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Enhancing economic agro-forestry for livelihood opportunity via Ecosystem Restoration: A case study

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Abstract

Meghalaya, a North Eastern state of India with its economy tied to natural resource-base and climate-sensitive sectors as agriculture, water, forestry. Encroachment of forest land for agricultural activity, overexploitation of biodiversity, unsustainable agricultural practices (slash & burn) and non-scientific mining resulted in habitat degradation and pollution. India Water Foundation, as development partner with Meghalaya Basin Development Authority (MBDA) under Integrated Basin Development Livelihood Program designed on Knowledge Management, Natural resource Management, Entrepreneurship Development and Good Governance through demand driven partnership made efforts towards Ecosystem restoration, linking forest, agriculture and water as most of economic value depends on nature and its services. Forest plays an indispensable role to conserve ecological balance and biodiversity restoration and indigenous people worship sacred groves, preserve flora and fauna biodiversity and bamboo reserves dedicated to deities in Garo, Khasi and Jaintia hills served as water catchments to fulfil domestic, agricultural, customary needs. Green Mission promoted protection of catchments forests, improved forest & water foot print, diversified farmer's livelihood, income and food security. Opportunities from social to economic forestry prospered state's economy. Adapting to temperature and weather conditions, entrepreneurs cultivated tea, fruits, flowers, spices and medicinal plants & had market linkages, connectivity, cold storages and financial inclusion. Climate resilient practices like re-wilding, adaptive management augmented sustainable green cover and restored water-land-biomass balance, promoted carbon sequestration and water-energy-food security nexus.

Keywords: Biodiversity conservation, Sustainable forest management, Deforestation and forest degradation, Gender, Economic Development

Introduction, scope and main objectives

The subject matter of the paper is Meghalaya, a North-East State in India, located in a fragile geo-environmental setting. It is subject to hydrological risks such as flood-drought-flood syndrome, eutrophication of water bodies and run off of rainwater from slopes of the Himalayas surrounding the State due to absence of water catchments, resulting in soil erosion (Sharma [2011](#)). The State is abundant in minerals like coal and limestone, endowed with a large forest cover, biodiversity and water bodies. However, due to unsustainable agricultural practices and unscientific mining, the quality of soil and water had heightened ecological degradation in Meghalaya.



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In Meghalaya, agroforestry has been historically widely practiced. However, the patterns of its conduct are variable, subject to the climatic and topographical conditions of the terrains in Meghalaya. For example, in South Meghalaya with extreme rainfall and steep slopes, people grow multi-crops, through agroforestry, such as bay leaf, betel leaf, wild pepper, jack fruit, leechi, pineapple, packing leaf, and broom grass which are mostly economically important plants and cash crops (Tiwari et. al 2010). However, despite the popularity of agroforestry, there existed insufficient data and information about Non-Timber Forest Plants (NTFPs) regarding their volume, value of supply and demand and identification of major market players for the NTFP products (CIFR 2008).

Moreover, traditional agricultural practice of *jhum* cultivation (slash and burn), which includes sowing, reaping and mass-burning the stocks of remnants of harvest, had significantly impacted hydrological parameters (Kumar [2021](#)). Combined with its economic underdevelopment with majority of the indigenous tribal population of Meghalaya declared as living below poverty line, the State was in need for intervention that united its key concerns of climate change, ecosystem restoration, adaptation and generating alternative livelihoods.

In this backdrop, India Water Foundation, an UN-accredited not-for-profit based out of New Delhi, as knowledge partner to the Meghalaya Basin Development Authority (MBDA), developed the Integrated Basin Development and Promoting Livelihoods Programme (IBDLP Programme) in 2012. The IBDLP Programme was founded on four pillars of knowledge management, natural resource management, entrepreneurship development and good governance. It employed a convergence approach, involving a multi-sectoral approach towards sustainable economic growth with water at the centre of this synergy. The present paper is written with the objective of analysing the success of the IBDLP Programme over nearly a decade since its introduction and the significance of agroforestry in alternative livelihood generation.

Methodology/approach

Before the IBDLP Programme was devised, the primary concerns that needed to be addressed were identified as: risks emanating from water-induced and environment-induced vagaries in terms of insecurity of water, food and energy sectors, floods, drought, water and air pollution, erosion of land, loss of biodiversity, deforestation and loss of livelihoods (Kumar [2021](#)). Ironically, though Meghalaya is home to two of the towns known for receiving highest levels of rainfall- Mawsynram and Cherapunji – it suffered from bouts of drought during non-monsoon seasons as a result of insufficient and mostly absent water conservation methods and tools.

The approach employed by India Water Foundation involved grassroots level research studying its sociological composition, cultural and economic practices, livelihoods, traditional knowledge and methods for use of water and other natural resources. Post examination, the IBDLP Programme was devised keeping in mind Meghalaya's economy which was closely tied to natural resource base and climate sensitive sectors including water and agroforestry. Encroachment of forest land for agricultural activity, mining and traditional subsistence hunting practice of tribal population had caused drastic degeneration of natural resources and biodiversity.

In contrast to the previously implemented piece-meal approaches to resolving issues related to food security, water, energy or biodiversity, the IBDLP Programme emphasized a strong cross-cutting approach to multiple sectors, devising mission mode approach through which a water-food-energy



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nexus was applied. These missions included apiculture, aquaculture, horticulture, agriculture and forestry, sericulture, water, rural energy, livestock management and tourism (MBDA [2018](#)). The Programme envisioned outreach, public awareness and engagement through vocational training, workshops and linking the activities in States to National Schemes of the Government of India for Rural Development, Water and Tourism.

Another project administered was Mission Green Meghalaya with a primary focus towards environmental conservation. Mission Green Meghalaya and the Forest Mission recognized the forest cover of the State being well above national average with more than 70% of the State's geographical area being covered with forests, yet increasing population and indiscriminate deforestation in community forests, private forests and of "green cover" along roadsides had resulted in a pertinent need to address the issue. Protection and restoration of "green cover" was integral to protect communities from landslides, slips, sinking and reducing pollution (Green Mission [2018](#)). Under this Mission, the aim was to rejuvenate the environment and cease any further ecological degradation, towards the achievement of which, a cadre of community chosen volunteers was created at village and micro watershed levels to increase awareness of natural resource management and conservation (SDGs Partnership Platform [2021](#)).

Meghalaya Community Led Landscape Management project (MCLLMP), funded by the World Bank and a part of the IBDLP Programme, devised effective methodologies for income generation of the rural poor in the state by increasing plantations of Non-Timber Forest Products (NTFPs) amongst trees and shrubs within forest areas. The focus was on cultivating economically viable crops- that were fast-growing and would yield harvest sooner than other economically viable spices and fruits- such as broom grass, bay leaf, bamboo, tuber crops and coffee.

Results

Forest Restoration

The Forest Mission resulted in nurturing natural resources and maintaining an ecological balance that ensured sustainable development. Forestry efforts included afforestation, building forest nurseries and quality tree plantation derived from tissue culture with the vision of increasing reliance on ecosystem to absorb ecological pressure and enhance water yield through conservation and preventing run off of rainwater. The Meghalaya State Forest Department took up afforestation through the Central Government Scheme, National Afforestation Programme; State Plan Scheme, Afforestation of Critical Catchment Areas and IBDLP Programme. Under the National Afforestation Programme, forest plantation in first quarter of 2013-2014 was raised to 2920 hectares; 1125 forest nurseries were raised and 420 hectares of geographical forest area was afforested. Under the IBDLP Programme alone, creation of 725 forest nurseries and 420 hectares of plantations were successfully undertaken (MBDA Forestry Mission [2018](#)).

Ecosystem Based Adaptation

The integrated approach towards creating a water-food-energy nexus and using water as a socio-economic indicator led to localization of WASH (Water, Sanitation and Health) communities which disseminated appropriate strategies on sanitation, making Mawlynnong village in Meghalaya, the "cleanest village in Asia" (BBC News [2016](#)). The Ecosystem Based Adaptation model in Meghalaya has



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met with success, being replicated in neighbouring Asian countries of Bangladesh, Nepal and Bhutan who have incorporated this model in their national policies. The localization of the EbA is now being adopted in neighbouring North East Indian State of Sikkim and under-developed aspirational districts across India.

Agroforestry

Since 2018, the Meghalaya Community Led Landscape Management project (MCLLMP) is being implemented as a part of IBDLP supported by the World Bank, for a period of five years. It aims to enhance community-led resource management across a range of diverse topographies in the State, with a focus on degraded forest restoration, agroforestry and homestead forestry (JICA 2019). Supplemented by the 2014 National Agroforestry Policy to “encourage and expand tree plantation in a complementary and integrated manner with crops and livestock to improve productivity, employment, income, and the livelihoods of rural households”, the IBDLP Programme has witnessed a large scale improvement in the economic benefits of agroforestry. Central Government Mission on Shifting Cultivation prepared in 2018 envisions transforming the practice of shifting cultivation to other sustainable agricultural practices that promote home gardens and agroforestry which ensures food security and reduces dependence on *jhum* cultivation.

Sustainable Development Goals

By empowering the communities and treating them as participants, experts and activists- a stark contrast from their initial State dependence for survival through subsidies- the IBDLP Programme enabled local tribal communities to garner economic and ecological benefits accruing from restoration of man-made wetlands, sustainable forest management and ecosystem restoration. Leading to carbon sequestration, improved water quality, biodiversity conservation, generation of alternative livelihoods and poverty alleviation, the IBDLP Programme is categorized as evidence of Best Practices by the United Nations (SDGs Partnerships Platform [2021](#); UN Civil Society [2021](#); UN Social Development Network [2016](#)). The IBDLP Programme succeeded in stepping towards full achievement of Sustainable Development Goals, specifically SDG 1 to eradicate hunger through improved livelihoods; increased water, energy and food security in SDGs 2, 6 and 7; increased resilience against climate change in SDG 13; biodiversity conservation and terrestrial life’s conservation with SDG 15.

Discussion

The IBDLP Programme’s success can be traced back to its recognition and respect for being culturally appropriate to a context of indigenous tribal populations resident in Khasi, Garo and Jaintia Hills of Meghalaya. India is not a Party to the ILO Convention No. 169 on Indigenous and Tribal Peoples, 1989 due to the classification of indigenous peoples and its argument that largely India’s population would then be classified as Indigenous. India recognizes tribes in accordance with the Indian Constitution. In furtherance of being culturally appropriate, the IBDLP Programme identified cultural practices of the tribes, including their use of traditional knowledge for maintaining ecological balance. The Central Government Mission on Shifting Agriculture proposed combining traditional knowledge on agricultural resource management and modern science to enhance productivity of pre-existing practices (World Bank 2018).



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An example of such a practice for traditional forest management can be found in the sacred groves of Meghalaya. These sacred groves serve as water catchment areas and water conservation remains its most well-documented ecological service, by far. Tribes use bamboo pipes to draw water from these catchments for agricultural purposes vide drip irrigation to irrigate crops, prevent water wastage and use it additionally, to meet domestic and cultural needs.

The focus of the IBDLP Programme on an integration approach and convergence led to building entrepreneurial capacity that transformed a State of dependents to participants in economy and ecology. Traditionally male members of the community worked in barely remunerative coal mining and limestone quarrying sectors. With the onset of the Programme, they were empowered and equipped to convert their lands into assets for piggery/poultry farming and as sources for livestock management (UN Social Development Network [2016](#)). They were also sensitized to the irrevocable harm their indiscriminate hunting of freshwater; terrestrial and avian species was causing to the fragile ecology.

As a result, through the Water Mission, Multipurpose Reservoirs were funded for construction, enabled with micro hydels wherever possible to generate renewable, clean energy. Jalkunds or Water Harvesting Systems were also constructed to preserve rainwater for use during non-monsoon seasons (Water Mission [2018](#)). The operation of these Micro-Hydel Power Plants involved working in collaboration with the existing Government schemes and other renewable power generation schemes of Ministry of New and Renewable Energy (Economic Digest [2013](#)). Moreover, the Forest Department of Garo Hills which exercises control over large swathes of District Council-owned Forests identified illegal inhabitants in forests who practiced shifting agriculture or monoculture plantations of areca nuts and rubber. By designating them “Forest Villagers” the economic nature of their agroforestry practices was legitimized.

Meghalaya is a matrilineal society with women serving as heads of households. This is largely because the ethnic majority of the demography of Meghalaya is composed of Khasi tribe, one of the last surviving matrilineal societies in the world (BBC News [2021](#)). However, their status was largely limited to being rubber stamps as prior to IBDLP Programme, they were unable to turn the financial wheels of the economy resulting from an absence of entrepreneurial spirit, institutional support, economic and social barriers (UN Civil Society [2021](#)). The IBDLP Programme offered vocational training, whereby women started to undertake *Laha* cultivation (silkworm and cocoon rearing) in their own homestead gardens and completed traditional weaving and dyeing of clothes, sold across State borders. Through supply chain management and increased marketing, a demand for locally made products was generated by IWF and MBDA locally and regionally. Additionally, women’s role in agroforestry was enhanced to substitute shifting cultivation and incentivising cultivation of fast-growing, economically viable crops.

IWF focused its efforts towards inclusive participation and gendered emancipation, by aiding in the implementation of a special scheme called “Women’s Economic Empowerment Entrepreneur Scheme”. Whereby, female entrepreneurs were given a margin money of Rs. 5000 (equivalent to 70 USD), allowing women above the age of 18 to apply with a business plan in the form of a project report to the bank. The IBDLP Programme emancipated these women, transforming them into “active partners” from mere “beneficiaries” of government aid and subsidies. By promoting cross-linkages of water mission with forestry mission, the IBDLP Programme promoted rejuvenation of local water



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capacity, sequestering GHGs emissions and incentivizing locals to create valuable, sustainable assets through their work by offering trainings in sericulture, weaving, strawberry and tea plantations amongst other activities.

There were however, hurdles to the implementation of the ambitious IBDLP Programme. These limitations to the conduct of the Programme included a lack of environmental financing, institutional convergence and horizontal and vertical development sector integration. The Gross State Domestic Product for Meghalaya improved significantly at the rate of 9.85% from the years 2015 to 2020 (IBEF [2021](#)). Despite this economic growth, it took nearly a decade for the impact of this Programme to be visible at the grassroots level. At this juncture, having set the ball rolling, it is important to devise mechanisms to scale-up the already functioning IBDLP Programme and understand the gaps in its implementation, to bridge them when the model is replicated in neighbouring States and Countries with similar topography and fragile ecological setting.

Conclusion

The IBDLP Programme was unprecedented in implementing a multi-sectoral and convergent approach towards sustainable development, economic growth and ecological preservation and restoration since its inception in 2012. Through its missions, it has empowered the community of indigenous tribes of Khasi, Garo and Jaintia tribes who are historically and ancestrally tied to the use of their lands for cultural, social and economic survival.

The Programme was successful in restoring a heavily degenerated ecosystem and optimized on ecosystem based adaptation to localize solutions for natural resource and knowledge management in the State. The Green Mission and Forest Mission together restored a significant portion of the depleting forest cover of Meghalaya, geographically covering an area of more than 70%.

India Water Foundation's recognition of water as a connector, cognizant of its role as a socio-economic indicator has transformed the scope of climate action, ecosystem resilience and water conservation in the State of Meghalaya. Constructing community water Jalkunds or Water Harvesting Mechanisms, small and Multipurpose Reservoirs has incorporated the integrative approach towards restoring water-land-biomass balance through natural resource management (Kumar [2019](#)).

The Programme was culturally appropriate and sensitive to traditional knowledge of the local tribes, utilizing sacred groves as water catchment areas to transmute water through bamboo pipes for drip irrigation, cultural and domestic needs. It also emphasized sustainable growth through reliance on locally adapted alternative livelihood generation in keeping with the ecological setting of Meghalaya, like horticulture, sericulture, forestry, plantation crops, aquaculture and apiculture.

IWF envisaged and achieved an increasing role for women in economic growth, women's contribution to environmental development which is significant due to their expertise, research and skills being vital for long-term sustainability of biodiversity and climate change resilience. Gender based frameworks mobilize local activism, strengthens awareness and enhances scope for policy research and implementation. Socio-ecological sustainability rests on the pillars of inclusion and meaningful participation of all stakeholders, especially the vulnerable and neglected. More needs to be achieved to empower women with a stronger voice in decision making related to environment and allow them to take advantage of opportunities in developing a "green economy" (UNFCCC [2021](#)).



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Lessons from Meghalaya indicate the replicability and focus on achieving the following recommendations:

- Inclusive development models- State and National Governments where this model is sought to be implemented post localization must include and engage stakeholders in a meaningful and participatory way in all decision making that shall inevitably impact their livelihoods and way of life. Such stakeholders include indigenous peoples, women and persons with disability.
- Agroforestry- The combined efforts of the IBDLP Programme supported by the Central Government Mission on Shifting Cultivation have led to the restoration of cultivable wasteland that was previously unsuitable for agriculture due to *jhum* cultivation. Agroforestry methodologies that emphasized cultivation of fast growing, economically viable crops led to a two-fold benefit. It emancipated communities, especially women and allowed for alternative livelihood generation.
- Achieving Sustainable Development Goals through Multi-Stakeholder Collaboration- The ultimate bar of achievement for any country is to successfully attain targets in the designated 17 Sustainable Development Goals. Through an integrative, inter-sectional and multi-sectoral approach, the IBDLP Programme has demonstrated its success in achieving SDGs in a developing country.
- Benefit Sharing Opportunities- The Convention on Biological Diversity envisages an equitable form of benefit sharing that is mutually satisficatory for all participants. Benefit sharing opportunities shall serve to incentivize trans-boundary water sharing and build cooperation amongst different Sates, Countries and Regions for effective water management, use and conservation (IUCN [2018](#)).
- Cross-Cutting Environment Policy- The Water-Food-Energy nexus is closely linked to sustainable development goals and access to health, education and livelihood opportunities. These sectors are not conflicting, rather, are complementary. Environment policies should be devised in a manner that strengthen local institutions and mechanisms for water harvesting, energy generation, food cultivation and land-biomass balance.
- Land Restoration- Degraded land in the form of those tracts of land subject to *jhum* cultivation (slash and burn agriculture) and quarried lands should be restored. Afforestation of diminishing forest covers should be conducted in association with National Forest Conservation and Afforestation Schemes.
- Forest Areas' Inclusive and Participatory Use- Utilization of common resources like forests, forest land and natural resources occuring on or under them should be devised after an inclusive and participatory approach that is culturally appropriate and cognizant of local, traditional and cultural needs of indigenous populations.



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