ISSUES IN NORTH-EASTERN INDIA

1. OVERVIEW

The North-east India, comprising of eight states, is blessed with abundant potential and opportunities. The region is populated by a number of different communities, with diverse cultures, languages and customs. It is also marked by difficult terrain, backward areas and limited connectivity. It comprises an area of 262, 230 km² which is nearly 9.12% of the total area of the country with more than 46 million population. Almost 8% of that north-east India is a bridge to Southeast Asia and a bridge had between India and the vibrant economies of Southeast Asia, including southern China.

The region is connected to mainland India only through a narrow stretch of land (about 22 km wide) in West Bengal called the *Siliguri Corridor* sometimes known as **Chickens Neck**. Apart from this the whole area is bounded by international borders. For e.g., Mizoram has only two national highways connecting to Assam and one NH running into Tripura. The NH connecting to Assam is the lifeline of Mizoram and in case of any disruption, connectivity with the rest of the country is essentially cut off.

The Department of Development of North Eastern Region(**DoNER**) was established in 2001 and became a ministry under the Government of India in 2004. It functions as a nodal department of the Central Government to deal with social-economic development matters of North-East India. It handled a Non-Lapsable Central Pool of Resources(NLCPR) Scheme followed by North East Special Infrastructure Development Scheme(NESIDS).

The North Eastern Council is a statutory regional planning body for Northeast India constituted under the North-Eastern Council Act 1971. All the Governors and the Chief Ministers of the eight states in the north-east and its members. The Union Home Minister is the Chairman and the DoNER Minister acts as a Vice-Chairman

2. CULTURAL LINKS (CLOSER TO INDIA THAN OTHER SOUTH EAST ASIAN NATIONS)

There are many evidences to show that the entire north-eastern India was assimilated in the immense body of mother India from 10th to 8 century BC, when Vedas were compiled, till 21st century.

Culture: Those, whom the recent western and westernised intellectuals termed as Mongoloids, were known as Kiratas since then. Yajurveda and Atharva Veda both mention Kiratas. Mahabharat describes Shiva and Uma disguising as Kirata couple to test Arjun's penance. Bhima during his all conquering tours of the East met Kiratas in Videha country. In Sabha Parva, sunrise mountain, Lohitya river and hills surrounding Pragjyotisha are mentioned. In Ramayana (Kishkindhakanda) Kiratas are mentioned: 'They are rich in gold, Gems, an expert in clothes making and they tie their hair and pointed knots'. In the book '*Social history of Kamrupa*', They have been described to have simple life, eating fruits and herbs, dressed in skins, doing top hair knots, pleasant looking but terrible with their weapons, yellow in complexion, adept in the art of weaving, etc. Vishnu Puran mention Kiratas in the north-east part of India. Greeks in the 1st century AD had heard about Kiratas. Trade to China was filtered through Kiratas.

Temples/Worshipping: A school of tantra is attributed to Minanatha and belongs to Kamrupa. By the 10th ready China was possessing 100 Tantra texts. Sammha tantra speaks of the tantrik culture of Kiratas, Bhotas, Cinas and Mahacinas. It got a concrete expression through the efforts of the then Indian rulers who took pride in calling themselves '*Dharam Rakshak'.* King Bhaskarvarman, a.k.a. Thagi Raja is one of the most notable examples. He was imprisoned by British rulers and there he got inspired to be a sanyasi to raise against the Britishers.

- During this age of creation, many temples were constructed all over Assam and the rest of the area, ruins of which are still surviving and places like *Malinithan*. It has beautiful images of Parvathy, Indra and Nandi.
- At the Tamreshwari near Sunpura, three inscriptions are available which are Shaiva, Shakta and Vaishnava.
- Kalika purana mentions Vishnu Pitha in this area.
- An altar of worship called Bura Buri is found and is considered as an altar to Mahadev or Adi Buddha.
- Brahmakunda and Parshuramkunda are places of pilgrimage in Lohit and Shivalik sites discovered in Paya in Lohit district.

Sages and Bhakti Movement

- Assam witnessed a great sage, Sankardeva (1449 to 1669AD), a Vaishnav bhakt who used common language to express abstract truths. He introduced many concepts like Namghar, kirtan, drama, translation of Bhagvat, etc.
- He was followed by Madhav Deva, Vamsi Gopal Deva, Anirudh Deva, Purushottam Thakur, etc. Some of them adopted Buddhist Tantrik practices. Gopal Dev came to Acamadesh (Assam) from Kalita (on the north east of Acamadesh).
- Some experts believe that Kalitas where Aryan or Buddhist settlers who were kshatriyas and were having a colony of Vaishnavite's in Northeast. Khunbao a leader of Noctes of Tirap district in Arunachal Pradesh became a disciple of Ram Ata of Bali Satra and is well known as Sant Narottam.
- Buddhism occupies an important place and this bhakti tale. In Arunachal Pradesh, Monpa and Sherdukpen in Tawang follow Mahayana Buddhism and Khampti, Sighpo in Dibang Mystic follow Hinayana Buddhism. Buddhist, Shaivartes, Shaktas and Tantrika with Natha's are inseparable as Mina natha is said to be the same as Lui Pa, who is, in turn, the same as Avalokiteshwara.
- The prayers of Buddhist tribes of Arunachal is repeated all over the himalayan borders, ' *Om Mani Padme Hum*': Hail the jewel in the Lotus.The mantra is written in Assamese script which is close to Devanagari and not in Chinese script.
- It is interesting to note that as per the Adi lore, the world was created from the word *'Keyum'.*Most probably, the grand Lama (the jewel in the Lotus) is the sage Padmasambhava. He is considered as an originator of the systems of worshipping which is followed by many even now from Ladakh to Lhasa.
- There is similarity even in nearby areas in the names of gods and goddesses.
    - In 640 AD Prince Gompa ran over upper Burma and western China. He later converted to Buddhism and sent for Buddhist priests from India and got them to reduce Tibetan language in writing in Indian script and that is still the script of Tibet.
    - The names of gods and goddesses are in Sanskrit: Manjushree, Avalokita, Vajrapala, etc. The name Dorji means virtue or thunder Bolt and is one of the most common names.
    - An image of Kaali is seen in many caves in Tibet, called Lahmo in some places. Most of the prayer flags are having a picture of a goddess on a lion: Vyaghreshwari, Seal of Tashi Lama bears the inscription 'Mangalam'.
    - The mother Goddess is called Tara or Dolma

3. AGRICULTURE AND SUSTAINABLE DEVELOPMENT

Overview

- Almost 35% area in the region is plain except Assam (84.44%). Net sown area is highest in Assam (34.12%), followed by Tripura (23.48%) and lowest in Arunachal Pradesh.
- Cropping intensity is highest in Tripura, followed by Manipur, Mizoram and Assam.
- Out of the 4 million ha net sown area of the region, roughly 1.3 million ha suffers from serious soil erosion problem. The region almost 10% of countries total precipitationannually.
- The soil is acidic to strongly acidic, however rich in organic matter.
- Farming is predominantly rice based with little exception in the state of Sikkim where Maize is dominating crop. Mixed farming system is mostly used as farmers practice subsistence farming. The system is dependent on horticulture and animal husbandry too, partly due to preference for non-vegetarian foods.

In the absence of major industries except in the state of Assam, the society is agrarian and friends on agriculture and allied sector for livelihood and other support.

Issues

- Topography : The area is extremely diverse: uneven land, high and variable rainfall pattern and ethnicity. Further expansion of cultivable land is constrained by geophysical limitation. The percentage of the cultivated area is around a tenth of the total geographical area in 5 out of 7 states.
- Farming Practice : The system is characterised by low cropping intensity (114%) subsistence level and mono-cropping. Rice dominates agriculture, but the productivity is low and production risky. States like Mizoram still practice the ecologically unsustainable shifting cultivation, also called '*Jhumming*' or '*slash and burn*' farming.
- Small Land-holding : Farmers are small and marginal. Against the proportion of 59% at all India level, the same varies from 65% in Arunachal Pradesh to 84% in Manipur and Nagaland.
- Land use pattern is faulty -
    - Annual loss of topsoil(46 tonnes per hectare) is almost three times larger than the all India average(16 tonnes per hectare).
    - Fertiliser consumption in the region is also very low.
    - Due to lack of proper water harvesting measures only 0.88 mhm out of 42.5 mhm water is used. There is no reliable assessment of the total irrigated area. Different sources however indicate that around 20.74% area is related.
- The diversification of agriculture with animal husbandry is common but has not made any significant contribution. This is because largely the cattle population is of indigenous breed, the proportion of crossbred bread cattle to total cattle population is higher than the national average only in Sikkim, Mizoram and Nagaland. The region is deficient in total food-grain production and even the per capita availability of milk, meat, eggs and fish per annum is less than the national average.
- Due to complete dependence on agriculture, the vulnerability to natural calamities such as floods, submergence as well as droughts, poverty is rampant.

Measures Needed

1.Self-Sufficiency in Rice & Food-grains Production:

- Increasing seed replacement rate
- Enhancing varietal replacement rate

- Increase in cropping intensity through assured irrigation
- Expansion of effective irrigation facilities
- Adoption of more intensive cultivation practises (SRI/ICM/Line Planning, etc.)
- Maintaining soil health and providing judicious soil nutrients.
- Re-visiting the extension mechanism
- Facilitation of credit, finance and crop insurance
- Farm mechanisation
- Marketing and creation of rural storage infrastructure.

2.Policy-level Initiatives:

- Organised Farming : The NER is the symbol of a typical rain fed production system, which adversely affects the regional economy.
    - On account of the geophysical limitation hindering expansion of cultivable area in many states, the vertical intensification of farming system is relevant. In the rice dominated areas, improve the **rice plus strategy** (rather than rice alone), is suggested. The flood escaping production system is required in flood Prone areas, where **Boro** rice is a promising crop enterprise.
    - Organised cultivation of crops like kiwi, passionfruit, off-season vegetables, anthurium, cut flowers, patchouly, Geranium, etc. has started in recent years. These high-value crops, numerous aromatic and medicinal plants can be practised with low-cost and resource conserving practises such as zero-tillage, System of Rice Intensification, etc. to meet the growing domestic as well as international demand.
    - In areas where crop production is restricted by smaller size of cultivable area, another strategy like ***agricultural plus*** is required. Here, crop production should exist with livestock, plantation, floriculture, medicinal crops and sericulture systems suited to the hilly terrains. The shifting cultivation which has been an age-old method of cultivation in such areas, requires an innovative and improvised strategy to improve productivity.
    - The **Sub Mission on Seeds and Planting material (SMSP)** aims to ensure production of high yielding seeds of crops. Under the National Food Security Mission-three born oil seeds (NFSM-TVO) olive plantation has been increased.
- Organic Farming : Market for organic product may be explored. The **Mission Organic Value Chain Development (MOPCD-NER)** has been implemented since 2017 to promote organic farming. It has initiated the formation of farmer producer organisations (FPOs) and farmer producer companies (FPCs). It aims to replace traditional subsistence farming with market oriented farming, following cluster approach for high-value crops such as turmeric, chilli, ginger and tea.
- Agro-processing, packaging and exploring of newer marketing avenues can provide advantages of high potential cross-border trade with surrounding countries also thereby adding value and reducing post-harvest losses.
- Capacity Building: of rural institutions through wide-scale knowledge initiatives, contract farming, reviving the village institutions such as Field Management Committees and traditional village panchayats/councils is important. This is relevant as the financial institutions such as NABARD, NEDFI, SIDBI,IDBI, etc, may use community-based institutional collaterals for effective credit delivery.

- R&D and Database Preparation: Continuous RND which will need investment also and preparing a regional database should be taken on priority with the help of electronic revolution.

4. INFRASTRUCTURE DEVELOPMENT

The latest initiative is a North East Special Infrastructure Development Scheme (NESIDS) entirely funded by the central government for infrastructure projects like water supply power and connectivity (building roads and highways, expansion of air connectivity and railway networks, the opening of trade routes as well as creation of infrastructural conditions for border trade as emphasised by the Act East policy).

Connectivity – Physical Infrastructure

- One of the two single biggest fast-moving projects is the 1500 km long Trans-Arunachal Highway from Sessa, north of Tezpur to Naharkatiya near Nagaland through Arunachal Pradesh under the Special Accelerated Road Development Programme in North-East (SARDP-NE). The other one is the Jirbam-Imphal railway line opening up Manipur to the railway network of India.
- Works are underway to extend the Bairabi railway in Mizoram line up to **Sairang**, situated around 20 km from Aizawl.
- Moreover, no less than five major bridges over the Brahmaputra, along with worlds longest bridge at Dhubri-Phulbari are at various stages of construction.
- Under the BBIN initiative, a sub-regional Motor Vehicle Agreement allows buses and later private vehicles with a Bhutan, Bangladesh, India and Nepal (BBIN) permit to travel unobstructed through the borders across these countries.
- The **Kaladan Multimodal Transit Transport Project (KMMTTP**) is a massive connectivity project being undertaken by the GoI to connect HALDIA in West Bengal to Sittwe port in Myanmar which will then enter India through the southern part of Mizoram. The KMMTTP is expected to provide a valuable alternate source of connectivity to the chicken's neck. While work on the Indian side is almost complete, the political turmoil in Myanmar has not helped the project completion on the other side.

Social Infrastructure

- Nine cities from across the north-east region are declared as 'Smart City' is – Agartala, Guwahati, Imphal, Kohima, Namchi, Gangtok, Pasighat, Itanagar and Aizawl.
- Social and Infrastructure Development Fund (SIDF) was created to upscale the infrastructure in NER. The fund is provided to benefit Arunachal Pradesh and other border areas facing special problems.

Suggestions

- A Northeast Regional Project Implementing Authority can be set up which will handle not only the funding of the projects but also put together a team for hands on monitoring of each project, coordinating with the state governments and all other relevant agencies.
- 'Make in the North-East' – the north-east trade with Southeast Asia needs further development. Raw material forms a major part of trade with Myanmar and Bangladesh. Meghalaya, for example, exports stone boulders, limestone and horticulture products to Bangladesh. They are processed and re-imported to India as stone chips and cement. There still exist scope for value addition and cross-border collaboration.
- The area has largely been insurgency free recently. Sooner or later the last remaining accord-the Naga Accord will be signed. On February 18, 2021 the Nagaland Legislative Assembly adopted a four-point resolution on decades old Naga political struggle with the house resolving to work unitedly in facilitating ongoing negotiations for a final solution between the Centre and other political groups. The Union Government has been holding two separate parleys with the Naga negotiators NSCN (IM)

since 1997 and Naga national political groups (NPGs) comprising of seven groups in 2017. To harness full potential of this area significant investments will be required in upgrading the regions infrastructure, education and skill development.

FACT TO KNOW The textiles and crafts of Northeast are made with deep understanding of earth and a sustainably reproduced. Eri is a type of silk woven in Assam. The weaving of this textile is slow but a rich process with incredible thermal properties. Eri silk also has medicinal properties. It is extracted without killing the worms and hence the name "Ahimsa silk" is associated with it. It is used for weaving the shawl worn by monks.

5. HUMAN RESOURCE MANAGEMENT: OPPORTUNITIES AND CHALLENGES

Due to lack of knowledge of opportunities and support from the communities in the region, they decide to join the labour forces in other states. Lack of skill development and capacity building reduces opportunities in different sectors. As per the survey conducted by National Sample Statistics (NSS) data 68th round, 2011-12 titled Formal Skill Acquisition of Population in the Age Group 15-29 years across the States of India, a mere 0.4% of the youth population against 3.9% of the whole of India has acquired formal skills in the north-eastern region. As per the Youth development index report 2017, self-employment remains the most preferred segment of youth employment in India, among which the figures of north-eastern states are higher than national average.

Suggestions

- Skill-Development:
  - Developing short-term skill improvement training courses on technical and other jobs like electricians, plumbers, home interiors, dress designers, etc.
  - Development of skills related to small scale industrial production like biodegradable plates and glass from natural fibres found in the region.
  - The North-Eastern Development Finance Corporation Opportunity Scheme for Small Enterprises (NoSSE) was specially formed to help first-generation entrepreneurs.
- Animal husbandry:
  - Dairy farms and processing units can be developed and the local youth can be entrusted for milk procurement and selling the products.Northeast still has the lowest contribution of milk production in all the states despite India being the largest milk reduces in the world.
  - Meat is in high demand in the NER. Approximately, 28% of the total pig population of India is found here. Youths have already started to engage themselves in the piggery venture, specially those from Assam, Nagaland and Meghalaya.
- Fish-Farming: Some traditional fish growers have already become entrepreneurs in fish farming. The abundant water bodies in the region and its various indigenous methods of fish farming like - *rice field capture fishery systems, wild aquatic cropping systems, Mountain valley rice fish farming system, and running water Terrace rice fish farming systems*, is enough for helping the youths in the region to become self-sufficient.
- Industrialisation: as per the demand of the socio-demographics structure of the region: starting from its environmental aspects like climatic condition to people's culture and custom is needed. For example, the industry of citrus fruits which are abundant in Assam and other north-eastern states can be developed. Due to indigenous textile culture , this is another important area which has generated

employment to both skilled and unskilled labourers. The next logical step is to find markets outside the state for the unique traditional handicrafts and the colourful textiles.

- Tourism – Historical and Natural: Various kinds of tourist industries like cultural, religious and adventurous can be built up in the region by the youth themselves. This will also create small economic activities like establishing take-away food stalls with biodegradable packages near innumerable picnic spots, making multi-lingual tourist guides out of the local youths through training and courses,etc. which will further boost the tourism industry. The process can start with simple steps such as: creating a north-east platform for coordinated action, developing destinations, creating tourism zones, involving local people and the private sector. Health resorts and Villa centres are also viable options. However, for tourism to really take off, the Inner Line Permit (ILP) system which restricts the entry of non-tribals into states like Mizoram, it might be an inconvenience.
- Political Representation: There is an under representation of youth in politics to the proportion of youths in Parliament was only around 12% in 2019.
- Agro-based Industries: The youths can also indulge themselves in various Agro-based and processing enterprises for the packaging of fresh farm products like vegetables and fruits, pickles, jams and jellies, bamboo-cane-jute products, aromatic and medicinal plants, and high-end products like strawberries, horticulture and floriculture.

Example

The wild water hyacinth stocks grow abundantly in these wetlands and have often been considered a nuisance for a long time. These stocks have ,ironically, been used by other countries for various purposes. An NGO from Assam, started to train disadvantaged youth and women to source out a variety of products from hyacinths . The hay-coloured dehydrated stocks are sturdy and strong to be woven into virtually anything. They can even be used in handlooms. Hundreds of low-caste rural women were trained in Kamrup district in the art of making bags, office folders and files from water hyacinth and took the project to Majuli, the only river island district in India. In Majuli, the youth artisans now sell their products to foreign tourists and at local fairs by using freely available hyacinth stocks and are improving the livelihoods.

NagaEd is an education technology start-up from Nagaland that was selected to join the incubation programme in Mumbai and was founded during Covid induced schools shut down.

'***Wander Nagaland***' is the first tribal social enterprise in Nagaland which is creating livelihood opportunities through tourism.

6. EDUCATIONAL POLICY INTERVENTIONS FOR THE REGION

Issues

- Minimal industrialisation and lack of jobs in the region.
- Largely dependent on permanent government jobs which are now minuscule compared to a large number of 'educated' persons.
- The education systems, specially at the college and university level, still focus around traditional subject areas granting degrees in specific domains with virtually no connection to the industry, national or global.
- There is also a practical necessity to think about a large number of average students who will need some life skills or value added training during this formative years to get employment in a very competitive market.

Recommendations

Our education systems need a rethinking whereby our governments, institutions, administrators and faculty should focus on restructuring of courses and programmes to incorporate three major elements- *globalisation*, *leadership* and *integration*.

- **Globalisation**

  The World Development Report 2019 next three major recommendations that will feed into our globalisation strategy for education.

  - First, there is a need to focus on new skills in demand, invest in rural areas and include high-order cognitive and socio- behavioural component in our programmes.
  - Developers of graduate and post graduate programmes in the region should come together state-wise or even at the regional level, form inter–disciplinary groups and explore how courses, workshops and training components can be added to the mainstream curriculum to globalise them.
  - Globalising means to incorporate a set of understanding and training that leads students to understand the larger economic contacts of the country, demands of the market trends of the global economy.

- **Leadership** :
  - Our academy programmes traditionally concentrate on knowledge content, text and theories to build a solid foundation in a subject. While this is a noble approach, an orientation is necessary to include leadership skills whereby graduates are trained to develop a problem-solving approach, inter-cultural understanding to work with a diverse set of peers, and a sense of responsibility for their actions and influence on others.
  - These qualities cannot be acquired In a day or just before a job interview. Specific courses should be introduced with motivation sessions means training across the programs, and faculty matters should be assigned to guide them.
  - The universities and colleges need to launch leadership development as a core component of all courses.

- **Integration of Knowledge Domains** :
  - North-eastern region is on the periphery and away from mainland India. Its distinct and diverse set of cultures often add to the isolation in our learners' mental process and world-views. Only a few are fortunate enough to study in other parts of India or abroad. For those left behind, our education programmes must offer training on acquiring a holistic approach to analyse any given issue from multiple perspectives including other knowledge domains. For example, students of political science should be able to join courses from computer science to look into social media politics. It will enhance the core learning in political theories and deal with implications of technology in politics. With a combination of statistics courses, the same graduates may be able to gain entry into the world of election result forecasting.
  - The educators and planners, institutions top management, and relevant government bodies need to come out of the watertight subject boxes and join hands to offer more interdisciplinary courses. This will also emphasise an individuals autonomy to grow in a specific direction of inherent interest, usually called passion or achieving one's dream in life.

- **Leveraging the Locational Advantage** : Though the look East or act East policies of the government are earmarked as a national agenda, our educational programmes in the region hardly kept this on the curriculum development agenda barring a few specific departments or subjects. An average

educated youth in the region hardly has any clue about how he or she can utilise his knowledge and focus on entrepreneurship, professional career or even the job markets in the Far East, specially with increased linkages with ASEAN countries. If our campuses in the region can attract more interactions, exchanges and joint programmes with universities in ASEAN countries, students can be exposed to look for more opportunities. It is high time that the educational programs and institutions start building these academic bridges.

SPECIAL ARTICLES

7. NECTAR - Strengthening S&T in the NE Region

- NECTAR was formed in year 2012, with the merger of rest while National Mission on Bamboo Applications (NMBA) and Mission on Geospatial Applications (MGA). It is headquartered at Shillong, Meghalaya.

NECTAR - Northeast Centre for Technology Application And Reach, an autonomous organisation, set up under Department of Science & Technology, Government of India is a one-stop shop for technological support to the North-East people. NECTAR is providing technological applications and scientific support to the farmers, entrepreneurs, or any organisation associated with rural corporation, construction, or any other industry in Northeast, where technological intervention and technical support are needed.

- The areas in which NECTAR has played flagship roles include Agro and food processing, renewable energy source, bamboo applications like construction and structural applications, composites and wood substitutes, bamboo for energy, bamboo in industrial products, bamboo planting material, skill development and employment generation.
- NECTAR's unique work is to act as a solution designer and partnership institution that helps in focusing on technology-based solutions for problems of the NE in consultation with state governments and other related bodies. It adopts applications of relevant proven technologies, preferably available in central and state government laboratories, institutions, and start-ups in the essential areas.
- NECTAR is also working for the applications to internal security, watershed analysis, development of fixed wing micro unveiled aerial vehicles, mapping of tsunami vulnerable areas, and Brahmaputra river embankment mapping and erosion study.

Bamboo-"Poor Man's Timber"

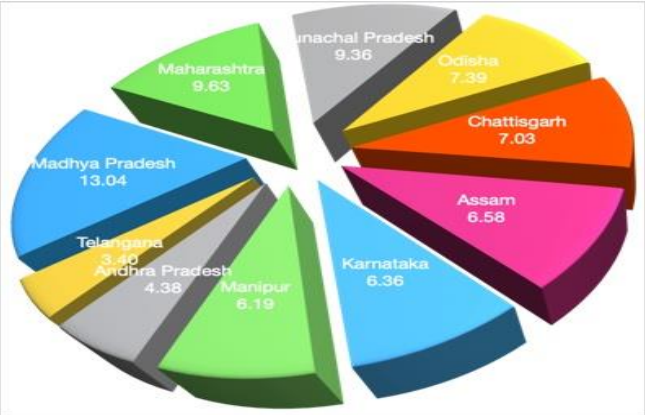
Properties

- Bamboo can survive and thrive in a range of climatic conditions.
- Used in both agricultural and industrial sectors, it's adaptability, resilience, cost-effectiveness and easy handling makes it an ideal material for resource-efficient livelihoods.
- Its soft shoots are used as a delicacy in some regions, while many use bamboo for construction and for of deluxe and houses.
- Bamboo can be used to create handicraft such as mats, furniture and baskets, toys, decorative items and even tools and implements.

Availability

India is an important country in the international bamboo export. Bamboo is grown on over 14 million ha across the country-major in Madhya Pradesh and the north-eastern states. The North Eastern

region alone comprises 60% of India's bamboo reserves, and is home to about 125 indigenous and 11 exotic species of bamboo. The State distribution as per Forest Survey of India Report 2019 is depicted in the adjacent chart.



Issues: Bamboo industry has been held back due to a variety of issues and its value chains, including regulatory and legislative barriers to cultivation and harvesting of bamboo, lack of technical know-how among the primary users of bamboo, lack of market linkages and insufficient market demand.

Impact of NECTAR on Bamboo-Industry

- Value-Addition: Traditionally, bamboo was largely used in paper making industry or for handicrafts.With NECTAR the value addition in the bamboo sector has increased to as high as 70%. To ensure ready availability of raw-material at a reasonable price, NECTAR financially encouraged various tribal groups to make bamboo mat and linked them with manufacturing units supported by the National Mission on Bamboo Application.This eliminated middlemen's commission and assured best rates for the actual mat weavers with quality supply to the units.
- Product Diversification and Green-material Approach:
  - NECTAR has diversified the bamboo products, processes, and equipment configurations and process technologies, establishing market presence and markets have acceptability for such products, specially roofing, cladding and flooring, and also developed waste realisation options.
  - Many GREEN technologies have been developed and commercialised as
    - ✓ wood substitutes, conversion of closed plywood units to bamboo ply, composites of jute and plastics,
    - ✓ bamboo-based classification for clean and renewable power generation using bamboo-based Gasifiers and thermal applications,
    - ✓ bamboo-based hybrid charcoal making to utilise waste and meet rural fuel requirements,
    - ✓ edible bamboo shoot processing for low-fat high-fibre diet requirement, bamboo pulp-based hygiene products for rural areas,
    - ✓ development of machinery according to available bamboo species, development of fire retardant,
    - ✓ earthquake resistant and easy to install pre-fabricated as well as permanent bamboo structures for rural and urban housing, schools, hospitals and disaster mitigation for plain and high-altitude areas.
    - ✓ identification of industrial applications like bamboo processing 'waste' for high-grade charcoal and activated carbon which is being used as deodorant, disinfectant, medicine, agricultural chemical, and absorbent of pollution and excessive moisture.
  - In the Agro and food processing sector, the Centre has supported setting up of bamboo shoot and pineapple processing units and King chilli pickle making units.

- Expansion of beekeeping activities in an year and spice processing facilities are other areas of support at the Centre provides.
- Honey testing laboratory, drink made from fermenter rice water, non-carcinogenic smokers for meat, etc. are also being supported.
- For business development of NE-based value added products like turmeric, black pepper, chilli, bay leaves and, and honey, NECTAR has created linkages between farmers and metropolitan markets.

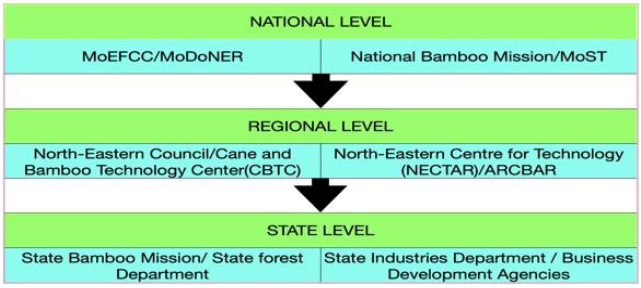
  - NECTAR is working on bamboo-based construction and structural applications with a green material approach.Under this effort, projects related to structural engineering and development of bamboo composite's by utilising the natural higher tensile strength of a way to strength ratio of the material. As a result, lightweight, durable and aesthetic constructions for a variety of applications have been recommended. Various relief and rehabilitation projects using bamboo composite material and prefabricated housing units have been initiated.

    One of the examples is eco-sensitive engineered composite material-based construction viz. doors and windows made of bamboo boards in Andaman and Nicobar Islands.

    - Another example is construction of nearly 55,000 ft.^{2} area with prefabricated housing structure as a shelter in the cloud-burst disaster-affected places in Leh and surrounding areas.
    - Bamboo prefabricated structures under the "Sarva Shiksha Abhiyan" in Manipur was initiated for setting up kitchen-come-store under the mid-day meal scheme.
  - NECTAR has developed maturity marking for identifying the age of bamboo culm (shoot of the bamboo plant). NECTAR has developed a flute technology known as culm cutting or stem setting technique which enables fast regeneration of bamboo.

- Marketing : NECTAR has created linkages with the raw material (bamboo mat) and connected NER with the markets of major metro city's of India. NECTAR also introduced selling of bamboo products through e-marketing portals to benefit its supported units and local people of Northeast, by bridging the gap between the producer groups and consumers.
- Human Resource Development through Skill-Based Training:
  - Nearly 30 million man-days per annum have been generated by NECTAR through various activities specially construction and mat-making.
  - Cost-effective raw-material, skill development training, induction and primary processing machine research supported for manufacturing bamboo sticks at villages and community locations.
  - Skill upgradation trainings are also provided in the areas of cleaning, use of natural dyes, processing of bamboo shoots, agarbatti stick rolling and incensing.
- **Central Schemes of Technology Solutions for Employment Generation:**
  - **TOSS-Technology Outreach and Service Scheme :** It is an umbrella scheme of NECTAR to establish linkages with individuals and institutions to deliver technology solutions to North Eastern region. This also creates opportunities for people to better their lives by value addition and sales of products and services that can be organised and made using the local natural and human resources.
  - **BAANS - Bamboo Applications And Support Scheme** : It undertakes support measures under PPP mode in various areas of bamboo applications to generate employment, create sustainable livelihoods and incomes, specially among the poor and disadvantaged groups, including women.

It also supports and promotes community groups, SHGs and decentralised associations of people to undertake economic activities in bamboo products and value-added processing, and in adopting measures for expansion and consolidation of bamboo technologies.



- NECTAR is also providing real-time industrial exposure to NE students in remote sensing and GIS applications technology for crop analysis based on satellite image data. The same was done through a technology outreach programme by conducting a scientific study damage analysis of potato crop due to unseasonal rainfall under Pradhan Mantri Fasal Bima Yojana (PMFBY).

- On September 2020, Ministry of Agriculture and Farmers Welfare inaugurated through virtual mode 22 bamboo clusters in nine states-namely Gujarat, Madhya Pradesh, Maharashtra, Odisha, Assam, Nagaland, Tripura, Uttarakhand and Karnataka.
- The Cane and Bamboo Technology Centre (CBTC) has designed a project for the sustainable development of bamboo industries to create a livelihood.
- Ministry of Tribal Affairs initiated the "4P 1000 Initiative: The tribal perspective through Bamboonomics" at COP 14 UNCCD 2019.

- **3-D Digital Mapping:** NECTAR has conducted neighbourhood mapping and GIS analysis how different categories of schools using 3D digital terrain model. The same models can be used for both operation room and field for planning counter-insurgency operations and launching field operations by the state police and paramilitary forces.
- **Fixed Wing Fixed Wing Micro Unmanned Aerial Vehicles:** UAV developed by NECTAR is a self-guided plane that can carry different type of consumer sensors and capture geo-tagged photographs with inbuilt GPS. It is a radio controlled model glider plane equipped with a small GPS, a miniature autopilot and consumer great digital camera. The 500 km^2 tsunami vulnerable area was photographed and mapped using NECTAR's Micro-UAV. By using 3D design model, the extent of flooding, type of buildings and structures, quantum of population likely to be affected at various level of tsunami waves can be visualised. It has also been used to take photographs over the river embankments of Brahmaputra to demonstrate the visualisation of flood related disaster and its mitigation.

Demand Drivers Under Bamboo Industry In India

- Population income growth, increase in exports and favourable demographics.
- Genetically modified seeds, favourable climate for agriculture and wide variety of crops, mechanised irrigation facilities and green revolution in eastern India.
- Strong demographic dividend and expensive labour force available in India
- Growing institutional credit, increasing MSP, introduction of new schemes like Paramparagat Krishi Vikas Yojana, Pradhan Mantri Krishi, Sinchai Yojana and Sansad Adarsh Gram Yojana and opening exports of wheat and rice.

- Initiatives like a Kisan Rath (mobile app for farmers, FPO's and traders), 200+ Kisan rails and Krishi Udaan Scheme for produce transportation, and perishable cargo centres, cold storage facilities at airports and inland container depot as well as Babu terminals and warehouses ■

8. CLIMATE CHANGE & WASTE MANAGEMENT

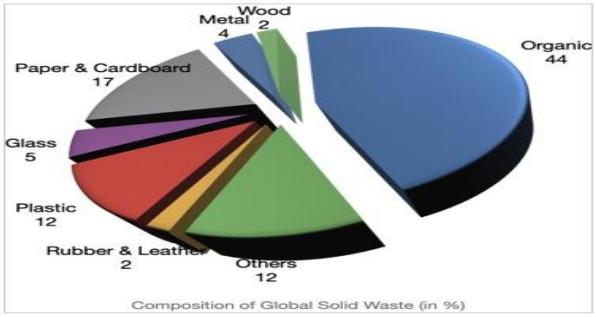
With high pace urbanisation, solid waste is a ferociously growing concern specially for the developing countries like India. Amount and complexity of waste is going rapidly but they equivalent demands of technology and resources are still inadequate. Waste and climate change are closely interrelated but, however, less recognised in the domains of climate change mitigation, adaptation and disastrous production. (Elucidate...)

Overview

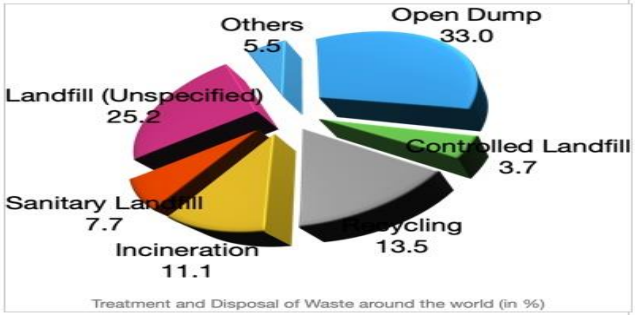
Globally, around 2 billion tonnes of municipal waste is generated annually, more than one-third of which has only contributed by income countries. Waste generation the person varies between 0.11 and 4.54 Kg. India with a global population share of 18.05% contributes 11.95% to the global waste generation.

The solid waste generated by various human activities is a major contributor to climate change, and simultaneously getting affected by it as well. In a wide variety of wastes viz., municipal solid waste, commercial and industrial waste, construction and demolition waste, agricultural waste, biomedical waste, electronic waste and hazardous waste, all these generate greenhouse gases (GHGs) during various stages of their life cycle.

- Waste Collection and Waste Incineration:
  - Energy consumption in transportation and furnace leads to emission of CO_2.
  - Anaerobic composition of organic waste in landfills is responsible for the emission of methane with Global Warming Potential(GWP) of 72.
  - Composting and biological treatment of waste emits nitrous oxide (N_2O) gas which has a long life time above100 years and GWP of 289.
  - An extremely short lived component called black carbon (BC) with a very high GWP 3200 is omitted from uncontrolled and open waste burning.
- Dumping and Land-filling: 70% waste globally lands up in open dumps and landfills which renders huge land services useless, decreases green cover, hence, reducing the natural carbon sinks. This also leads to leaching of highly poisonous sludge into soil, polluting groundwater.The toxicity of hazardous waste and the landslide incidences of waste dumps also pose life threats special to poor and privileged people working/living around such sites.



Composition of Global Solid Waste (in %)



Treatment and Disposal of Waste around the world (in %)

The production and global handling of waste disposal is depicted as shown in the trial charts below.

GWP is the amount of heat that is absorbed by a GHE, expressed in relation to that absorbed by the same mass of CO_2.

Effect Of Climate Change On Solid Waste Management

Changes in Precipitation Patterns:

- Increased average global surface temperature may lead to hotter and drier summers and shorter winter and and in can increase duration and frequency of extreme weather events like drought, hurricanes and cyclones. There has been an increase in daily precipitation rate as well as the number of days. The average moisture content is generally higher during these times.
- This elevates the risk of flooding which creates voluminous quantities of waste converting resources including infrastructure and property into debris and litter and hinders the process of waste management.
- Waste management structures are protected by capping layers and bunds, which can be at higher risk of erosion and become unstable because of the heavy rainfall.
- The frequency and rate of waste decomposition is also severely affected by heavy rainfall.
- The flow concentration and volume of leachate is an also announced at the landfill sites.
- The clay substrate areas are at higher risk of collapsing and can have a huge impact on the adjoining infrastructure.
- Reduction in rainfall can cause droughts and it affects canal and riverine waste transportation system. The concentrations of organic waste are increased during these times and the restoration of landfill sites through screening, landscaping, etc. is also affected due to increased stress on vegetation.

Changes in Temperature Patterns:

- Frequent occurrences of very heightened atmospheric temperatures and heat waves fasten the rate of degradation and decomposition of waste for which the contemporary infrastructure of waste management is not enough.
- High temperatures can cause drying up of the compostable waste which enters the decomposition process as microbes fail to sustain.
- Worker safety and health is also at a great risk from the strong unpleasant odour, discomfort from extreme temperature and air pollution.
- Maintenance cost shoots up due to additional cost for cooling of machineries.

Increase in Sea Level and Storm Surges:

- Rising global temperatures have melted the snow covers and raised sea levels. This has increased risks of inundation, flooding, bund erosion and sea water intrusion of the dump sites and waste management sites in coastal areas leading to coastal water pollution.
- Increase sea-level also aggravates the impacts of storm surges, hurricanes, cyclones etc. which create huge debris and disaster wastes.

Effect Of Solid Waste On Climate Change

Municipal solid waste can be broadly classified into organic (biodegradable) and inorganic (non-biodegradable) waste. When organic waste is decomposed anaerobically it produces landfill gas (LFG), which is a mixture of 45-60% methane, 40-60% carbon dioxide and 2-9% other gases. GHGs can be emitted from municipal solid waste management either directly or indirectly. Direct omissions take place

when an anaerobic composition of organic waste takes place or when the biological treatment of waste (incineration/composting) is carried out. Indirect emissions are caused due to fuel consumption in vehicles used for waste collection and transportation.

There are three modes, viz., upstream, direct and downstream through which the base sector is contributing to GHG emissions. The upstream contributions are emerging from the energy input provided during manufacturing/distribution of the product, when the product is an operating mode it accounts for direct contributions and the downstream contributions are arising due to disposal of the product.

In less developed nations the rate of generation of waste is rising exponentially and so is the emission of GHGs.

Climate Change and Effluent Treatment Plants (ETPs)

Temperature: Various treatment processes are announced with warmer temperatures such as the conversion and removal of processes or the usage of anaerobic reactors. Whereas lower temperatures are favourable for stabilisation ponds, activated sludge process and aerobic biofilm reactors are temperature independent.

Rising Sea Level: The untreated water from a waste water facility might get released and damage the ecosystem in the event of a flood. In case there is a structural damage to waste water facility, then treated water might keep sleeping for a longer duration until the costly repairs are undertaken by the municipalities.

Storm Surges: Store and brings along the danger of flooding and causing infrastructural damage in coastal regions or flood prone regions. In the long run, increasing sea-level also poses a serious threat to ETPs in coastal areas. High intensity tropical storms have the potential to cause further damage to infrastructure like effluent pipes. Overwhelming flow in the pipes during storms can cause pollutants enter the system directly and contaminate supplies.

Precipitation : The retention time in treatment system might get affected by increase flow rate caused by the floods impacting the nitrogen removal process. This will lead to higher total nitrogen concentration in the output. Coliforms, Giardia and Cryptosporidium will be produced in high concentrations as a result of increased effluent issues from sewage water overflows.

In the areas with low rainfall the water quality will deteriorate because the lower flow rate will also decrease the capacity of systems to dilute pollutant concentrations.

There is a risk of fire discharge of poisonous gases emitted into atmosphere from the sewage treatment plants as well. The detail is shown in the Table below.

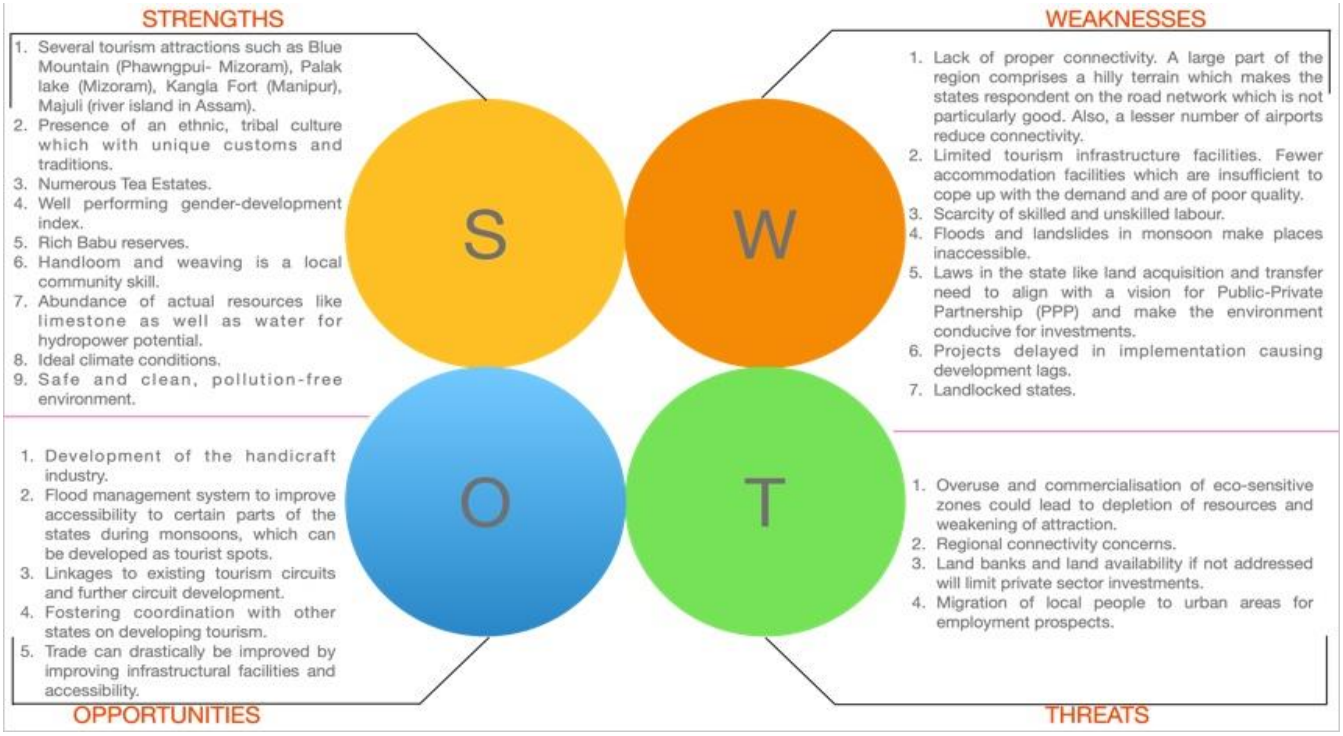
Gas Emitted from ETP	Reason
Methane (CH_4)	-Anaerobic decomposition of the organic matter present in sewers.
Nitrous Oxide (N_2O)	- Biological Nutrient Removal (BNR) Process - Nitrification Denitrification (NDN) Process
Carbon Dioxide (CO_2)	- During treatment process -Due to electricity consumption

Hydrogen Sulphide (H_2S)	-Anaerobic decomposition of organic matter -From the reduction of mineral sulphites and sulphates -Highly corrosive to mechanical and electrical equipment and sewer pipelines
Volatile Organic Compounds (VOCs)	-Occurs during turbulent flow near exchange between ambient atmosphere and waste-water. -Significant amounts are found in refinery and petrochemical waste-waters.

Integrated Solid Waste Management (ISWM) - Mitigation Strategy

ISWM is a comprehensive approach for reducing the quantity of waste reaching the landfill sites. It introduces a four R's principal viz. Refuse, Reduce, Reuse and Recycle, in order to lower the GHG emissions from the waste sector. The principal can be explained as: the things that are not necessary can be “refused”, the things that are required can be “reduced” to some extent, the things already in use can be “reused” and the things that cannot be reused can be “recycled”.National Action Plan for Climate Change (NAPCC) and Swatch Bharat Abhiyan will play a role in this mitigation strategy.

SWOT ANALYSIS of NORTH-EAST



MIZORAM – FACTS TO KNOW

Introduction

- Mizoram actually means land of the Mizo people. The word Mizo is an umbrella term for a number of tribes and clans, such as *Lusei* or *Lushai*, *Lai*, *Mara*, *Hamar*, *Paite*, etc.
- Prior to the British rule the different Mizo tribes lived under a number of sovereign chiefdoms.
- Under the British the area was called Lushai Hills and was annexed in 1895. After independence Lushai Hills (later Mizo district) became a district under Assam. In 1972 it became a union territory as Mizoram. In 1987 it became a full-fledged state.

Culture and Religion

- The tribes were primarily animistic and practised primitive farming, hunted wild animals and frequently fought with each other.
- The folk songs revolved around three major themes ' –love', 'hunting 'and 'warriors'.
- There were a few tribal dances such as *Cheraw*(bamboo dance), *Sarlamkai*, *Chheihlam*, *Khuallam,* etc.
- They observed three festivals called *Pawl Kut, Chapchar Kut* and *Mim Kut.*
- *There was no written script.* Britishers invented a script for the Mizo language.
- Around 87% of the population practises Christianity. Around 8% of the population is Buddhist, primarily from the Chakma tribe along the Indo-Bangladesh border. Mizos are from Mongolian race, mostly Christians and Schedule Tribes who follow a special code of ethics namely *Tlawmangaihna*, which always keeps them in a close-knit society.
- Mizoram has a classless society with a strong sense of community. Due to discipline of the residents, Aizawl has often been called a *'honk-free city'.* The presence of shops without shopkeepers along the highways shows the trust on which the society is built.

Mizo Insurgency 1966-1986

- In 1959, the Mizo Hills, which was then a district under the state of Assam, was hit by a famine locally known as '*Mautam*'. This was a phenomenon of bamboo flowering after every 48 years or so, followed by plagues of insects and rats, leading to agricultural famine.
- Due to negligence of both Union and State Government, the Mizo National Famine Front was formed, led by Laldenga. In 1961, it became a political party called the Mizo National Front (MNF), with Laldenga as its president. On the night of 28 February 1966, the MNS launched an armed uprising against the Union of India, followed by a declaration of independence on 1 March 1966.
- Suppressed by the Indian armed forces, the MNF retreated and continued its operations from East Pakistan and Burma, with support from China.
- After two decades of violence and atrocities the Mizoram Peace Accord was signed by MNF leader Laldenga, Union Home Secretary and Chief Secretary of Mizoram on 30 June 1986 within the framework of Indian Constitution. Subsequently, Mizoram became the 23rd state of union of India on 20 February 1987. The MNF won the election and Laldenga became the first chief minister of the state of Mizoram.

International Borders

- 318 km border with Bangladesh on western side guarded by BSF.

- 404 km border with Myanmar manned by the paramilitary force Assam Rifles.
- Due to cultural and ethnic affinity at the border, during normal times India agrees to a Free movement Regime (FMR) with Myanmar, allowing residents within 16 km on either side of the border to travel freely without visa restrictions for 72 hours.
- Sandwiched between Bangladesh and Myanmar, Mizoram can act as a '*land-bridge'* between the two countries and become India's '*gateway to south-east Asia*'.

Minorities and Backward Areas

- Under the sixth schedule to the Constitution of India, there are three autonomous District councils in Mizoram - the *Lai* ADC, *Mara* ADC and *Chakma* ADC (after the names of the majority tribes).
- (*Lai and Mara or ethnically related to the Mizo while Chakma is a distinct tribe in terms of culture, linguistics and religion*).

Agriculture

- Major crops - **oilseeds, sugarcane, potato, maize, paddy and pulses**.
- The Birds Eye Chilli from Mizoram has a geographical indication(GI) tag.