and conflicts in human settlement zones continue to rise.

The most striking threat to Assam's forests has been the expansion of land under agricultural use. This includes extension of land holdings into protected areas, encroachment of protected areas for human settlements dependant on agriculture & rise of the unorganised monoculture industry sector (dominated by tea). These threats have resulted in direct and immediate consequences such as a manifold increase in man-animal conflict incidence (Choudhury, 1999; Talukdar & Barman, 2003) in addition to other long-term effects on global temperatures, climate change, species extinction, etc (Pandit et al., 2006; Rao & Geisler, 1990). Numerous non-governmental organisations, government agencies & multinational organisations have been spearheading the task of combating deforestation and devising multifarious models for the implementation of conservation programmes (Lindenmayer et al., 2007; Levi et al., 2009).

ECOLOGICAL NETWORKS – WHY?

The last two decades have witnessed a shift in conservation thought from an emphasis on single-species conservation to habitat restoration & from singular fragmented habitat conservation to ecological connectivity & habitat networks (Jones, 2011). This shift in thought has been propelled by developments in the fields of ecological theory and, the growth of landscape ecology as an interdependent area of investigation (Turner, 2005). In the 1980s, the Russian geographer, Boris Rodoman proposed the polarized-landscape theory in which a landscape is zoned in such a way that intensively used patches are balanced by natural zones that function as a coherent & self-regulating 'whole' (Richardson et al., 2009). In the recent past, on-ground programmes have shown that successful conservation activities must look beyond particular species and delineated areas. The approach must be multi-scaled and consider the web of interlinked species and habitat – not just protected areas but also areas interconnecting protected areas for a complete view of what a landscape really constitutes (Secretariat of the Convention on Biological Diversity, 2004). The progression from single species to landscapes has involved a change in overall conservation thought and has shifted the focus on long-term gains over short-term symptomatic relief and healthy habitats as the key indicator for successful conservation efforts. Landscape-scale approaches have also ensued a growth in transboundary conservation efforts between two or more countries. Many forest & mountain landscapes transcend national borders and exist across multiple countries and require borderless approaches to their conservation. In the past two decades, several transboundary &

landscape-scale initiatives for conservation and habitat restoration have developed. One such example in the Eastern Himalayas is the Kangchenjunga Landscape Initiative spearheaded by the International Centre for Integrated Mountain Development (ICIMOD) and spread across four countries (India, Nepal, Bhutan & China).

Here, we define certain characteristics of ecological networks with the Rural Futures programme in the Eastern Himalayan region:

- A focus on biodiversity conservation at the landscape and transboundary scale
- Ensuring that human settlements ('encroachments')communities around areas of high biodiversity value play a participatory & leadership role in the conservation programme
- Promoting sustainable use of Natural Assets in and around areas of high biodiversity value

For optimising planning efficiency for scalability & reproducibility of programmes, each habitat zone is and will be designed to maximise their ecological value (and function as a coherent whole (Bennett, 2004;) (Bennett et al., 2006):

- **Core Areas:** of high biodiversity value and where conservation of this endangered biodiversity is of primary importance
- **Corridors:** for maintaining ecological connectivity between the core areas and surrounding areas of high biodiversity value
- **Buffer Zones:** are areas with encroached human-habitation and with high-potential for mixed forest-agroecology based livelihoods. These areas are critical to ensure economic incentives for forest-fringe communities & for their long-term sustenance and socio-economic mobility
- **Sustainable use areas:** are areas with full potential for the implementation of organic agro-forestry implementation and form extensions to the buffer zones. Ideally, human-habitation should shift to these areas from the buffer zones to allow for biodiversity growth outside of the core areas.

PLANS – ECOLOGICAL CONNECTIVITY

Our plans for landscape-scale impacts & ecological connectivity stem from these deep-rooted ecological concerns as well as low socio-economic mobility among the forest-fringe communities across the Eastern Himalayas (Secretariat of the Convention on

Biological Diversity, 2010). Our focus region for on-ground implementation is the 'upper Assam zone' defined as the area between the Northern bank of the river Brahmaputra in the south and the foothills of the Eastern Himalayas in the North. This region is close to 40,000 km2 in size and over a quarter of this landscape holds the status of being an Elephant or Tiger reserve. This area contains some of the world's largest Asian Elephant populations, that migratinge over 16,000 km2 of this zone. (WWF, n.d.). We have used Asian Elephant Migration corridors as indicators of historical forest contiguity (Campos-Arceiz & Blake, 2011; Harich et al., 2016; Ministry of Environment and Forests, Government of India, 2017) (Campos-Arceiz & Blake, 2011) (Harich et al., 2016) and have based our Rural Futures pilot programmes in areas adjoining or within protected areas, elephant corridors & interspersed human habitats towards a model of coexistence.

Most of our priority areas lie on the Assam-Arunachal Pradesh border areas or the India (Assam)-Bhutan transboundary landscape & we envision building a naturenomics based civilisation across this transbounday zone.

Map #1 – Satellite map of South-Eastern Bhutan, South-Western Arunachal Pradesh & Central-North Assam depicting on-going and proposed habitat restoration sites

MAJOR CONSERVATION ISSUES IN THESE LANDSCAPES

Land-use

Grazing associated pressures, eEncroachment & habitat loss due to deforestation, open grazing, small-scale forest fires, siltation, chemical use in neighbouring monoculture plantations

Livelihood opportunities

Land degradation has led to reduced food production, water shortage,

poor natural water reservoirs, biodiversity loss, loss of soil organic carbon & a general reduction in ecosystem services and their outputs. This has resulted in severe resource insufficiency and reduced livelihood opportunities for communities whose dependencies on forest resources are high

Communities with small agricultural land-holdings, loss of crops due to man-animal conflict, unsustainable dependency on diminishing forest resources, communities with limited access to alternate sources of livelihood

Resource extraction

Illegal timber logging, firewood collection for sale, forest collection for fodder, poaching & hunting, unsustainable extraction of NTFPs

Policies

Lack of participatory policies for community autonomy over forests & natural resources

Over the course of our habitat restoration programmes, we've realised that key to ensuring project success and longevity is heightened community participation and ownership of various facets of the programme from land to management to revenue. This becomes difficult to pursue in areas where protected land in owned by the government and not by communities – difficulties arise in devising mechanisms of profit-sharing and land-rights. For projected conservation outcomes, it would be imperative for policies to be participatory in nature and allow for community autonomy over natural assets and/or contain straightforward mechanisms for revenue sharing & commons management.

HABITAT RESTORATION SITE-PROFILES:

ZONE A:

Khalingduar Reserve Forest, Udalguri District, Assam in the West till Nameri National Park, Sonitpur District, Assam in the East.

#1 Bhairabkunda Reserve Forest (on-going)

Our first habitat restoration site in the Udalguri district of Assam lies in a tri-junction of Assam, Arunachal Pradesh and Bhutan (marked on map #1 as 1) and was chosen because of a variety of reasons – some of highest rates of human & Elephant deaths due to conflict (Aaranyak, 2019), mMass deforestation (Thakur, 2010) & vVery low socio-economic mobility (Maity, 2018). This site is part of the 22.5 km2 Bhairabkunda Reserve Forest and lies South-East of Jomotsangkha Wildlife Sanctuary in Bhutan. A detailed case-study on this project is presented in chapter xxx.

#2 Balipara Reserve Forest (on-going)

Our second habitat restoration site in the Sonitpur District of Assam (marked on map #1 as 2) lies 102 kms east of the ULM site and has been a refuge for large populations of elephants (both migratory & settled). This site is a part of the Balipara Reserve Forest which was once a contiguous belt extending from Sonai-Rupai Wildlife Sanctuary in the wWest to Nameri National Park in the eEast (separated by the Jia Bhoreli River) and Pakke National Park towards its nNorth-eEast. It is estimated that over 80% of the Balipara Reserve Forest has been encroached for human settlements and/or agriculture (Assam Tribune, 2013). A detailed case-study on this project is presented in chapter xxx.

#3 Sonai-Rupai Wildlife Sanctuary

The planned site in the Sonai-Rupai Wildlife Sanctuary lies about 60kms East of the Bahirabkunda Reserve Forest & 70kms West of the Balipara Reserve Forest. Sonai Rupai covers an area of 220 km2 and saw encroachment of over 85 km2 of its land between 1990-2000 (Goswami, 2011). Sonai Rupai forms a critical habitat for lLarge mMammal migration and is amongst few habitats that supports re-introduced populations of the Pygmy Hog (a critically endangered suid).

ZONE B: Transboundary Manas Conservation Area (TraMCA)

The India-Bhutan border zone, running East to West is over 700kms long and the border zone, on either side, consists of multiple protected areas. The projected area for this transboundary programme spreads over 2500 km2 of protected areas connected through a network of mixed-use land and forests. This transboundary complex provides seasonal passage to over 5000 Asian Elephants annually and over the last 2

decades, due to high deforestation & human encroachment, report some of the highest rates of man-animal conflict globally. The landscape harbours two of the four eco-regions in the Eastern Himalayas - under the WWF Global 200 ecoregions - which are Terai-Duar Savannas and Grasslands, and the Eastern Himalayan broadleaf and conifer forests. At the core of this landscape lie India's Manas Tiger Reserve & Bhutan's Royal Manas National Park and provide refuge to flagship species like elephants, tigers, rhinos and 1500 other species of mammals, birds & vascular plants. This eco-zone contains multiple diverse indigenous communites with very strong relationships with the eco-system, making community-based conservation even more pertinent.

With reference to map #1, this area would begin from the West of site #1 with site #4.

#3 Khalingduar Reserve Forest:

Khalingduar forms a contiguous green belt with the Jomotsangkha Wildlife Sanctuary in Bhutan and once contained over 7000 hectares of dense forest. Reports suggest that over 80% of this dense cover has been lost over the past two decades due to illegal logging, encroachment activities & over-grazing. Khalingduar lies about 40kms West of Sonai-Rupai and is ideally suited to connect Zone A with Zone B and also forms a critical physical network with the Bhutan National Park system essential for population dynamics and genetic diversity. (Das, 2011)

#4 Bornadi Wildlife Sanctuary:

Bornadi Wildlife Sanctuary lies a little less than 30kms West of Khalingduar and also functions as a physical link with the Jomotsangkha National Park in Bhutan. Bornadi was established in 1980 to increase protection for safeguarding dwindling populations of the endangered Hispid Hare & the critically endangered Pygmy Hog. Wild populations of the Pygmy Hog had almost completely disappeared but efforts are being made to reintroduce them from captive breeding centres.

#5 Manas National Park & Tiger Reserve:

Manas is a UNESCO world heritage site, a tiger reserve, an elephant reserve & a biosphere reserve that lies about a 100 kms west of Bornadi Wildlife Sanctuary. Manas National Park continues across the border into Bhutan as the Royal Manas National Park and forms a critical tiger habitats. Manas National Park spread over 950 km2 contains two major biome types – forest & grassland and therefore provides ideal habitat for a wide variety of mammals – from the Asian Elephant to the One-horned Rhinoceros to the Hispid Hare, a large population of migratory birds & rare flora. Anthropogenic threats to this critical habitat have been many

and some of the only successful conservation efforts have been those that have been community-centric and livelihood oriented. Eg: Aaranyak's habitat restoration programme in the Manas Landscape. (their website is down but I'll try again tonight)

The transition from zone A to zone B will be made over the course of the next 2-3 years and will coincide with site #1 & site #2 gaining enough experience to independently take the project(s) forward. Our efforts will be focused on creating capacities in each site and facilitating new projects with new JFMCs across the India-Bhutan (Assam-Arunachal Pradesh) border areas. Zones A & B are focus areas for the next 10 years and we aspire to gather a collective of other civic society organisations to facilitate similar efforts in areas adjoining the immediate zones of interest and ultimately, across the Eastern Himalayas.

BIBLIOGRAPHY

Biodiversity Hotspots in India. (n.d.). Retrieved October 4, 2019, from http://www.bsienvis.nic.in/Database/Biodiversity-Hotspots-in-India_20500.aspx

Sharma, N., Madhusudan, M., & Sinha, A. (2012). Socio-economic Drivers of Forest Cover Change in Assam: A Historical Perspective. *Economic & Political Weekly, XLVII. Retrieved from* https://www.researchgate.net/publication/255785815_Socio-economic_drivers_of_forest_cover_change_in_the_Upper_Brahmaputra_Valley_Assam_a_historical_perspective

Ministry of Environment and Forests, Government of India. (2017). *Forest Survey of India.* Retrieved from http://fsi.nic.in/forest-report-2017

Wildlife Trust of India. (2017). *Rights of Passage (2nd ed.)*. Retrieved from https://www.wti.org.in/wp-content/uploads/2017/08/pub_right_of_passage-1.pdf

Choudhury, A. (1999). Status and conservation of the Asian Elephant Elephas maximus in north-eastern India. *Mammal Review,* 29(3), 141–174. https://doi.org/10.1046/j.1365-2907.1999.00045.x

Talukdar, B., & Barman, R. (2003). Man - Elephant Conflict in Assam, India: Is There a Solution? *Gajah,* 22.

Pandit, M. K., Sodhi, N. S., Koh, L. P., Bhaskar, A., & Brook, B. W. (2006). Unreported yet massive deforestation driving loss of endemic biodiversity in Indian Himalaya. *Biodiversity and Conservation*, 16(1), 153–163. https://doi.org/10.1007/s10531-006-9038-5

Rao, K., & Geisler, C. (1990). The social consequences of protected areas development for resident populations. *Society & Natural Resources*, 3(1), 19–32. https://doi.org/10.1080/08941929009380702

Lindenmayer, D., Hobbs, R. J., Montague-Drake, R., Alexandra, J., Bennett, A., Burgman, M., … Zavaleta, E. (2007). A checklist for ecological management of landscapes for conservation. *Ecology Letters,* 0(0), 071010211025003-??? https://doi.org/10.1111/j.1461-0248.2007.01114.x

Levi, T., Shepard Jr, G. H., Ohl-Schacherer, J., Peres, C. A., & Yu, D. W. (2009). Modelling the long-term sustainability of indigenous hunting in Manu National Park, Peru: landscape-scale management implications for Amazonia. *Journal of Applied Ecology,* 46(4), 804–814. https://doi.org/10.1111/j.1365-2664.2009.01661.x

Jones, J. P. G. (2011). Monitoring species abundance and distribution at the landscape scale. *Journal of Applied Ecology,* 48(1), 9–13. https://doi.org/10.1111/j.1365-2664.2010.01917.x

Turner, M. G. (2005). Landscape Ecology: What Is the State of the Science? *Annual Review of Ecology, Evolution, and Systematics*, 36(1), 319–344. https://doi.org/10.1146/annurev.ecolsys.36.102003.152614

Secretariat of the Convention on Biological Diversity. (2010). *Linking Biodiversity Conservation and Poverty Alleviation: A State of Knowledge Review* (CBD Technical Series No. 55). Retrieved from https://www.cbd.int/doc/publications/cbd-ts-55-en.pdf

Campos-Arceiz, A., & Blake, S. (2011). Megagardeners of the forest – the role of elephants in seed dispersal. *Acta Oecologica,* 37(6), 542–553. https://doi.org/10.1016/j.actao.2011.01.014

Harich, F. K., Treydte, A. C., Ogutu, J. O., Roberts, J. E., Savini, C., Bauer, J. M., & Savini, T. (2016). Seed dispersal potential of Asian elephants. *Acta Oecologica,* 77, 144–151. https://doi.org/10.1016/j.actao.2016.10.005

Aaranyak. (2019, January 2). Human-elephant conflict in Assam has taken a “disaster” prop .. Read more at: http://timesofindia.indiatimes.com/articleshow/67352481.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst. The Times of India. Retrieved from https://timesofindia.indiatimes.com/city/guwahati/human-elephant-conflict-in-assam-has-taken-a-disaster-proportion-aaranyak/articleshow/67352481.cms

Thakur, S. (2010, August 6). Deforestation leading to man-elephant conflict. *The Assam Tribune*. Retrieved from http://www.assamtribune.com/scripts/detailsnew.asp?id=sep0710/at08

Maity, S. (2018). MULTIDIMENSIONAL POVERTY STATUS OF BODO TRIBES OF UDALGURI DISTRICT, BODOLAND, ASSAM. *JOURNAL OF ECONOMIC DEVELOPMENT*, 43(1), 29–47.

Assam Tribune, T. (2013, March 28). Encroachment bane of Sonitpur reserve forests. *The Assam Tribune*. Retrieved from http://www.assamtribune.com/scripts/detailsnew.asp?id=mar2913/state05

Goswami, R. (2011, June 22). Sanctuary on revival route - No encroachment, deforestation reported in Sonai Rupai in the past four years. *The Telegraph.* Retrieved from https://www.telegraphindia.com/states/north-east/sanctuary-on-revival-route-no-encroachment-deforestation-reported-in-sonai-rupai-in-the-past-four-years/cid/384404

WWF. (n.d.). About North Bank landscape. Retrieved October 6, 2019, from https://www.wwfindia.org/about_wwf/critical_regions/north_bank/about_north_bank_landscape/

Richardson, B. J., Bouthillier, Y. L., McLeod-Kilmurray, H., & Wood, S. (2009). *Climate Law and Developing Countries: Legal and Policy Challenges for the World Economy.* UK: Edward Elgar.

Bennett, G., & IUCN--The World Conservation Union. (2004). *Integrating Biodiversity Conservation and Sustainable Use: Lessons Learned from Ecological Networks.* Switzerland: IUCN - The World Conservation Union.

Bennett, G., Mulongoy, K. J., & Secretariat of the Convention on Biological Diversity. (2006). *Review of Experience with Ecological Networks, Corridors, and Buffer Zones.* Montreal: Secretariat of the Convention on Biological Diversity.

Das, J. (2011, August 11). Bid to restore status of Khalingduar reserve forest. *The Assam Tribune.* Retrieved from http://www.assamtribune.com/scripts/detailsnew.asp?id=oct1111/state05

CHAPTER VIII
THE FUTURE: THE NATURENOMICS™ CIVILIZATION

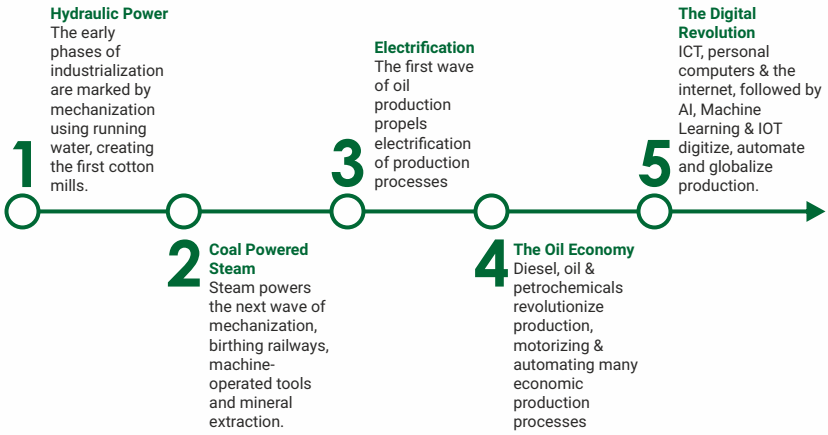
I believe the sole existence of humans completely depends on nature. Through this project we would like to restore the nature of the area we grew up in and would like to spend the rest of our lives in.

Manjoy Boro
Committee Member
Bogijulee JFMC

WHAT COMES NEXT?

In 1925, the Soviet economist Nikolai Kondratiev upended economic orthodoxy by theorizing that the world's economy grew and shrunk in forty to sixty year long waves. In contrast to the shorter favoured 5-7 year boom-bust cycle, Kondratiev believed that economic transitions were better marked by the rise and fall of inequality, opportunity, social freedoms and technology – and basing his theory on historical observable facts, theorized that the global economy of the time was towards the waning period of a global cycle that had begun in 1896.

Building on his theory in the 'thirties, the famous economist Joseph Schumpeter theorized that the turning point marking each wave stemmed from clusters of emerging innovations, heralding a new era of technology-centred expansion. This model was refined and perfected by long-wave theorists such as Carlota Perez, who explicitly linked phases in long-waves with the phases of the industrial revolution and its innovations (Perez, 2002). Rather than describe the two hundred year history of industrial production and expansion in terms of short economic cycles, the long wave model sees them as cycles of technology, innovation – and crucially, of energy consumption.



The five long waves of the industrial revolution

In this long-wave model, economic upswings marked expansion periods where new energy was unlocked and new technology settled into the market, investments grew and the market was not yet saturated. Downswings, on the other hand, coincided with a rash of new innovations proliferating in response to the shocks of a shrinking economy. In other words, downswings occurred just before the switch in energy and technology: hydraulics to steam and coal, to steel and mechanization, to oil and diesel, to automation and finally the digital revolution.

Long wave economists theorize we are on the brink of a sixth wave, but remain divided over what comes next. John A. Mathews, in the *Greening of Capitalism* (2014) makes a case for renewable energy as the driving innovation for the sixth wave, releasing the global economy from carbon lock-in and accessing a seemingly limitless supply of energy to propel economic processes. Investment patterns seem to bear this out - investments in renewables grew at 18% in 2018 (Frankfurt School - UNEP, 2019) and they now represent 9% of the world's total energy share (BP, 2019). However, the optimism of John A. Matthews' prediction has not gone without criticism. Andreas Malm points out,fossil fuels afforded a crucial level of independence from natural conditions, enabling rapid expansion of production and economies (2017). Renewable energy, however, is still highly limited by the constraints of geography and climate, as well as the whims of changing weather in the case of solar energy.

Others, such as Hornborg et al. (2019) point out that renewable energy infrastructure support is still embedded in highly unsustainable global supply chain systems and depend heavily on international trade relations for effective expansion. Rare earth minerals for photovoltaic cells in solar panels are supplied through ecologically damaging extractionism and mining and vitally, the supply of rare earth metals is finite, precluding, it would seem, infinite energy expansion and growth.

Current renewable energy infrastructure cannot deliver the level of energy currently being supplied through fossil fuel consumption. The limits to even the seemingly infinite supply of renewable energy calls for a rethink of our energy consumption patterns. Proponents of degrowth call for a reduction of energy consumption, of a rethink of business as usual models - a view shared by proponents of green capitalism such as

John A. Mathews as well. In addition to exceeding the current carrying capacity of this planet, energy use and flows are distributed unequally, draining resources in one region to feed growth and expanding energy consumption and resource use in others. The resultant unequal exchange (Hornborg, 1998; Illich, 1973; Bunker, 1985) of energy and natural resources creates an unbalanced ecological debt - disproportionately affecting some regions over the other.

THE INVISIBLE ECONOMY

The idea of ecological debt dates back to the 80s, as indigenous communities and Third World activists, beset by structural adjustment programmes to deal with sovereign debt in Third World countries, sought to reframe the conversation on global debt. While financial debt, recognized by institutions like the IMF and World Bank, accounted only for immediately accounted economic transactions, ecological debt extended far more deeply into the global economy. The invisible value flows of natural wealth, represented by both undervalued commodity chains as well as resource extractionism and the supporting costs absorbed by local ecologies through externalised environmental costs, they argued, far outstripped the value of the Third World's financial debt.

Since the early 2000s, improved scientific instruments for measuring global ecological footprints have borne these assertions out. A calculation from 2008 revealed that 87% of climate change and ozone depletion related impacts faced by lower income countries can directly be traced to emissions and industrial activity in mid to higher income countries (Srinivasan et al., 2008). By this estimate, the $5 trillion created in ecological devastation by the rich world dwarfed the $1.8 trillion owed in international debt by third world countries (Patel, 2010).

Yet many of these frontline communities find themselves shouldering the consequences of ecological debt, whether through destroyed ecologies, or through rising weather risks and climate-driven challenges. These vulnerabilities are similarly unequally distributed globally, with

lower income countries lacking the adaptivity and capacities to invest in building resilient communities. This labour, often supported via already strained public institutions in lower income countries, similarly remains unaccounted for in the global economic paradigm.

The unfortunate consequence of this invisibilization of natural capital in supporting our economy, is that the labour capital that goes into maintaining and enriching it is rendered largely invisible in the broader economy. As a result, the labour these communities put into mitigating damages to the environment that are largely externalized costs for corporations in their business accounts or in maintaining ecologies in the face of sustained economic pressures to convert to visible economic value chain flows is obscured or rendered "unproductive". Unproductive, that is, until mediated by a formalized value chain that produces commodities with recognized material economic values.

Both nature and labour, however, precede the development of monetary capital. Early human societies began in close relationship with nature, moving from hunting and gathering to a myriad diverse forms of agriculture, still dealing primarily with nature. Historical ecology reveals the continued interdependency of natural capital and labour capital: humans depend on ecologies to survive; in return, humans have cultivated and tended to ecologies in different ways, occasionally enriching them far beyond what might have occurred naturally. A multispatial comparative study across 15,000 sites in Australia, Brazil and Canada found that indigenously held and managed lands had far higher biodiversity than protected areas (Garnett et al, 2018). Historical trends in the Amazonian rainforestindicate that pre-Columbian societies may have cultivated huge swathes of what we think of as one of the most biodiverse forests today, seamlessly blending food forests into the wilderness of the Amazon (Maezumi et al, 2018). Closer home in the Eastern Himalayas, community forests maintained by the Adi community in Arunachal Pradesh, for example, have been instrumental in ensuring the conservation and longevity of the endangered toko plant (Singh et al, 2010).

David Graeber, writing comprehensively about the history of debt in civilization (2011), notes that the earliest forms of money develop as social relationships - and economies - grow more complex and demand mediating instruments in dealings between strangers. Andreas Malm,

analyzing the historical record, (2018) posits that nature capital and labour capital both supercede and exist independently of socially contracted credit-mediated relationships. This essential autonomy of labour capital and nature capital lend them temporally transcendental qualities with the potential for radical transformation of our economic paradigms today, if centred effectively.

INTERDEPENDENCY NEVER DISAPPEARED

While the last two hundred years have marked a period of unprecedented economic expansion and growth, in many ways they mark an aberration in human-nature relations, driven, primarily, by the rapid expansion of commodification. Conservationists and environmentalists have long been calling for limits to runaway growth, but nowadays an increasing number of economists have joined their fray. In 2018, a report by the Institute for New Economic Thinking crunched the numbers and found that a continued 3% global economic growth rate would lead to environmental and climate collapse as described by the IPCC in their seminal report on the effects of global temperature rises. Nobel Laureate and economist William Nordhaus similarly puts the world on track for a 2.5 degree Celsius temperature rise: far above the upper limit prescribed by the IPCC and agreed upon by the strictest action plans submitted under the Paris Agreement.

While there is little consensus on what needs to be done, there is consensus on this: people are among the primary drivers of these rapidly shifting climate patterns.

However, as analyses of global ecological debt show, this responsibility is not evenly distributed. Where some economies have been built on the principle of infinite consumption equalling infinite growth, other economies and cultures have been built around principles of interdependency. Contrary to stagist models of progress and cultural evolution, cultures built on the principle of interdependency within the

broader web of life are neither underevolved or primitive, but instead centre different values that govern social and economic relationships within their context. From land and water protectors among Native American communities in North America to indigenous tribes such as the Kichwa cultivating food forests in the Amazon to community councils managing community forests in the Eastern Himalayas, interdependent socio-economic relationships with nature co-exist with destructive, consumption based relationships.

The divide between the "wild" and "occupied" is, in many ways, an artificial one, as an increasing body of scientific evidence indicates. 80% of territories belonging to the world's indigenous people host 85% of the world's biodiversity - although indigenous people make up only 5% of the world's population. Trends based analysis across time reveal a similar story. An increasing number of archaeologists, anthropologists and ecologists now believe that the wilderness of the Americas before the arrival of the conquistadors is a myth. Indigenous communities, they argue, were instrumental in terraforming their landscape through various means: fires to manage and maintain the prairies, cultivating fruit and nut trees, even changing the soil to make it more productive (Denevan, 1992; Mann, 2003). Most notable among these is a study conducted in 2017 across several sites in the Amazon (Maezumi et al, 2018) revealing that domesticated species of trees were highly prevalent in the basin, far more than should have been if the rainforest was completely wild. The clustering of these areas in close proximity to archaeological sites show that despite the passage of time, the traces of human changes to the landscape still remain.

The success of interdependent relationships between contemporary societies and nature - and their failures - raise vital questions for us today. *Jhum* cultivation in the Eastern Himalayas is a case in point. A form of slash-and-burn agriculture, *jhum* cultivation once use to revitalize and enrich the soil with nutrients, allowing for greater resilience both among forests and cultivated spaces. However, as populations expanded, land tenure policy shifted (the result of colonial imposition, as well as the broader global trend towards the enclosure of the commons for profiteering) and pressures on cultivation land to meet both local and export needs rapidly expanded, *jhum* cycles have shortened, resulting in accelerating land degradation across the region. An ecologically friendly

approach turns destructive once it crosses a certain threshold of scale, raising pertinent questions for contemporary science to build on traditional knowledge and practice, as well as broader issues of land policy: when does this threshold occur, how do we preserve the best of its effects and eliminate its worst effects, what are the most effective land and commons tenure policies for maximum sustainability and how do we achieve this at the scale needed to meet population food needs today.

Developmentalist perspectives focus on replacing "outdated" cultivation techniques with capital-intensive, chemical-intensive agricultural techniques. The unfortunate result of these agricultural techniques has been a decline in soil health, a decline in vital pollinator populations and shrinking crop biodiversity that has serious repercussions for the resilience of our food production systems in the future (FAO, 2019). A perspective focused on enhancing interdependent webs of relationships might instead look at *jhum* cultivation and see the opportunity to make an easy transition to biochar - a non-disruptive shift, which enriches the soil.

The Naturenomics™ perspective builds on this principle of mutually beneficial interdependency, still evident in a number of cultures globally, to build non-disruptive solutions for putting ecology back in economy. It is important here to note that the Naturenomics™ perspective is not a primitivist perspective or a nostalgic one, relying on myths about ecologically noble savages, but instead is forward looking and seeks to unite the developmentalist world and the interdependent world to create effective solutions that are neither hampered by technocratic nor nostalgic utopianism.

Instead, the Naturenomics™ perspective seeks to rebuild interdependency by refocusing the lens of our economic perspectives on the invisible natural capital based economy underlying our visible value-driven economy. By collapsing the artificial distance imposed between natural capital and labour capital by financial capital's limited scope of understanding of value flows, mutually interdependent socio-ecological relationships can flourish where natural capital value flows can become driving forces behind community economies. As the previous chapters outline, this closes the gap in the tension between human and biodiversity needs. With socioeconomic wellbeing pegged

to flourishing ecologies via a natural capital base, communities no longer have to face the zero sum game choices between preserving local ecologies for the future and their own survival in the face of income decline.

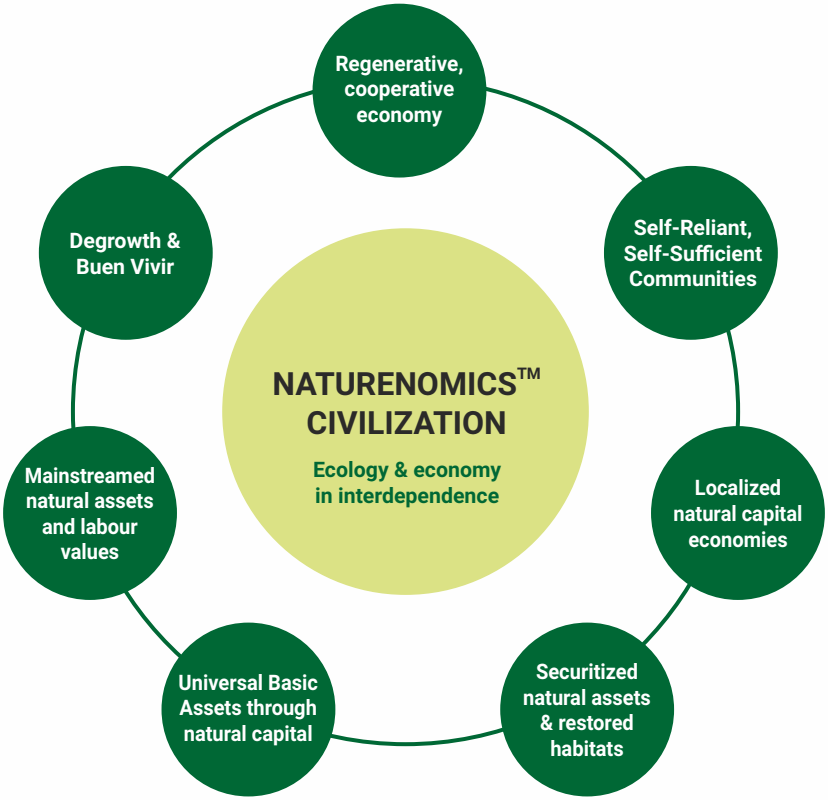
THE NATURENOMICS™ CIVILIZATION

What could the future look like?

The future envisualized in the Naturenomics™ Civilization begins in the Eastern Himalayas, but is, at its heart, a global vision. It is a creative reimagining of economy, transitioning away from value generation through ecological destruction to deriving value through natural asset regeneration and ecological preservation. Vitally, the Naturenomics™ Civilization seeks to rebuild fractured relationships between nature capital and labour capital, rebuilding cooperation by forging global alliances to preserve and enrich global natural assets in the face of borderless environmental issues.

The reintegration of economy, society and ecology represents humanity's best chance at saving the natural world. Revaluing forests as community wealth assets is one of the many tools to achieve this, but the creation of holistic ecological civilizations will ultimately recognize not just the ecosystems service value of forests, but crucially the labour value involved in managing and regenerating forests. In doing so, an ecologically-centred economy emerges in which economic value is created through ecologically restorative activity.

Imagine a future Naturenomics™ community: self-reliant and egalitarian, where every member has equal access to essential basics needed not just for survival but for social and economic wellbeing. Their economy may not exist at the level of sophistication of our financial economy, but agroforestry and agroecology practices have shortened supply chains and reduced dependency on outside systems for food security. These food systems are resilient, drawn from a diverse gene pool of seeds and sown to mimic the natural diversity of an ecosystem.



A vision for a society built on Naturenomics™ principles

Robust social and civic institutions enable them to effectively and participatorily manage their pool of natural capital to create access to and deliver universal basic assets and services in an equitable manner to all the members of a community.

As a result of local delivery chains for food and basic social assets and services, communities achieve complete self-sufficiency. Where developmentalism fosters dependence on external markets, subjecting incomes within communities to the whims of markets that exist beyond their control, socioeconomic mobility through localized alternative businesses and natural capital enhancement strengthens local economies and markets. Through interconnected and building collaborations to effectively regenerate natural capital across borders, these local economies afford communities a level of self-sufficiency and resiliency against the worst market shocks - even more likely to increase

in the coming years, as markets cope with fluctuating natural conditions.

In this future, forests are valued not just for the commodity values they represent when consumed, but for their sustained long-term value. Their labour in managing these natural assets no longer remains obscured, but these value flows are mainstreamed and remunerated, giving them income elasticity that is directly pegged to the health and enrichment of natural assets surrounding them. In a Naturenomics™ civilization, there is inherent value in maintaining forests, to add to community asset values, while industrial civilizations see value only in the conversion of habitats and natural resources into tradeable commodities via ecological destruction.

Such a society would go far beyond the limited perspective of circularity, to eliminate waste at its root via a transition to a participatory degrowth model, focused on durability, repair, lower consumption, defragmented supply chains, ecological restoration and a conceptualization of *quality of life* no longer defined by the ability of an individual to consume more. The indigenous concept of sumaq kawsay or *buen vivir* in Ecuador might be its closest approximation, in its search for harmonious interdependency between people, landscapes and wildlife, cooperative collaborative growth and human well-being embedded within the well-being of the collective (Gudynas, 2011). It is only through collaborative, cooperative efforts that borderless natural assets can effectively be managed and restored to create seamless habitats for endemic flora and fauna.

Business as usual is at an end and even green growth has its limits when faced with the finite constraints of the Earth's natural resources. As far back as 1972, scientists have been blowing the whistle on our infinite growth, infinite consumption model (Meadows et al., 1972). The growing rift between consumption to fuel our market economy and the energy capacity of the natural world has led to burgeoning scarcity. The Naturenomics™ Civilization seeks a post-scarcity world detached from a focus on growth numbers through a consumption driven economy. With sustainable living as its focus, it interrogates the assumptions governing the fundamental issues of value, growth and quality of life that dominate our public discourse today.

The next global economic revolution has to think big, beyond the

limitations of our dominating assumptions today: beyond sustainability, beyond technocracy and beyond growth. An equitable future and quality of life must be detached from the right to consume more, towards a question of well-being. As journalist George Monbiot writing recently for *The Guardian* puts it: private sufficiency, public luxury.

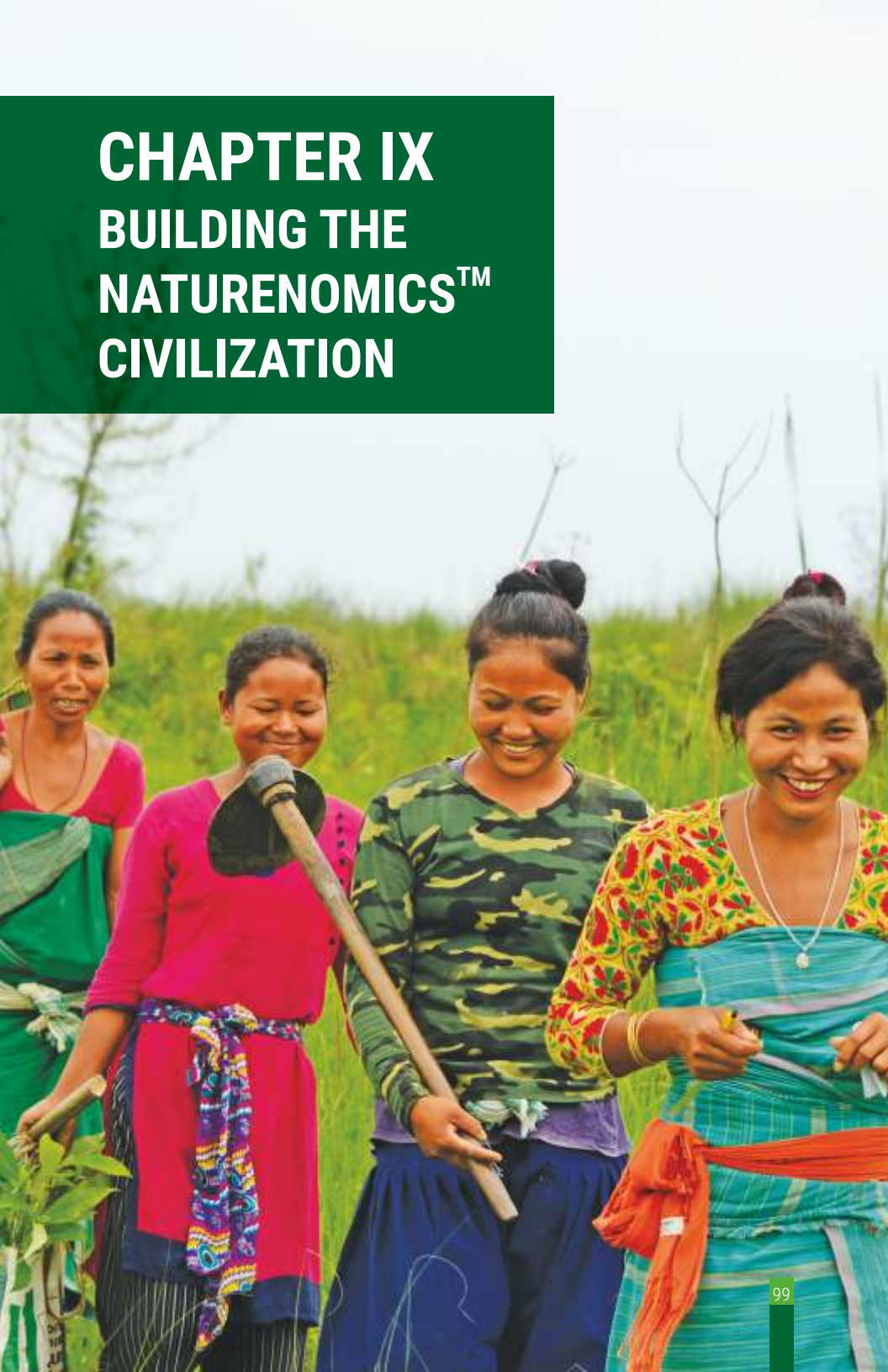
The Eastern Himalayas are ripe for this transition. Unlike the rest of India, industrialization is not as embedded in the landscape and the economy of the Eastern Himalayas, making the transition to alternative economies less disruptive than they might be elsewhere. 80% of the region depends on agriculture for income and many of the communities across this region already have cultural systems that strongly value the natural world. Bhutan's Gross National Happiness Index is a practical, local demonstration of what a non-growth focused approach to well-being and quality of living might look like. With the correct tools and action strategies, the Eastern Himalayas could become the world's first Naturenomics™ Civilization with resilient, thriving communities.

Successive energy revolutions paved the way for greater innovation and greater growth, but runaway growth created an ecological crisis. The Naturenomics™ Civilization future takes the best of all these stages of growth and combines them with a global vision for responsible growth delivered through rural natural asset creation, natural capital, global equitable access to universal basic assets (such as healthcare, education, water and renewable energy), decentralization to rural and indigenous communities and sociocultural values of interdependency leading to global balance.

BIBLIOGRAPHY

Refer to the bibliography in chapter IX for a full list of sources referred to in this chapter

CHAPTER IX
BUILDING THE NATURENOMICS™ CIVILIZATION

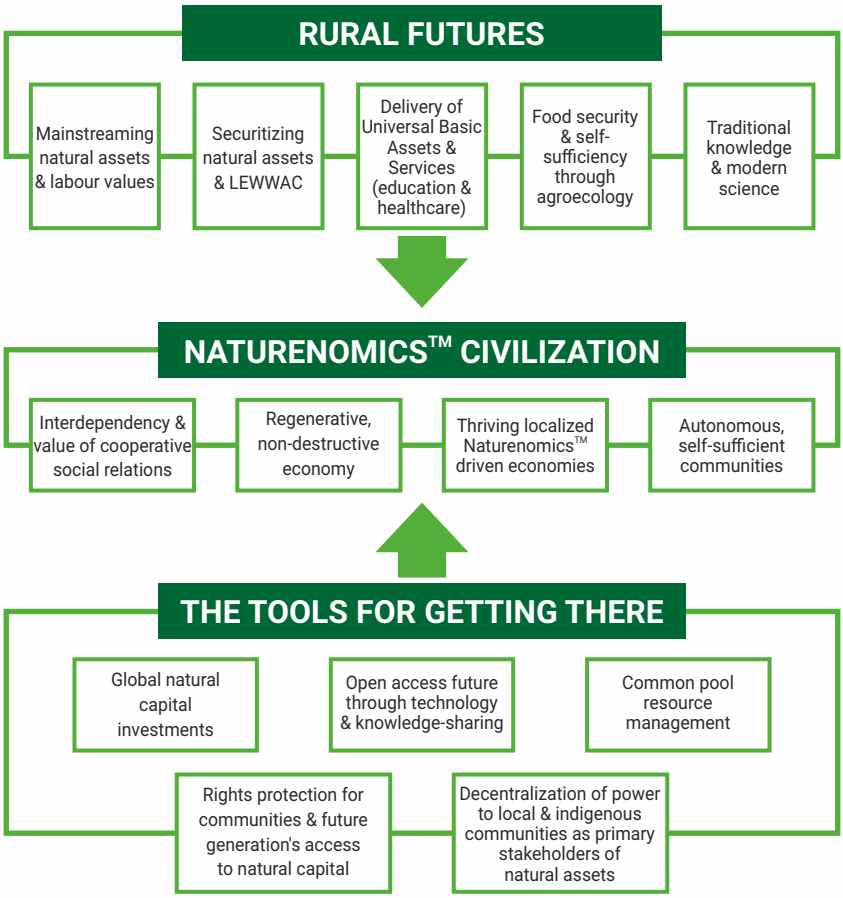


Our shared goal with Balipara Foundation is to find out ways and means that enable our Community to retain custodianship of our natural assets for as long into the future as possible. Our partnership, therefore, is to establish ways and means to make conservation viable to custodian communities.

Primson Daimary
President
Gethsamane Joint Forest Management Committee

THE TOOLS FOR GETTING THERE

Building a Naturenomics™ Civilization calls, first of all, for a recognition of the interdependency of ecology and economy - and importantly, the importance of interdisciplinary perspectives, knowledge and epistemology in formulating effective solutions. A truly holistic perspective for solution building calls for in-



Building a Naturenomics™ Civilization

depth analysis of the intersections between landscapes, ecology and communities - the terrestrial sphere, the biosphere and all social living. The integrated Naturenomics™ perspective, with ecology placed at the centre of economy, builds a robust framework for the Naturenomics™ Civilization. Its broader view of the world, people and wildlife creates nuanced knowledge for developing action blueprints for securitizing biodiversity assets and LEWWAC and building on Rural Futures.

Rural Futures is the primary driving action strategy for achieving immediate change on the ground among communities. By delivering a real tangible economic incentive to orient themselves towards habitat restoration, Rural Futures creates opportunities for communities to achieve socioeconomic mobility in a non-destructive manner - thus also closing the rift that exists between our market institutions and the carrying capacity of natural capital. Agroecology and agroforestry serves to both eliminate food insecurity, while diversifying agriculture-based income streams and creating both economic and genetic-based resiliency among local cropping systems. In the long-term, the Rural Futures vision of building natural capital driven alternate livelihoods and businesses and using natural capital to deliver Universal Basic Assets creates a self-reinforcing cycle, enabling communities to build up robust civic and social institutions for localized planning, resource development and allocation.

However, for these action strategies to be effective, there is a need for a deeper web of support - action strategies in themselves, but which call for support beyond local, immediate, on-the-ground action. There is need for action at the policy level, at the broader national and international level, to effect these transitions in a meaningful and importantly, in a scalable way. In the absence of scalability, the idea of a Naturenomics™ Civilization becomes, itself, moot.

Some of these key strategies are outlined here -

HYBRID KNOWLEDGE – TRADITIONAL KNOWLEDGE & MODERN SCIENCE

Revaluing indigenous and traditional knowledge, rigorously testing and

developing this knowledge through modern scientific techniques for context-specific globalized use.

Where modern science sees humans and the natural world as disconnected, indigenous systems of knowledge recognize the interconnectedness of people and their natural world. They are attuned to the Naturenomics™ view of the world, having perfected it over centuries of living on and working the same patches of land, resources and natural assets – often to create greater wealth than might occur naturally.

Indigenous communities have expert knowledge in the intimacy of this interrelationship, in regenerating the natural world and its species. This expert knowledge, supplemented with the techniques and tools of modern science is vital in understanding ecosystems, measuring their health and setting effective goals to enrich them. The Snowchange project in Finland, for example, blends the knowledge of the Sami people regarding trends in salmon and insect populations and combines them with scientifically recorded data on temperature, to reveal the effects of temperature disruptions on local ecologies.

Other researchers are reviving indigenous practices, such as the aboriginal peoples of Australia and Native American people's controlled use of fire to eliminate excess dried brush, as a means of preventing wildfire breakouts, enriching the soil and local ecologies. In a hybridized future, many more of these initiatives will continue to set the agenda for conservation goals and action.

The process of revaluing natural asset regeneration and conservation to build a new green economy must involve indigenous communities as stakeholders. Ethnobotany research by the Balipara Foundation across the Garo, Nyishi, Mishing, Bodo, Adivasi, Assamese and Nepali communities in Assam uncovered in-depth knowledge of over 300 unique plant species. The Lepcha and Limbu of Sikkim, the Adi of Arunachal Pradesh, the Khasi and Jaintia of Meghalaya – and many more, have long histories of using traditional knowledge to manage and conserve forests. Their expertise and experience are vital to both understanding and protecting the forests of the Eastern Himalayas.

Between 2017 and 2018 the Balipara Foundation carried out an intensive ethnobotanical study across seven indigenous communities in the

Sonitpur district in Assam. Instead of beginning by documenting biodiversity, the Foundation began by documenting indigenous knowledge and customs involving and related to flora across the Adivasi, Bodo, Garo, Mishing, Nyishi, Nepali and Assamese communities in Sonitpur. Over the course of the study, the Foundation documented 300 species of flora – including new medicinal uses for several plant species in the district. The Foundation's ongoing biodiversity study across Upper & Lower Assam, sponsored by the Department of Biotechnology and conducted in partnership with ATREE, the IBSD and a coalition of universities and institutions in the North East, which incorporates community interviews into the study process, has shown similar results, revealing further new medical uses for plant species across the state.

In a region like the Eastern Himalayas, where it is difficult to acquire up-to-date and accurate information about species prevalence, let alone the myriad functions and values of various species within their ecosystems, ethnobotanic studies are vital in mapping species and their interrelationships. Through mapping the complex and essential ecosystem webs and their functions, we come closer to understanding the precise dangers that the loss of a particular species entails. Indigenous communities are the experts in this matter, in the histories of species and perhaps most crucially of all, natural methods of species regeneration that have proven historical value.

RESTORING THE COMMONS

The development of natural capital and natural assets as a commons, not as privatized resources, managed through cooperation, negotiation and the strict distribution of responsibility among communities and local governments.

The tragedy of the commons has become something of an accepted maxim in popular imagination, shaping social science research inquiries, policy and action. Introduced by Garrett Hardin in the late sixties, it came to dominate conservation discourse through its argument that public lands would be prone to over-exploitation as individuals sought to maximize personal gain over sharing resources

and ensuring community welfare. As an idea driving action policy, the tragedy of the commons has been used to justify the increasing privatization and enclosure of common lands for both conservation and effective management.

However, a growing body of anthropological, sociological and even research in behavioural economics indicates that human behaviour and cultures are far more complex than Hardin's individualist model might suggest. Susan Cox writing in 1985 noted that Hardin's thesis stemmed from a fundamental misunderstanding of the form and function of the commons in medieval England, where use of common lands was carefully designated, negotiated and managed. Buffum (2012) writing about Bhutan's community forestry observes that existing historical community norms for managing forests, coupled with a strong governmental policy for devolving control of forests to communities as a whole, ensured no tragedy of the commons occurred in the region. Nepal, where community forestry was introduced only a few decades ago, shows similar positive outcomes for both communities and conservation (Adhikari, 2007; Birch et al, 2014).

Perhaps the most famous of these criticisms came from Nobel Laureate, Elinor Ostrom, who did extensive studies on commonly managed resources and amply demonstrated that communities around the world had developed effective strategies for managing the commons and ensuring their longevity. Through her work she identified a set of core principles that represent a strong, tangible blueprint for action in both shifting economic paradigms and creating a robust management system for the world's natural assets:

1) Natural assets need clearly defined boundaries, coupled with systematic rules of access and the roles and responsibilities of those accessing and managing the commons

2) These rules need to be matched to local needs and conditions for them to be effectively followed. This is where community councils play a significant role, in mediating between personal land needs and the longevity of natural assets.

3) These decisions must take place in a democratic and horizontal decision-making processes, which allow all stakeholders to participate in creating and shaping rules for resource governance.

4) Communities must self-monitor, to ensure these rules are applied and followed fairly and that no single person exploits natural assets beyond the allowed amount

5) Those who do exploit forest resources must be penalized through both social and financial mechanisms

6) Swift, equitable and just conflict resolution and support, through closer proximity of community council systems to the resources in question.

7) Community rights and control over natural capital is vital in enabling communities to proactively protect forests, in preventing the imposition of external and distant authorities and influences, who lack the direct investment that indigenous and local communities have in nearby habitats.

DECENTRALIZATION FROM URBAN TO RURAL, LOCAL & INDIGENOUS COMMUNITIES

Local and indigenous communities and their traditional ecological knowledge become the primary drivers of change and action, taking the lead role in enhancing natural assets – and managing the global commons.

It is no accident that most global biodiversity hotspots overlap with the settlements of indigenous communities. Research shows that indigenous communities are highly effective at managing natural assets, outdone only by areas under total protection – and even these areas reflect a decline in biodiversity compared to areas managed by indigenous communities over time. What we think of as the wilderness today reflects centuries of transformation through coexistence: indigenous communities living in symbiotic relationships with the natural worlds.

However, indigenous communities remain marginalized globally, with little recognition for their land rights and little legal protection for

community spaces and regarded as little more than tenants on government land. While the UN Declaration on the Rights of Indigenous Peoples paves the way for a primitive adaptation of a system of community-based rights, it is a non-binding declaration with little materializing by the way of legal protections for community spaces. Though India is a signatory to the UNDRIP, for example, all Indian citizens are considered "indigenous" by our civic and political institutions, leaving little room for special provisions for the rights of tribal communities as officially mandated by the UNDRIP.

Indigenous communities and their centuries of experience in sustainably managing community spaces and living symbiotically with the natural world must lead the transition to ecological civilizations. Part of this means devolving power over natural assets and the global commons to indigenous communities, giving them the legal and political security to effectively manage natural capital.

The evidence for the effectiveness of decentralization and strengthened land tenure among indigenous and rural communities is plentiful. Research conducted regularly by the World Resources Institute and the Rights & Resources Institute since 2015 demonstrates a close interlinkage between land tenure rights and forest preservation. A meta-analysis of existing studies by the Centre for Global Development supplements this, noting that indigenous communities are nearly as effective as parks-based conservation in preventing forest loss. Research by Schuster et al. (2019) across 15,000 sites in Brazil, Australia and Canada found that indigenous managed territories actually had a higher level of biodiversity than protected areas.

Closer home in the Eastern Himalayas, a study conducted by the World Bank in 2006 found that North East states where communities had official rights over forest land under Schedule Six, and where community forests were a regularized arrangement, deforestation was much lower than in regions without similar rights recognition or areas where there was unclear responsibility distributed between government agencies and communities.

Enhancing land tenure and delineating clear lines of management and divisions of responsibility between communities and government

bodies is essential for rebuilding natural capital. As reflected in the steps for instituting effective common resource management processes, communities require clear sanction to both negotiate and set limits on resource use, as well as institute a clear system of immediately actionable consequences to reinforce use terms for natural assets. Doing so goes a long way towards building local engagement for enhancing natural assets, building localized institutions for their management and putting in place the negotiation processes needed to manage natural capital as a common pool resource - not just as an individualistic source of income.

A NEW RIGHTS SYSTEM FOR COMMUNITIES AND INDIVIDUALS

Stronger protections for collective community rights to build community power in managing global natural assets and a new understanding of equality, justice and the pursuit of happiness in the context of the continued future of humanity.

While the UNDRIP provides certain protections for the rights of indigenous communities to their traditional land, its provisions are limited in scope and effectiveness. Globally, rights to land - to our natural capital - are still conceptualized in a simplistic divide: belonging to governments or belonging to individuals. This atomization of ownership of natural resources has in many ways brought us to where we are, with nearly 75% of the world' land facing degradation (UN-IPBES, 2019). Under this model of ownership, the immediate profitability of natural capital outweighs other considerations: community use rules, preservation for the future and public interests.

A new rights system must both future-proof human rights and mainstream community-based rights, extending the concept of rights beyond the current individualist and temporally frozen system of rights. The current existentialist threat posed by climate change calls for a system of protection on the global commons – including natural assets, ecosystems services, climate and the broader ecology – that ensures their sustainability and survival for future generations. In part, this

requires formally recognizing access to the global commons as an inalienable right for all, as long as that access does not infringe on the rights of other individuals and communities.

Community-based rights will legally empower indigenous and local communities to manage global natural assets, while removing the incentives and protections for destructive individualist behaviour. Ecological civilizations envisualize robust democracies, in which community stakeholders negotiate on an equal footing with corporations – already granted the protections and rights afforded "legal individuals" – and states. A strong framework of community and commons rights will create the space for indigenous communities to participate as vocal political and economic stakeholders in setting goals for protecting and restoring damaged ecosystems and building natural capital for the future.

AN OPEN ACCESS FUTURE THROUGH KNOWLEDGE SHARING & TECHNOLOGICAL INTERDEPENDENCE

A global intellectual commons coupled with open knowledge & technology sharing, to build equitable solutions to environmental and social challenges that can locally managed, developed, repaired and rebuilt if necessary.

Technology and science are part of the economy's fabric, essential for healthcare, infrastructure and housing, waste management, renewables and in developing resiliency to meet climate challenges. However, technology and knowledge remains unequally distributed, with regions facing the greatest climate risks forced to spend heavily to access this technology and knowledge – despite holding the smallest proportion of the world's ecological debt.

While raw resources that go into developing technologies are extracted & developed into products in developing countries, the intellectual property & ownership of these technologies is held in first world countries. At present, approximately 78% of green innovation R&D spending is concentrated in OECD countries and 80% of the patents on

solar photovoltaic systems, geothermal, wind and carbon capture are held by private multinational corporations based out of the USA, UK, Germany, France, South Korea and Japan. In the long run, this creates an unequal dissemination of technology, leading to technology dependencies – in this case, the greatest dependencies being created in countries most at risk for climate change and environmental degradation. This, again, externalizes the costs and losses of environmental degradation, with the burden of invisible ecological debt being held by OECD countries, but a monetized technological and economic debt being held in third world countries.

The rise of IoT technology and smart technologies has raised further issues regarding technology ownership. The John Deere tractor case provides a stark illustration of this issue, with farmers across the globe finding themselves locked out of using their tractors by increasingly smart software governing formerly purely mechanical functions, preventing them from repairing their tractor except from sanctioned dealerships – effectively creating a monopoly on how these tractors can be used. Right to repair activists globally have pointed out that this turns technology companies into rentiers of technology, effectively licensing users to use technology for a fee while maintaining proprietary rights over the technology & its powering software.

Local communities must be empowered to be co-creators of green technology solutions rather than creating dependencies, by using open source software and technology to build green technology solutions for creating a Naturenomics™ Civilization. Local communities are empowered to model and analyze data on community challenges – climate risks, natural asset needs, universal basic asset needs – to innovate and develop solutions that meet local, specific needs. An open access knowledge and technology commons will also spur the transition to a repair and reuse model of technology use and distribution.

A knowledge-sharing commons creates access to all current, relevant knowledge, best practices and innovations – facilitating a cooperative, collaborative technology market instead of the current competitive technology regime, which prioritizes competition for profits over finding long-term solutions through global solidarity.

On a broader global level, this calls for the dispersion of restrictive patents on technologies vital to community survival and adaptation to

ecological threats. Technology law must be adapted to recognize the essential role technology plays today, on par with essential commodities and services.

As smart software powers clean-tech such as smart clean energy grids; sensors for managing waste, water use & agricultural production and every facet of our digital lives, the impetus for technological independence and ownership is growing ever more urgent. Technology could create the leap forward in production, supply and distribution systems to eliminate harm along LEWACC indicators. In the Eastern Himalayas, where previous waves of industrialization have little penetration in a largely agricultural economy, the switch to green technology could leapfrog environmentally destructive industrial processes to build a green economy from the grassroots up, instead of the current trickle down application ongoing globally. But to make this leap, technology and knowledge banks must be developed and disseminated at a grassroots level through fair transfer mechanisms.

FINANCIAL DIVESTMENT FROM THE CARBON ECONOMY; INVESTING IN NATURAL CAPITAL

From a carbon driven economy to a natural capital driven economy, through investments in carbon reduction through ecological restoration and renewables, a balancing of global ecological debt and building community wealth through natural asset based funds.

Despite growing calls for divestment from oil, investments in oil have continued to grow in the past few years, with funds still investing billions in oil companies. Investments in fossil fuels grew at 20% between 2016 and 2018: a higher growth rate than investments in renewable energy for the same period (18%). Proportionately, fossil fuels still account for 80% of the world's energy supply and although renewable energy investments have been growing significantly, they still consist of less than 10% of the world's total energy supply – nowhere near enough to support a complete transition in energy use within the next few years.

Additionally, at present, environmental costs are highly externalized, creating a false image of current economic profitability. As mentioned previously, estimates from 2009 found that first world ecological debt to the third world was 5 times the total financial debt the third world owed the first world. Under current accounting regimes, however, these costs remain invisible and uncompensated. Creating an accurate map of the true costs of the current economic system will disincentivize ecological destruction, particularly when coupled with systematic accounting programmes & ESG guidelines which absorb these costs into operational costs, and by penalizing environmentally risky behavior through fines.

A meaningful economic transition needs to be driven by the recognition and accounting of ecological debt across industry. A complete divestment from oil must be followed by an investment in renewables – not just existing technologies such as solar and wind, but in experimental technologies such as salinity gradient power/blue energy, hydrogen cells and as yet unplumbed renewable energy resources. Structured policy plans dealing with ecological debt mitigation must move entities to shoulder ecological debts previously outsourced to public institutions or communities. Payments from these debts and cap-and-trade based profits can be channeled into citizen wealth funds for indigenous and local communities in return for their continued management, regeneration & enrichment of natural assets.

However, these solutions still occur within the realm of business as usual, leaving financial systems intact and imposing regulations to manage its most devastating effects. A far more essential rethink and restructuring is necessary, to divest completely from petrodollar derived investments and move to an investment system centering natural capital.

A systematic and comprehensive assessment of ecosystems services values, pegged to an effectively calibrated system of valuation would provide the means for this transition to a natural-assets backed financial system. Through this, an allotted area of healthy natural assets would have a particular value that could be swapped through fiat credit systems. For ensuring maximum security, blockchain based cryptocurrency could ensure that genome based keys of natural assets are keyed to a specific value – thus eliminating potential duplications,

miscounting and other errors. A natural asset backed fiat credit system will form the basis for creating citizen wealth funds, with its pay-outs going back to community managed funds for delivering universal basic assets and services, or even a universal basic income if needed.

Importantly, a natural asset backed credit system will incentivize the enrichment and regeneration of the world's natural capital. It is essential, however, that in this investment process we do not turn to the enclosure of our remaining commons - as is increasingly happening in the Third World through the influence of both conservation agencies and global financial institutions - but to develop common, community-wealth based natural capital investment. The wealth created through a natural asset backed credit system must be equitably accessible for communities, or else we run the risk of creating perverse incentives in managing natural capital, with potentially devastating consequences for both vulnerable forest-fringe communities and for our fragile natural capital.

The future of the Eastern Himalayas depends heavily on action taken within the next decade. Building a Naturenomics™ Civilization starts at the grassroots level – through programmatic approaches such as ***Rural Futures*** which focus on natural asset creation and habitat restoration as a means of building resiliency and adaptive capacity among local communities in the region.

The deep-penetrating hegemony of the carbon economy must be rejected. The fifth industrial revolution must be ecologically centred as humanity faces its greatest existential threat yet – or else we face the risk of complete non-evolutionary extinction. The Naturenomics™ Civilization represents an interdependent, cross-border and pan-community vision for action, bridging social and cultural differences for a radically transformative resilient and equitable global future.

BIBLIOGRAPHY

Cox, Susan Jane Buck. "No tragedy of the commons." *Environmental Ethics* 7.1 (1985): 49-61.

Altieri, M. A. (2009) Agroecology, Small Farms, and Food Sovereignty. Monthly Review. 61(3), 102-113.

Adhikari, B., Williams, F., & Lovett, J. C. (2007). Local benefits from community forests in the middle hills of Nepal. *Forest policy and economics,* 9(5), 464-478.

Birch, J. C., Thapa, I., Balmford, A., Bradbury, R. B., Brown, C., Butchart, S. H., ... & Peh, K. S. H. (2014). What benefits do community forests provide, and to whom? A rapid assessment of ecosystem services from a Himalayan forest, Nepal. *Ecosystem Services,* 8, 118-127.

BP. *BP Statistical Review of Energy 2019.* Retrieved from: https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/renewable-energy.html.html#renewable-power

Bunker, S. G. (1988). *Underdeveloping the Amazon: Extraction, unequal exchange, and the failure of the modern state.* University of Chicago Press.

Ding, H., Veit, P., Blackman, A., Gray, E., Reytar, K., Altamirano, J. C., & Hodgdon, B. (2016). *Climate benefits, tenure costs: The economic case for securing indigenous land rights in the Amazon.* World Resources Institute: Washington, DC. Retrieved from: http://www. wri. org/publication/climate-benefits-tenurecosts.

Eldredge, Z. (2018) Intellectual Property & Climate Change. THE TROUBLE. https://www.the-trouble.com/content/2018/9/20/intellectual-property-and-climate-change Accessed: 01/03/2019

FAO. 2019. The State of the World's Biodiversity for Food and Agriculture. J. Bélanger & D. Pilling (eds.).

Ferretti-Gallon, K. (2014). *What Drives Deforestation and What Stops It? A Meta-Analysis of Spatially Explicit Econometric Studies-Working Paper* 361 (No. 361). Center for Global Development.

Garnett, S. T., Burgess, N. D., Fa, J. E., Fernández-Llamazares, Á., Molnár, Z., Robinson, C. J., ... & Collier, N. F. (2018). A spatial overview of the global importance of Indigenous lands for conservation. Nature Sustainability, 1(7), 369.

Gudynas, E. (2011). Buen Vivir: today's tomorrow. Development, 54(4), 441-447.

Holt-Giménez, E. & van Lammeren, I. (2018). Can Food As A Commons Advance Food Sovereignty? in Routledge Handbook of Food as a Commons, pp. 313-328. Routledge.

Hornborg, A., Cederlöf, G., & Roos, A. (2019). Has Cuba Exposed the Myth of "Free" Solar Power? Energy, Space, and Justice. *Environment and Planning E: Nature and Space.* https://doi.org/10.1177/2514848619863607

Hornborg, A. (1998). Towards an ecological theory of unequal exchange:

Articulating world system theory and ecological economics. *Ecological Economics,* 25(1), 127-136.

Illich, I. (1973). *Tools for Conviviality.* New York: Harper and Row.

Maezumi, S. Y., Alves, D., Robinson, M., de Souza, J. G., Levis, C., Barnett, R. L., ... & Iriarte, J. (2018). The legacy of 4,500 years of polyculture agroforestry in the eastern Amazon. *Nature plants,* 4(8), 540.

Magdoff, F., & Williams, C. (2017). *Creating an Ecological Society: Toward a Revolutionary Transformation.* New York: NYU Press.

Malm, Andreas. (2017). Long Waves of Fossil Development: Periodizing Energy and Capital. In B. R. Bellamy, & J. Diamanti (Eds.), *Materialism and the Critique of Energy MCMPrime.*

Malm, A. (2018). *The Progress of This Storm: Nature and Society in a Warming World.* Verso: London.

Mathews, J. A. (2014). *Greening of Capitalism: How Asia Is Driving the Next Great Transformation.* Stanford University Press: Stanford.

Matthew, R. A., Brown, O., & Jensen, D. (2009). *From conflict to peacebuilding: the role of natural resources and the environment (No. 1)*. UNEP/Earthprint.

Meadows, Donella H; Meadows, Dennis L; Randers, Jørgen; Behrens III, William W (1972). *The Limits to Growth; A Report for the Club of Rome's Project on the Predicament of Mankind.* New York: Universe Books.

Monbiot, G. (2019). Capitalism is destroying the Earth. We need a new human right for future generations. *The Guardian*. Retrieved from: https://www.theguardian.com/commentisfree/2019/mar/15/capitalism-destroying-earth-human-right-climate-strike-children. Accessed: 22/03/2019

Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action.* Cambridge University Press.

Patel, R. (2011). *The Value of Nothing: How to Reshape Market Society and Redefine Democracy.* Granta.

Patel, S. (1974). The Technological Dependence of Developing Countries. *The Journal of Modern African Studies,* 12(1), 1-18.

Perez, Carlota (2002). *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages.* UK: Edward Elgar Publishing Limited.

Poffenberger, M., Barik, S. K., Choudhury, D., Darlong, V., Gupta, V., Palit, S., ... & Upadhyay, S. (2006). Communities and forest management in northeast India. *World Bank: Background Paper,* 12.

PRISMA. (2016). *Conservation and Community Rights: Lessons from*

Mesoamerica.

Robbins, J. (2018). Native Knowledge: What Ecologists Are Learning from Indigenous People. Yale Environment 360. https://e360.yale.edu/features/native-knowledge-what-ecologists-are-learning-from-indigenous-people. Accessed: 01/07/2019

Ransom, D., & Baird, V. (Eds.). (2010). *People First Economics.* New Internationalist.

Rights and Resources Initiative. (2018). A Global Baseline of Carbon Storage in Collective Lands. Indigenous and local community contributions to climate change mitigation. Washington, DC: RRI.

Singh, R. K., Srivastava, R. C., & Mukherjee, T. K. (2010). Toko-Patta (Livistona jenkinsiana Griff): Adi community and conservation of culturally important endangered tree species in eastern Himalaya. *Indian Journal of Traditional Knowledge,* 9(2), 231-241.

Stevens, C., R. Winterbottom, J. Springer, and K. Reytar. (2014). "Securing Rights, Combating Climate Change: How Strengthening Community Forest Rights Mitigates Climate Change." Washington, DC: World Resources Institute. Accessible at www.wri.org/securing-rights.

Storm, S., & Schröder, E. (2018). Economic growth and carbon emissions: the road to 'hothouse earth'is paved with good intentions. Institute for New Economic Thinking: Working Paper Series, (84).

Srinivasan, U. T., Carey, S. P., Hallstein, E., Higgins, P. A., Kerr, A. C., Koteen, L. E., ... & Norgaard, R. B. (2008). The debt of nations and the distribution of ecological impacts from human activities. *Proceedings of the National Academy of Sciences,* 105(5), 1768-1773.

United Nations Environment Programme, European Patent Office & International Centre for Trade and Sustainable Development. (2010). Patents and clean energy: bridging the gap between evidence and policy.

UN-IPBES. (2019). *Nature's Dangerous Decline: 'Unprecedented'; Species Extinction Rates Accelerating.* Retrieved from: https://www.ipbes.net/news/Media-Release-Global-Assessment

Afterword

Ending silos: Interdependent perspectives for the Naturenomics™ future

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All around the world, ecosystems are reaching their tipping point. Human overuse, misuse and abuse of our natural assets directly threatens the crucial role these valuable resources play in maintaining balance: endangering these precious survival resources and putting us up against the greatest existential risk to the future of human life. Regions like the Eastern Himalayas, considered one of the world's richest biodiversity hotspots and vulnerable to the slightest changes in temperature, are in danger of disappearing altogether. The International Centre for Integrated Mountain Development's projection for the next hundred years reveals a dire picture: bare rock instead of snowcapped peaks, desert instead of rich forests and seasonal streams in place of roaring, mighty rivers.

Global dialogues on the future of our natural capital are stalled, in deadlocks or ineffectual, 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.

Yet despite this grim outlook, there is a bright shimmer of hope on the horizon: A Naturenomics™ civilization that supports all, starting with our most vulnerable communities through Rural Futures among our villages,

especially among forest-fringe communities on the frontlines of the fight to preserve our natural capital.

As the chapters in this book have highlighted, we need 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.

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

We have let ourselves be siloed off from each other for too long and like the blind men meeting an elephant for the first time, have fumbled in the dark, blindly reaching for the single silver bullet to solve our environmental crisis – while each claims to have the single one-size fits all solution to all crises. But there is no silver bullet. There are only many, complex solutions, each tailored for specific contexts and to the needs of the communities serving as stewards of our natural capital.

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. Putting ecology back in 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.


BALIPARA FOUNDATION
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